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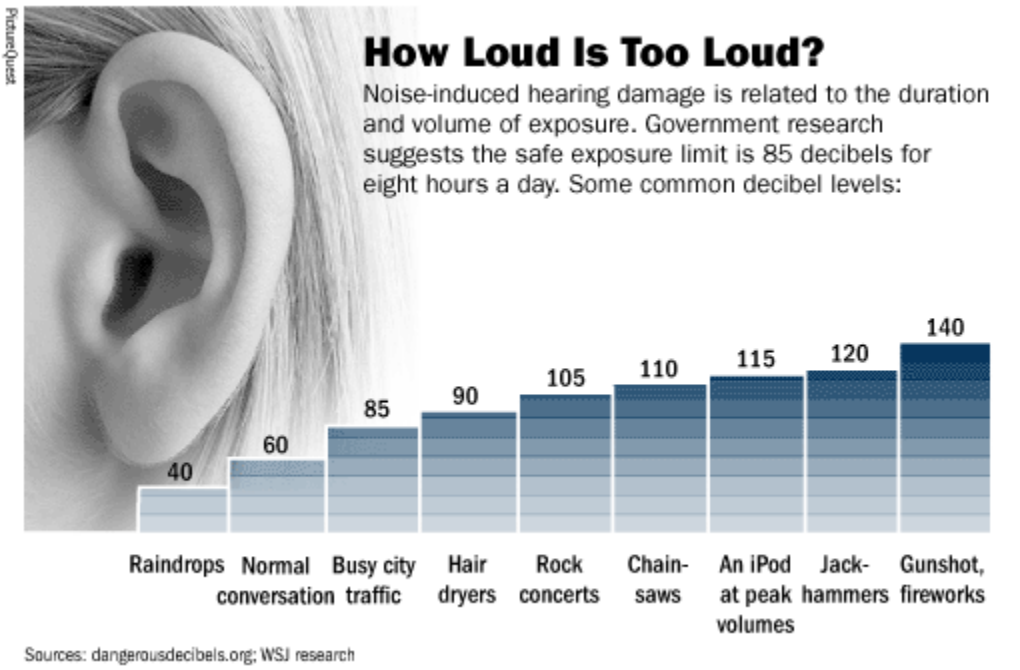
***Enhancing Performing Arts With Technology***

***COLLEGE PREP***
***NOV 2012 Audio Mini-Class***

# Safety

## Acoustic

- How loud is **too loud? ACT if you feel a level is too loud. Free Apps for your phone.**




- Protecting the Audience –speaker height + proximity

## Mechanical

- Don't let Pythagoras meet Humpty Dumpty! *Always route cables down to floor level on speaker and mic stands.*
- Test temporary stands/towers carefully *each* time you use them. Be sure legs are fully extended. Tower stability relies on wide base.
- Tape cables where they cross audience or performance floor areas. Assume an oblivious person will blunder along. *See your formerly spherical SM58 mics.*

**Electrical**

- 3 types of audio signal – always know what you are connecting! Easy to fry mics + preamps/mixers.
    - Mic level – millivolts
    - Line level - 1 volt
    - Speaker level – up to 70-80v AC, and ***lots*** of current.
- Power on/off order – Power amps are LAST on, FIRST off. Avoids blowing speakers…

## Physics of Successful Audio

**Goals**

- Direct sound path from speakers to ears – no bounces
- Humans acutely sensitive to left-right axis; insensitive to Z axis. *Raising speakers protects ears and gives best coverage.*
- Keep acoustic energy directed at audience ear – not empty spaces, or feet. *For best intelligibility, maximize the ratio of direct to reflected sound.*
- Keep audio energy level as low as possible consistent with reinforcement
- *The best audio is when the audience doesn't even notice there's a system working…*

## Physics of Successful Amplification & Mixing

**Goals**

- Electronics operates best in a range of linearity. $Y = mx$. Your job is to keep EACH stage of the audio chain in its linear range. Otherwise … distortion, ear fatigue, scowls, tomatoes.
- Watch clipping lights on all equipment
    - Board – per channel. Adjust trim pot at top of channel
    - Power Amplifiers – on front panel. Back off send level & raise amp gain if needed.
    - Equalizers/outboard eqpt – similar.
    - Digital recording devices have ZERO tolerance for overdrive – if the sampling algorithm can't represent more than XXX bits – any add'l energy will sound yucky.

