Albuquerque Central S.D.A. Church

Audio/Visual Production Training

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Welcome and thank you for your commitment to this role.

Hopefully you will learn something new, if not, please allow this to be a refresher for you.

Why is the role of Audio/Visual so important to God?
<NS>

Romans 10:17

So then faith comes by hearing, and
hearing by the word of God.

The word needs to be heard to develop faith.

Matthew 13:19
When anyone hears the word of the kingdom, and does not understand it, then the wicked one comes and snatches away what was sown in his heart.

We must be proficient in our roles to ensure the WORD IS HEARD

<PRAY>

So what qualifies me to teach you anything?
<NS>

My Background

- 10 years theatrical experience
- Learned some lighting & sound
- Navy taught me to strive for perfection, professionalism
- Completed Navy Basic Instructor Training
- 3 years Head A/V
  Sutter Hill SDA Church, CA

I learned a lot in the theater
Everything except Costumes and Sets
Most importantly – TEAMWORK

I learned a lot in the Navy
Firefighting/Sub Hunting/Shooting Ground Targets
Most importantly – TEAMWORK

I learned a lot in the church
Most importantly – TEAMWORK

Teamwork

How do we work as a team?

- Provide the same level of commitment
- Adhear to established procedures
- Provide feedback
- Offer support

All this includes the Worship Leader, Praise Team and Pastor. We are all ONE team.

The same level of commitment is usually difficult but it will give us something to strive for.

Following the same procedures will ensure equipment life, safety of people and a wonderful Worship experience.

We all need to provide feedback to each other, before, during and after the service. Quality of sound, too loud, vocals out of balance etc.

We need to support each other. If you're not assigned to the board one day, let the on-duty tech know if your available to assist.

We need to develop a relationship with all team members. Feedback is easier to hear from someone we trust and we are more accepting of new ideas and better ways.

Purpose

The purpose of the chuch audio production is revealed when you first look at the other people in the church sanctuary and their primary purposes;

- The pastor's primary purpose, during the service, is giving the message to the congregation.
- The worship leader's purpose is leading the congregation in the worship of God through song.
- The musicians' purpose is assisting the worship leader in accomplishing their goal.
- The congregation has a purpose as well. Their purpose is to be fed, nutured, taught, called to worship and bring a sacrifice of praise

Therefore by Him let us continually offer the sacrifice of praise to God, that is, the fruit of our lips, giving thanks to His name.(Hebrews 13:15)

Only when looking at these purposes can we see how the purpose of church audio production starts taking shape. The purpose of church audio production is supporting the pastor, worship leader and the musicians in accomplishing their goals while taking into consideration the needs and desires of the congregation and balancing all of that with proper live audio production processes and procedures.

We can not afford to have an "Us vs Them" mentality.

Be aware, the purpose of church audio is not a list of responsibilities or duties. There is such a place for such information but such lists do not define the purpose.

Can anyone describe A/V Tech vs Sound Engineer?
Here's a demonstration of what a sound engineer does.

Where did I get most of my knowledge?

Resources

A crazy amount of searches on the internet
learning terms, equipment and processes

"Audio Essentials for Church Sound"

From behindthemixer.com

By Chris Huff

This $30 book saved my life when I took over as Head A/V at Sutter Creek.

The website has over 100 pages of articles.
Start at the last page and work backwards.

So what are we going to learn here?
<NS>

Objectives

- Understand the terminology associated with audio and visual (A/V) equipment
- Understand the roles/purposes of various A/V equipment
- Understand the relationships between various A/V equipment
- Learn how to manage or use some of the basic equipment
- Describe the steps performed to prepare for a performance
- Describe the steps to perform during a performance
- Describe the steps performed post-performance
- Cover In-depth the Sound Board *(OPTIONAL)*

Why would terminology be of importance?

Tell a Sailor to “secure” a building and he’ll turn off the lights and lock the doors.

Tell a Marine to “secure” a building…
and he will put everyone on the floor at gun point.

We need to know the proper terminology so we are all speaking the same language
<NS>

Terminology

NOUNS

SOUND: Vibrations that travel through the air and can be heard when they reach a person's ear

