
THORBURN ASSOCIATES INC.
Acoustic and Technology Consultants
eNewsletter

September 2004

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Greetings

Welcome to the September 2004 issue of our eNEWSLETTER. The server move took longer than we had planned. The Internet gods did not smile kindly on us during our move. We just have to remember that computers are our friends and technology makes our life easier.... Ya Right! Anyway, thanks to all of you who gave us feedback on the format of our eNewsletter. Based on your comments, we are moving from a monthly to once every two months publication schedule.

As always if you have an idea, question, suggestion please drop us a note at TA@TA-Inc.com for general information or eNews@TA-Inc.com for specific comments about our eNEWSLETTER.

Cell Phones

Tired of cell phone interruptions and the poor etiquette of others when they are on cell phone calls? It seems that four churches in Monterrey, Mexico are too! They have started jamming calls. The \$1,500 jammers are boxes about the size of walkie-talkies. As churchgoers walk into the sanctuary, the devices overwhelm the cellphones with electronic noise. Within a few minutes, the phones show "no signal," incoming calls don't ring, and callers are bounced to the phones' voice mail.

Jamming cell phones is illegal in Mexico, the United States and most other Western countries, but it appears that Mexico's Federal Telecommunications Commission has looked the other way. In the United States, cell phone jammers are supposed to be used only by embassies, the military, the Secret Service and police, who use the devices to isolate hostage-takers.

Digital IMAX

Earlier this month at the Giant Screen Cinema Association (GSTA) conference in Montréal, we had the chance to see Spiderman 2 on a big, IMAX size screen. If you have not been to an IMAX or other Large Format Cinema in the recent past, the screens are in the neighborhood of 60 feet tall by 80 feet wide (the actual size varies depending on the number of seats and real estate available).

One of the problems that the industry has is how to fill these theaters or "getting butts in the seats" as they say. Traditionally an IMAX or Large Format Film is about 45 minutes in length and is some form of documentary film taking us to places we have never been before, or cannot go to. Outer space is a great example. However with more IMAX theatres showing up as part of the mega multiplex, theatre owners have resorted to showing standard films on the big screen. They either blow up the image and present a

very grainy film or only fill up a very small portion of the screen and let the audience view what seems like a "postage stamp" compared to the screen size.

To address this problem IMAX has developed a Format Conversion Process called DMR (Digital Re-Mastering). The process starts by converting a 35mm frame into digital form at very high resolution, capturing all the detail from the original. The proprietary software mathematically analyzes and extracts the important image elements in each frame from the original grainy structure to create a pristine form of the original photography. This is the most complex step in the IMAX digital re-mastering process.

To create the brightness and clarity that audiences have come to expect from the IMAX experience, IMAX uses a proprietary computer program to make the images sharper than they were originally, while colors are adjusted for the unique technically superior characteristics of the IMAX screen. The completed re-mastered film is then transferred onto the world's largest film format, 15-perforations 70mm.

IMAX has always delivered incredible six channel multi-speaker sound that helps put audiences in the picture and now it has re-created this immersive experience for IMAX DMR. IMAX DMR re-creates each film's original soundtrack, adding another sonic dimension to upgrade the original movie soundtrack to IMAX standards.

Other Films that have been converted by the DMR process include:

- *Apollo 13*
- *Star Wars Episode II: Attack of the Clones*
- *The Lion King*
- *Beauty and the Beast*
- *The Matrix Reloaded*
- *The Matrix Revolutions*
- *Harry Potter and the Prisoner of Azkaban*

Having had the chance to work on a number of film post-production studios, the standard quality of the multiplex cinemas has been very disappointing to us - the quality bar is just too high. We have seen how you should be able to hear and see a film. Spiderman 2 in DMR on the big IMAX screen is as close as it gets to being at the studio!

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Teleconferencing

It's time to re-visit the issues of acoustics for conference rooms. We are getting a number of phone calls from clients looking for help with the quality of their conference calls. Problems are in one of two areas: it is either a problem with the room or the equipment has not been optimized. Over the past few years fixed audio teleconferencing systems have improved, but with that improvement has come an increase in the complexity of the setup. Today's systems all require a computer and detailed knowledge of how their software algorithms control the Digital Signal Processor inside the box. The rooms we are being asked to look at are large rooms that are too big for the tabletop "Polycom style" units.

Once you have chosen a room for teleconferencing, it is important to have it evaluated by an acoustic or audiovisual engineer. The goal is to optimize the acoustic quality of the room, making the conversations more intelligible for both your group and the people at the other end of the line. You may not know it, but there are several things lurking around in most conference rooms with the power to wreak havoc on your audio. These are known as STC, NRC, and NC ratings.

The first, STC, stands for Sound Transmission Class. This rating basically describes how soundproof your room is. The higher the sound isolation between one room and the next, the higher the rating. Construction of thick walls and a thick ceiling have the greatest effect on blocking exterior noises and boosting your conference room's STC. This rating is especially important if you are as concerned about sounds (such as private conversations) being heard outside the room as you are about noise coming in.