# Planning and Running a Show

**Planning**

- Know the order, performers, script, desired setups as much as possible
- If pre-recorded tracks are involved … obtain and test them before showtime
- If demand > resources, figure out how to mike that 19 piece kazoo orchestra with only the 5 mics you have.
- Tools/Matls
    - Wireless batteries
    - Headphones – for solo bus, and checking monitor mix
    - Flashlight
    - Duct tape
    - Labeling tape
    - Clip board
    - Script/show order

**Team**

- Best to have a board person and a stage/roaming person. Can trade off (acts, nites).
- Board person – mixes, responsible for overall sound quality
- Board assistant if needed – handles intercom for cues, playbacks of recorded effects or tracks, deals with MOTP who wander up.
- Stage/Roamer
    - helps performers set mics, DI boxes, etc.
    - Leaps into action when something goes wrong – zaaap noises, dead mic, performers unable to position mics, tangles extraordinaire, etc.
    - Resets mics to desired L-R order between acts if needed
    - Floats thru the room *listening. It doesn't sound the same everywhere in the room … tell the mixer if problems.*
    - *Covers the board for bio-breaks.*

**Where to mix? What to wear?**

- Best mix position is from IN the audience – same plane – not up 15' in the loft.
- Don't mix under a balcony, or outside a doorway. Remember diffraction gratings?
- Deliniate the mix position so people don't crowd you, tip over eqpt, bump settings, etc.
- On your head should be … **nothing**. No intercom headset. No hat. (hair okay, but uncover your ears). (Improvement to intercom pending).
- Face forward to speakers and performance area. Don't mix "side-saddle". You need to hear it just like the audience does. (Rework loft so board can sit straight on).
- Black garb- makes you less conspicuous when you have to crawl around during a show.

**Configuring Performance Areas for Success**

- Arrange mics on the board in your logical left-to-right order
- Color code mics if you can
- Label channels with masking or white tape and a thick dark marker
- Set up boom stands so they are balanced – not edge-of-tippy
- Match mics and stand clips – wrong size clip encourages plummeting
- Keep cables in bundles (usually downstage) – leave clear space for performers to move.
- Arrange monitors to cover performer's area – aim for ears (not toes)

**Advanced Mixing Techniques**

- Using Groups (submasters) - Vocals vs. Instrumentals
- Monitors
    - What do performers need to hear?
        - Themselves?
        - Rhythm Section?
        - Cues?
    - How do monitors affect performers?
    - Talkback function
- Built-in effects (use with discretion)
- 101 things to do with Aux Sends
    - Streaming performances for far away family members, etc.
    - FX sends
    - Different monitor mixes for chorus vs. orchestra
    - etc

**Problems and Solutions**

- Feedback
    - Use EQ to your advantage
        - Find the1st few  resonance frequencies of the room, create narrow "notch" filters to absorb them – but don't butcher the music
        - Individual channel  parametric EQ allows adjusting for particular mics, instruments, singers. (Parametric means you can move the notch point)
    - Drop the master til you can figure out what channel is too hot
    - Use channel gain lights to guide you
    - Use solo bus
    - Try to aim mics orthogonal from speakers if they must be in close proximity
    - Understand the sensitivity patterns of mics and use the dead zone to your advantage
    - Keep monitors low
    -
- Buzzing / hum
    - Best if all audio equipment powered from a single outlet if load allows. Power the board from the amp rack.
    - Turn down all channels, investigate one at a time.
- Distortion
    - Check overdrive lights
    - Use your ears and the solo function on the board
    - Listen up close to each speaker – maybe its fried and no longer linear (rubbing cone or diaphragm)