

# SCHOOL SOUND

SOUND ADVICE FOR TODAY'S SOUND OPERATORS

Spring 2005

## Attention Secretary, PLEASE ROUTE TO:

- Sound Operator
- Principal
- Athletic Director
- Drama Director
- Other \_\_\_\_\_
- Save for the  
Sound Operator Manual

A newsletter  
for anyone who  
wants to learn  
about sound!

## In This Issue

- 1 The ingredients for a sound system.
- 2 How to work with the layers of sound in a room.
- 3 The benefits of using a programmable equalizer for a variety of events.



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### New systems in your area --

El Paso High School, El Paso, IL

### Redesign of the Gymnasium sound system

When El Paso High School contacted Thompson Electronics Company they were on their 2<sup>nd</sup> gymnasium sound system in 4 years. The contractor the school previously worked with was unable to address the major sound system and acoustical problems. They were unhappy with the room acoustics and the sound system performance they were experiencing.

### Solutions

Trying to keep the system upgrade/revision within budget was a main concern for the designer of the project. To help keep costs down, a majority of the head end equipment was reused from the original system. The original system had good quality components, but they were implemented in an incorrect manner. TEC replaced and added equipment to work with the room acoustics and aid in music reproduction. An additional Digital Signal Processor and amplifier were added to allow separate channels for different tunings for each speaker array. Acoustical panels were used to help lower the reverberation time (Rt60) of the gymnasium. This reduction in Rt60 helps with the overall intelligibility. The end result is a well balanced and intelligible gymnasium sound system that outperforms the previous designs.

This newsletter is a free service courtesy of Thompson Electronics Company. We hope to provide you with useful information to assist you in your sound system needs.

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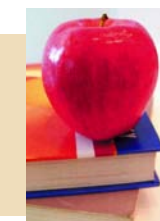
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Presented by



Taking Communications to a Higher Level  
Thompson Electronics Company



## Recipe for the Right Sound

**B**asically, a recipe is a list of ingredients and directions. We found a recipe that works for sound! But, it takes more than a good recipe to make a great meal or dessert. For the best results, you need the best ingredients and the best directions possible. You also have to understand the expectations of those who are going to taste the results of your effort. For example, a chef may like extra spicy food. But, when preparing food for others, the chef must take into consideration the guests for whom the food is prepared. The chef may need to vary the recipe slightly.

### THE INGREDIENTS

If a recipe calls for cream, it's not essential to use Alpine milk from hand-milked Bavarian cows. But, if you try to use skim milk instead of cream, you may jeopardize the final results. The same holds true for sound reinforcement. A microphone designed for hand-held vocals substituted for a lectern microphone simply isn't the ingredient for the recipe. It won't create the desired result.

Here is a list of ingredients for your sound system:

- Well-designed, properly installed main loudspeaker system
- Quality microphones for speech

- Quality-microphones for music vocals
- High quality microphones and direct boxes for musical instruments
- Low-noise main mixer with sufficient inputs and outputs, gain and headroom
- Quality equalizer(s) of the right type and configuration
- Well-built, well-maintained cables and sufficient spares
- Quality monitor loudspeakers and/or in-ear monitors
- Quality CD playback and recording devices, as well as a quality digital reverb unit
- Your mixing skills, which are the icing for the cake

### THE DIRECTIONS FOR A GREAT MIX

Let's start with the basics (eggs, flour, milk...):

It is vital to understand the acoustical elements of the sound mix and their effect on each other. Take a look at the following multi-layer cake. It represents the concept that each layer builds on the other and they all work together to create a desired outcome. It should be pointed out that you might not use all of these layers. However, the principles remain the same.

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## For Further Information

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A multi-layer cake is similar to the layers of sound in a room. The layers build on each other.

The amount of ambient noise in the room establishes the base layer of sound. In other words, the air system, conversations, people moving, etc., create noise the sound system must overcome. The ambient noise will also change levels. For example, an empty room is much quieter than one filled with people.

The second layer consists of acoustical instruments. It is important to begin first with the main instrument(s) like the piano, then add the drums, and finally add any other acoustical instruments. Piano and guitar are often lead instruments. If that is true in your situation you should begin with the pianist playing a selection. Then the guitarist would join after the first verse. If you have trouble hearing the guitar, it may be necessary to reposition the guitarist. If the guitar is still not loud enough, then a microphone will need to be added.

Next, if you're using drums, have the piano begin playing. After a minute or two begin the drummer. Listen first to determine if you can still hear the piano. (Hint: the higher octaves of the piano are usually easier to hear over other instruments.) If the piano starts to get buried, increase the microphone level on the piano gradually. Again, try to reposition people before adding microphones or raising volumes. You

may try moving the drums farther back on the stage or enclosing the drums with isolation panels. If neither of these options work, gradually increase the microphone level on the piano. Note: we always advise natural acoustical solutions before adding sound reinforcement. Finally, add any other acoustical instruments including acoustical guitar, woodwinds and brass.

