

Sound of Worship

Sound Advice For Today's House of Worship

Summer 2011

Call us...



Sound Planning

Wheaton, IL

(630) 653-6700

www.soundplanning.com

Pro sound & video for churches

- Design and consulting for renovation and new construction projects
- Alterations, upgrades, service, and repairs to any system
- Worship facility, multipurpose room, and auditorium



In This Issue

How to achieve natural tone...

Page 1

The key to good sound...

Page 2

EQ tips for speech...

Page 3

For More Information



Sound Planning

Wheaton, IL

(630) 653-6700

www.soundplanning.com

Phone:

(630) 653-6700

Fax:

(630) 653-8672

Website:

www.soundplanning.com

E-mail:

sales2011@soundplanning.com

Know Your Instruments to Improve Your Mix

All modern mixing consoles have an EQ section that gives the sound tech a great deal of control over the tone of each sound source. The tech can shape the tone to help create a more natural sound or perhaps create an unnatural sound for an effect. There is some very basic knowledge that is required in order to achieve a natural tone.

First, the sound tech needs to know what each instrument sounds like before there is any attempt to put a microphone in front of the instrument. Listen to the instrument without any amplification. Walk around and listen to how the sound quality changes, depending on what angle you are to the instrument. This change in directional response is easily illustrated by the grand piano. Put the piano lid at full stick and then listen carefully as you walk around the piano as a helper plays. Cover one ear to simulate what a microphone will pick up. The piano sound (tone) will change as you listen at the keyboard end and then

move to the far end. As you move farther away from the piano, the tone should have fewer changes and appear more natural. Since the piano was designed to be heard at a distance, that conclusion would be appropriate.

However, in situations where we need to amplify the piano, we usually do not have the luxury to place our microphone at a reasonable distance. Feedback likely would be a quick problem. If any other instruments or vocalists are singing, the distant piano microphone will probably pick up too much of the other instruments or vocalists, which will tend to make the resultant amplified sound very unnatural. This is called "bleed" or "stage crosstalk" and it is usually not a good thing!

The key to good sound is to first find a close microphone position that will pick up the most natural or desired sound before any EQ on the mixing console is done. Spend time experimenting with different microphones and microphone