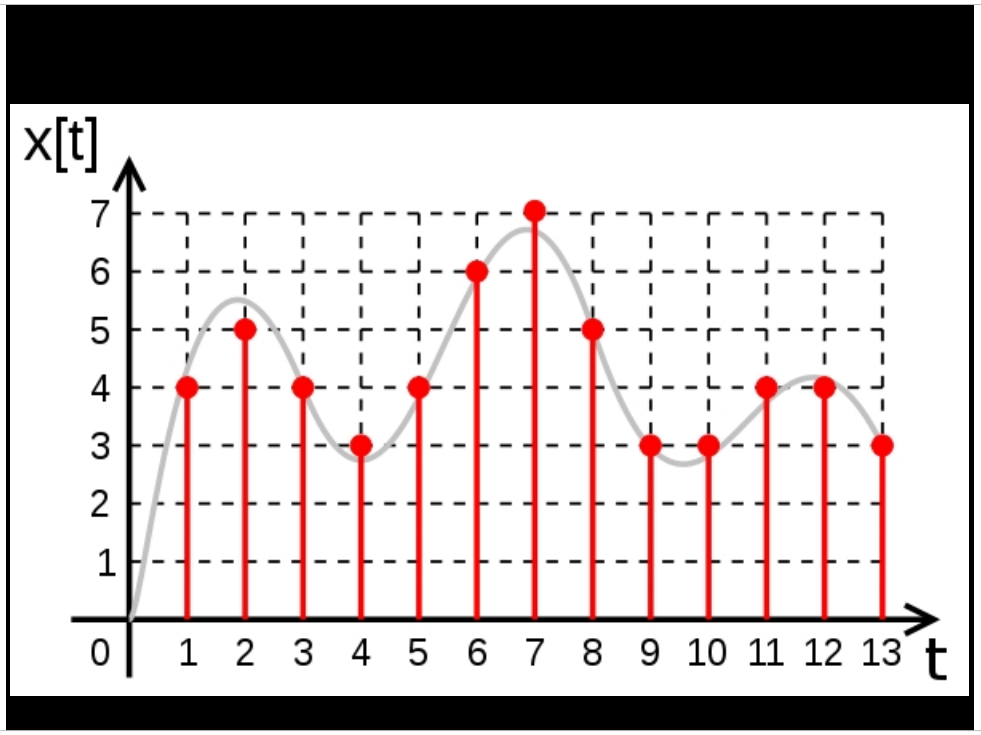
SIGNAL: A representation of sound, typically as an electronic value

- **Analog:** Using a physical item (electricity or AM-FM waves) to transmit data
- **Digital:** Using a bit pattern (0 and 1) to transmit data

Analog uses the characteristics of electricity to provide data to a piece of equipment ie. voltage

Or it can use the characteristics of frequencies to provide data ie, amplitude or the frequency itself

The difference between Analog and Digital is com-picated and confusing to me.
<NS>



The big difference between analog and digital waves is Digital signals must have a finite set of possible values. Where as Analog waves are smooth and continuous, digital waves are stepping, square, and discrete

<NS>

Terminology

NOUNS

AMBIENT AUDIO: Background noise

STEREO: Audio which is made up of two channels — left and right

MONO: Audio which is made up of one channel, typically the left

PHANTOM POWER: A 48v DC current which is sent through audio cables to provide power for devices such as microphones.

Normally, Phantom Power is only needed for Powered microphones like condensor mics.
Our Pencil (choir) mics are powered.
<NS>

Terminology

NOUNS

PEAK: The highest level of strength of an audio signal. Often (incorrectly) refers to an unacceptably high level, where the signal begins distorting.

CLIP/CLIPPING: The point at which a signal distorts

SIGNAL FLOW: A path the signal travels from source to speakers

STAGE NOISE: Sound coming directly from the stage

We'll cover basic signal flow as we cover the equipment

Terminology

NOUNS

WIRE: A single conductor.

CORD: Carries electricity in the form of amps and voltage, providing power to equipment. Made of many wires creating a single conductor.

CABLE: Carries electricity in the form of voltage to provide a representation of sound. Made of two or more insulated wires wrapped in a single jacket.

With regard to electrical cables vs cords, the tendency is to use "cord" for a collection of insulated wires intended to be handled frequently (as a lamp cord or the cord for your earphones), and to use "cable" for a relatively fixed connection (as the wires in your walls or the cable connecting your TV to "cable").

In this environment, it’s recommended we used the same terminology. So if it’s a Power conductor, it’s a cord. If it’s a Data conductor, it’s a cable.

Terminology

VERBS

RAISE/LOWER...
BOOST/ATTENUATE...
INCREASE/DECREASE...
BRING UP/BRING DOWN: To change the signal strength or sound volume

SECURE: To tape into place

ACTIVATE/DEACTIVATE: To turn on or off

NOISE CONTROL: Reducing the amount of sound coming directly from an instrument, amp or floor wedge

Terminology

ADJECTIVES

HOT/COLD...

STRONG/WEAK: Describes the *strength* of a *signal*

LOUD/QUIET: Describes the *volume* of *sound*

Terminology

MEASUREMENTS

DECIBEL (dB): Logarithmic measurement of signal strength. 1/10 of a Bel. *This is a relative measurement to the ambience of the room.*

HEADROOM: In a cable or audio device, it's the difference between the maximum level of the signal being carried and the maximum level the device is capable of carrying without distortion. Headroom is safety room.