The third level of sound consists of electronic instruments such as keyboards, electronic guitars, bass guitars, acoustic instruments with electronic pickups, electronic drums, etc. The piano is usually the primary acoustical instrument, and you have already set the piano level. Now add any electronic keyboards to the mix. At this point, you can have the drummer and other acoustic musicians take five. Use the same procedure as before. Begin with piano and add one keyboard at a time. Then continue with any other electronic instruments. When you have finished, take a break. Leave the room and listen to silence for five minutes. Then go back and listen to the whole instrumental mix.

Last, but certainly not least, are the vocals. Beginning with the background vocals, add each vocalist one at a time, as you did the instruments. Finally, add the primary vocalists. Obviously it is vital that the primary vocalists are heard and understood above all the other instruments and background vocals.

### A PERSONALIZED TOUCH

As in our example of the chef varying the recipe slightly, you, as the sound operator, may need to vary this recipe slightly. You know what your audience likes to hear. Also, you know the demands of your specific event. So if you would like the background vocalist to be as pronounced as the primary vocalist, add your personalized touch!



### A FEW TIPS FROM THE CHEF

1. Always listen for what is too loud as well as what is too soft.
2. If a musician or vocalist says they need more of themselves in the monitors, first think of turning other instruments or vocals down...just a bit. Ask them what is too loud.
3. Always make level changes to the monitor mix or channel gain/trim control when the musician or vocalist is not active.
4. Make small, gradual changes.
5. Occasionally turn down the master levels for the main system and listen to the monitor system to see how loud it is. The monitor system may be causing the main system to sound poor. Also, walk to the first few seats to see if you hear more sound from the monitors than the main system.

### A FINAL WORD

Communicate with the musicians. Let them know this recipe may take several attempts before creating a cake that deserves icing. It will take extra time, effort and patience on everybody's part. You wouldn't start the recipe 10 minutes before it needs to be served, so don't wait for dress rehearsals or show time to start building your sound mix. The results will be worth it!

■ Travis Ludwig



## TECH TALK Programmable Equalizer

There is a specialized piece of electronic equipment that will improve the sound and flexibility of your sound system(s). It is not very expensive; but properly utilized, it can make a big difference. It is a programmable equalizer.

### WHAT IS AN EQUALIZER?

An equalizer (EQ) is a set of filters that allow the operator to adjust or change the frequency response of the sound system. It also allows the operator to compensate for loudspeaker deficiencies or change the system response for specific needs.

### SO WHAT IS A PROGRAMMABLE EQUALIZER?

A programmable equalizer is an equalizer plus it allows multiple settings to be stored in memory. The operator can adjust the system for a particular use, store it in memory, readjust the system and again store it in memory. Now, with the touch of a button, the operator can recall the different settings and instantly change the sound of the system for a specific event.

Why would you need this in the gym sound system?

The gym is used for many events in most schools. Here are three applications:

**Sporting Events** For sporting events, the system needs to be highly intelligible despite loud crowd noise. In this situation, speech intelligibility is more important than the ability to

produce high-quality music sound. The system Programmable EQ is adjusted to produce a clear sound that can cut through the crowd noise. Often, the bass response is reduced to help improve the clarity.

**Assemblies or Symposiums** For this type of event, the system does not need to produce as much volume, though it still needs to be clear. The system engineer can adjust the system so it produces a clear, natural sound for good speech intelligibility.

**Musicals** The previous speech settings would not be appropriate if the system was being used for a musical. For music, the bass response is very important so the music sounds natural. The high frequencies are also critical for reproducing the important musical harmonics of instruments and voices. Assuming the basic sound system is capable of reproducing good musical quality, the programmable equalizer can be adjusted to maximize the sound quality.

Another application would be to adjust the system for maximum gain-before-feedback (volume) when floor or other area microphones are used for drama or musicals. Feedback is often a problem for these events, and careful use of the equalizer can help.

A programmable equalizer can store settings for all of the previous examples. The system can quickly be set for the drama rehearsal after school, then with the touch of a button, reset for the game that evening.

### HOW DO I ADJUST THE PROGRAMMABLE EQUALIZER?

Accurate adjustment is very difficult to do without proper test equipment and, more importantly, experience. The equalizer is probably the most abused and misadjusted piece of equipment because inexperienced operators often adjust it. If misadjusted, the resulting sound quality is worse than without the equalizer. During adjustment, try switching the equalizer bypass switch in and out. The system should sound better with the equalizer switched in or it should be adjusted again. Please call us for help. We have the staff, equipment and experience to do the job right.

### CAN THE PROGRAMMABLE EQUALIZER BE ADDED TO MY SOUND SYSTEM?

Most current sound systems will allow the addition of a programmable equalizer. However, it may be more difficult to add it to an older, simpler sound system. The equalizer is positioned in the system signal flow between the mixer and the amplifiers. Many newer, self-contained, mixer/amplifiers have the features to connect an equalizer. Systems with separate mixers and amplifiers easily allow the addition of a programmable equalizer.

We would be glad to help you improve your sound system with the addition of a programmable equalizer. Please call us and we will answer your sound system questions. We understand that the sound system can be very intimidating. Let us be your expert!

■ Ron Huisinga