Continued on page 2

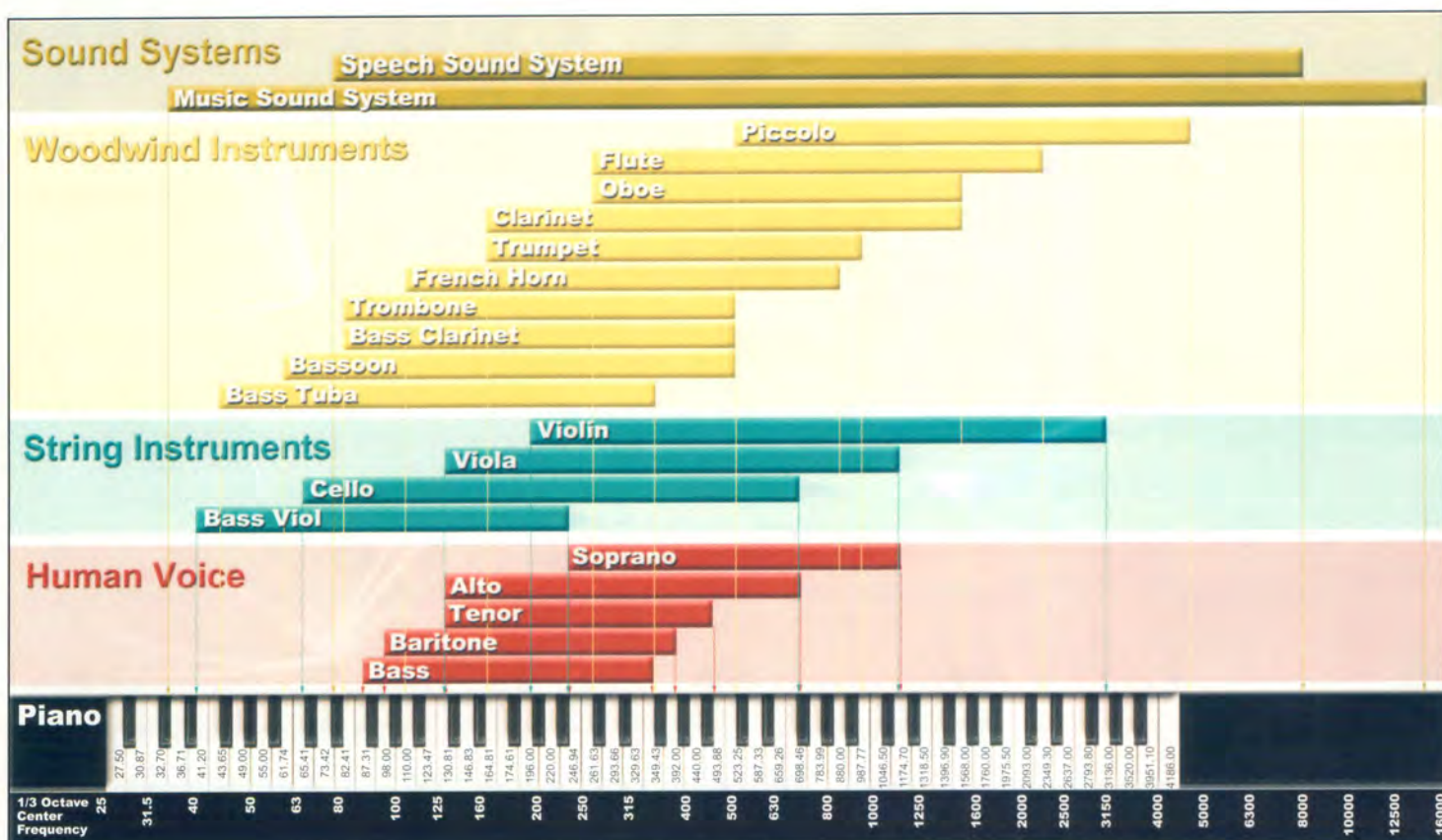


Figure 1
Bandwidth for many instruments and human voices.

positions. Use some high quality closed ear headphones to actually hear what the microphone is picking up and how your different positions affect the sound. If the microphone is positioned poorly, no amount of EQ will make it sound great. Of course, the instrument itself and the player will also have a great impact on the sound quality of the instrument. Again, EQ will not make a bad piano sound great nor will it improve the attack or clarity of the piano if the player has a very soft touch. That is why the tech needs to listen first and then position the microphones.

The other major characteristic of an instrument is its “bandwidth.” That is defined as the range of frequencies that is characteristic of each instrument and the human voice, male and female. The lowest frequencies are called the fundamentals, and every instrument

and voice also has harmonics that extend the upper frequency limit by many octaves. Knowing the bandwidth for each instrument and how the different EQ controls can affect the tone will help the sound tech to quickly modify and improve the sound. The chart in Figure 1 shows the bandwidth for many instruments and human voices. Keep a copy by your mixing console as a quick reference.

But just memorizing the chart will certainly not guarantee that you can quickly use the EQ controls to optimize the sound of an instrument or voice. It takes a good ear, a lot of practice and a lot of live sound experience to be a great mixing console tech. So where do you begin?

Let’s start with the human voice. Buy a book on CD or download a sermon to your iPod. Get a good pair of headphones so you can hear every

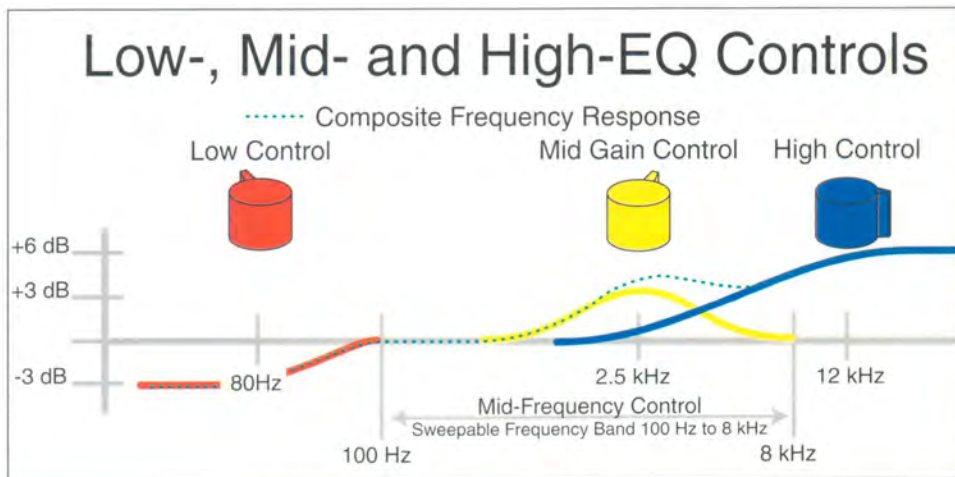
change as you practice with the EQ controls. The headphones will isolate you from the room acoustics which can mask the subtle EQ adjustments. Now touch the play button and have some fun. Start with the bass or “Low” EQ gain knob at its 12:00 position. That is normally “off” or no EQ. While listening closely, rotate the Low gain knob counter-clockwise (CCW or down) or clockwise (CW or up). On a male voice, you should hear the voice get very “thin” with a lack of bass when the knob is turned all the way down (CCW) or become too bassy and “muddy” when the knob is turned fully up. Set the Low gain back to off (12:00) and then rotate the “High” EQ gain while listening to the high frequencies. These frequencies are part of the harmonics that give each voice their unique texture. Turning the High gain knob down can make the voice sound muffled like they

have walked behind a curtain. At the opposite setting, the voice can become very "brittle" or "edgy." There are a lot of adjectives that are used by sound people to try to communicate what they are hearing. Bruce Bartlett has put together a glossary of common sound quality terms. It can be found at www.bartlettmics.com.