The second rating, NRC, stands for Noise Reduction Coefficient and deals with how much sound the materials on the walls and ceiling inside the room absorb. Vocal echoes that may sound slight to you will be picked up by your microphone and amplified for those on the other end of the teleconference. The reverberation you hear in the room is really just a series of echoes building up until you cannot

distinguish their source. Parallel walls made of hard materials are the most common source of these unwanted echoes. Rectangular rooms can also cause this problem by allowing sound from one end of the room to reflect back. One solution for defeating this type of echo is to "color" the sound in the room. This is achieved by covering portions of the ceiling or walls with slot finishing and perforated metals or woods. Another source of these echoes is glass. Large windows facing lobbies or looking over a skyline should be covered with cloth drapes to dampen sound reflection.

The last rating, NC, for Noise Criteria, indicates the level of background noise present in the room. This noise is usually made up of sounds that we have learned to tune out: computer fans, a nearby elevator, the rumble from air ducts, and many other commonplace office noises. While you may be blissfully unaware of these sounds, your microphone isn't. This background noise will be transmitted to the other group and provide an unnecessary distraction that runs the risk of masking your voice. Close coordination between audio consultants and design/construction teams can identify and reduce the sources of this noise.

When you are convinced the conference room is at its acoustic peak, the final step is the installation of the microphones and loudspeakers. Luckily, this is much less involved than creating the room. The main thing to remember is that the microphones should be between one and three feet from the person speaking. If there is more than one person speaking, use more than one microphone. In those cases, it's a good idea to also install an automatic microphone mixer. These are designed to activate only the microphone closest to the person speaking, eliminating the problem of several voices being transmitted at once.

While mounting a microphone on the ceiling may make the room appear more attractive, it puts the microphone out of its effective range. To make matters worse, most loudspeakers are ceiling mounted and their sound waves have a more direct route to the microphone than a speaker's voice. Once the sound of the loudspeaker is picked up by the microphone, it travels through the system in a cyclical route while being amplified. The resulting high-pitched squeal is known as feedback. Anyone familiar with the annoying screech of feedback knows that once it begins, the conversation ends.

Another important thing to keep in mind is that a problem called "acoustic echo" occurs when teleconferencing in full duplex mode. Full duplex mode is when both parties are able to talk at the same time, like in face-to-face conversations. To do this, both parties set their teleconferencing unit on Full Duplex Mode. This leaves their mics open and speakers on, which lets the audio signals travel in both directions at once. The problem arises when the sound from their loudspeakers (your voice) is transmitted through their mics. Hearing the delayed sound of your own voice returning through your loudspeakers can be quite confusing. To remedy this, a device called an echo canceler can be used. An echo canceler looks at the audio coming through the loudspeakers, compares it to the audio going into the mics, and eliminates any matches from the transmission. To effectively cancel out "acoustic echo", these units should be used at both locations.

Knowing the basics of teleconferencing will make you more comfortable with system. However, when your teleconference begins, don't forget the most important detail--your notes!

Computer History Museum

One of the neat things about our corporate headquarters' is its location in the San Francisco Bay area. We have two great baseball teams, two great football teams, arena football, soccer, hockey, and basketball plus many museums to visit once you've had your fill of professional sports.

The Computer History Museum is located in the south bay just off Highway 101 at 1401 N. Shoreline Boulevard. It is the world's largest and most significant history museum for preserving and presenting the computing revolution and its impact on the human experience. It allows you to discover how computing became the amplifier for our minds and changed the way we work, live and play. The exhibit portion of the Museum spans history from pre-computing to supercomputing, and reflects the development in technology from gears to vacuum tubes to exotic semiconductors. It features more than 600 artifacts including the Honeywell "Kitchen Computer", the Cray 1, the Johnniac and an Eniac rack.

We were called in to help address the acoustical and audio system problems in the newly renovated auditorium. The first task was to control the excessive reverberation and rear wall echo. Placing acoustical treatments on the exposed metal ceiling and adding acoustical and black out drapes on the rear wall achieved this. The next step was to rearrange the signal flow through the existing equipment as a

temporary patch, while the system is upgraded.

The museum is open Wednesday & Friday for docent led tours at 1 PM and 2:30 PM; Saturday for self-guided tours from 11 AM till 5 PM with docent led tours at 11:30 AM, 1 PM and 2:30 PM. There is no charge for the tours but donations are welcome and membership is encouraged. Tours last approximately one hour.

More information can be found at <http://www.computerhistory.org>.

Question of the Month

Q. I have been told that installing an automatic microphone mixer in my sound system will eliminate feedback. Is this true?

A. No! The complete *elimination* of feedback is a myth about automatic microphone mixers. Installing an automatic mixer will help *control* feedback by increasing the volume of the sound in the Public Address before it starts to ring. But how much louder the sound system can be turned up will be determined by the number of open microphones connected to the sound system. Every time a microphone is activated or turned on, the sound from the audio system in that room will also increase. Ideally, we only want to turn on the microphones that are needed for the communication between the individuals talking.

The room's acoustics and properties and the physical placement of microphones and loudspeakers determine how loud the sound system can be turned up before feedback begins. However, feedback can be minimized through careful planning, selection of equipment, coordination in the design and installation of the system.

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