Now look at those knobs between the Low and High EQ controls. On modern mixing consoles, there will be at least two knobs. They will be called the Mid Gain and the Mid Frequency controls. The frequency control will select the center frequency of a band of frequencies. The Mid Gain control will adjust the amount of boost or cut of those selected frequencies. This combination is very powerful and has the ability to radically change the tone of an instrument or voice.

down (CCW). Now adjust the Mid Frequency. Start with the knob at full CCW and slowly rotate the knob CW. You will hear a great change in the tonal character of the voice. Then turn the Mid Gain fully up (CW) and again do the frequency sweep. In real use, the gain controls are usually not adjusted to their extremes. Play with a combination of settings to hear how the voice quality can be affected.

The natural voice quality will often get changed because of the microphone that is used and how it is used (microphone technique). The sound system speakers and the acoustics of the room will also play a part in the sound quality of the amplified voice. The EQ controls can then be used to help create a natural tone or perhaps to even improve the talker's natural tone.



Low-, Mid- and High-EQ Controls.

More expensive mixing consoles will have two sets of controls, and they split the middle frequencies into two bands, often labeled High Mid and Low Mid. Some mixing consoles have an additional control labeled Q that controls the width of the frequency band.

Again, play the test voice and turn the Mid Gain down all the way

Now try these experiments with other instruments. The principles are the same. With a knowledge of the bandwidth of your instruments and how the EQ controls can affect the sound quality, you are on your way to becoming a skilled sound tech.

EQ Tips for Speech

Three frequency ranges:

1: Speech Fundamentals: The fundamental frequencies have a limited range but they are very important to our judgment about voice quality. Fundamentals are a key factor in our ability to know who is talking.

Male: 85 Hz to 180 Hz

Female: 165 Hz to 255 Hz

2: Vowels: The vowel sounds occur between 350 Hz and 2000 Hz. This band contains the power and energy of the voice.

3: Consonants: The consonant sounds occur between 1.5 kHz and 4 kHz. There is not much energy but they are vitally important to intelligibility.

How to use EQ to improve intelligibility:

1. Reduce (Roll-off) the low frequencies. This is especially important if the talker's mouth is very close to a directional microphone. Due to proximity effect, the microphone will pick up more bass. For some talkers, that may be ok. But for many, the additional bass will tend to mask the consonants, making it harder to understand the talker.

Bass-roll off can be implemented with the Low EQ control or with an adjustable High-pass filter. Some microphones have a built-in bass roll-off filter switch. But don't go too far as too much roll-off will cause the voice to lack warmth. It could sound "tinny."

2. Add a slight boost in the 1 kHz to 5 kHz range with the Mid control. This will improve clarity. Or reduce the 200 Hz to 400 Hz range. That reduces some of vowel energy, which then makes the consonants appear louder.

3. Add a slight boost in the 3 kHz to 6 kHz range. This adds brightness and presence to the voice. But too much boost will be irritating and harsh, causing the listener to become fatigued. It will also accentuate any sibilance sounds.

Every talker has a unique voice which will likely require unique EQ adjustments. This is the "art" side of mixing. Skillful mixing requires knowledge (science) and art. Listen carefully. Does the talker sound natural and clear? With enough experience you will learn to "trust your ears."

Sound of Worship

Sound Advice For Today's House of Worship

Summer 2011

PO Box 53
Willmar, MN 56201-0053

PRSR STD
U.S. POSTAGE
PAID
HUISINGA & OLSEN

Attention Secretary,
PLEASE ROUTE TO:

- Sound Operator
- Pastor
- Music Minister
- Other _____
- Save for the Sound Operator Manual

A newsletter
for anyone who
wants to learn
about sound!

 Sound Planning
923 West Liberty Drive
Wheaton, IL
(630) 653-6700

Pro sound & video
for churches

Impact Your Church with a Great Sound and Video System!

Since 1976, **SOUND PLANNING** has served hundreds of churches in the Chicago area with high-quality sound systems, video systems, professional service, and guaranteed results. We have the people, the equipment, the technology, and the experience to meet your needs.

Great sound can breathe life into powerful messages. It can help you make an impact on your congregation, and it can bring excitement and clarity to any presentation!

- Church and choir sound systems
- Wireless microphones
- Wireless listening systems for the hearing impaired
- **SANYO** video projection system



Call Sound Planning today at (630) 653-6700 for a free sound system evaluation!
Sound Planning / Design - Installation - Sales - Service / (630) 653-6700