IMPEDANCE: The amount of opposition a device has to an audio signal

The reason decibels are logarithmic is because it needs a reference. In our case, it the ambient noise of this room. Also, by moving twice as far from the sound source you are hearing about half the volume.

So if a singer can't hear the music from the floor wedge, instead of just turning up the volume, have them stand closer or move the speaker closer to them. This helps control Stage Noise.

Humans don't normally hear a change in sound unless it's at least 3dB.

Terminology

MEASUREMENTS

WAVELENGTH: The length of a wave, measured from any point on a wave to the corresponding point on the next phase of the wave. Not to be confused with Frequency.

FREQUENCY: The number of occurrences of a repeating event per unit time

Wavelength and Frequency are not the same thing but they to go hand-in-hand. There is a direct relationship between the two.

Assuming a wave moving at a fixed wave speed, wavelength is inversely proportional to frequency of the wave: waves with higher frequencies have shorter wavelengths, and lower frequencies have longer wavelengths.

Terminology

MEASUREMENTS

The wavelength and frequency of light are closely related. The higher the frequency, the shorter the wavelength. Because all light waves move through a vacuum at the same speed, the number of wave crests passing by a given point in one second depends on the wavelength.

HERTZ: Unit of frequency, cycles per second.

Equipment

The Basics

Sources

Mixers

(EQs, DSPs)

Amplifiers

Speakers

What are our SOURCES?
Piano, Microphones, Computer, CD players, DVD Player, Tape player, Other connected devices like Instruments and music players.

The Terms…

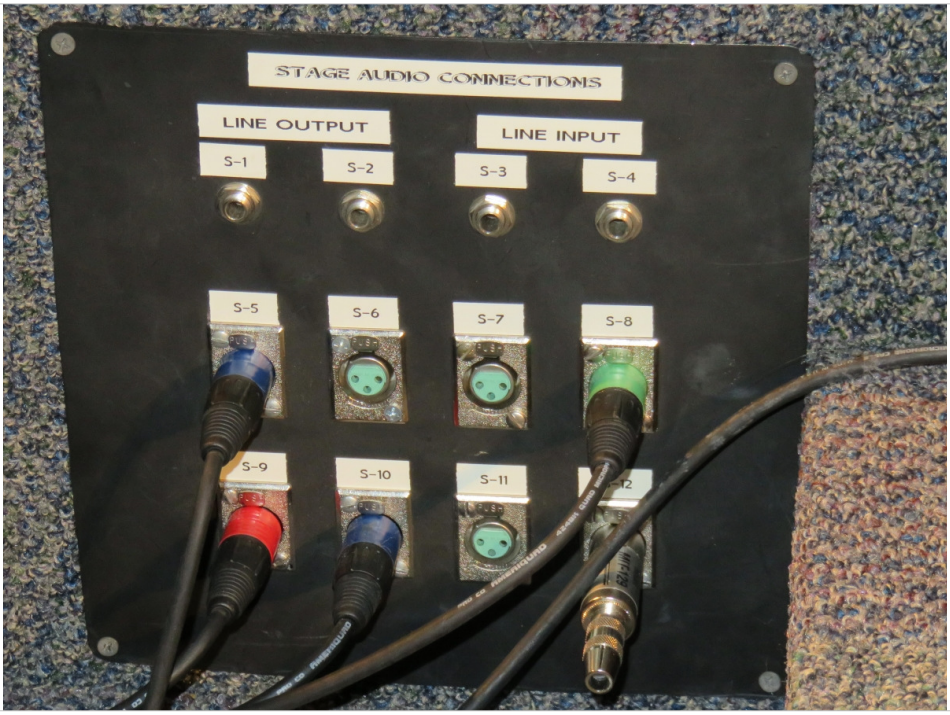
- Sound Mixer
- Mixer Board
- Sound Board

are all interchangable

At Front of House
The piano is mic’d and fed to the Organ Mixer
<NS>

We also have 4 choir mics.
<NS>

If someone brings an electro-acoustic guitar, they Will need a Direct Input (DI) BOX to plug their guitar into using a 1/4” audio plug. The DI BOX then uses an XLR cable to connect to the Organ Mixer or the stage connections. We’ll cover cables and plugs a little later.



These are the stage connections.

S-1 & S-2 are fed FROM Aux Busses of the Main Mixer and S-3 & S-4 are fed TO the Inputs of the Main Mixer on Channels 11 & 12.

Remember these, you'll see them again in the In-Depth Mixer Training

The choir mics connect in S-5 to S-8 (Mid Row)

The Organ Mixer connects in S-9 and S-10
S-11 & S-12 connect to Mic 5&6 on the SubMix
These are all fed to the Splitters.
<NS>

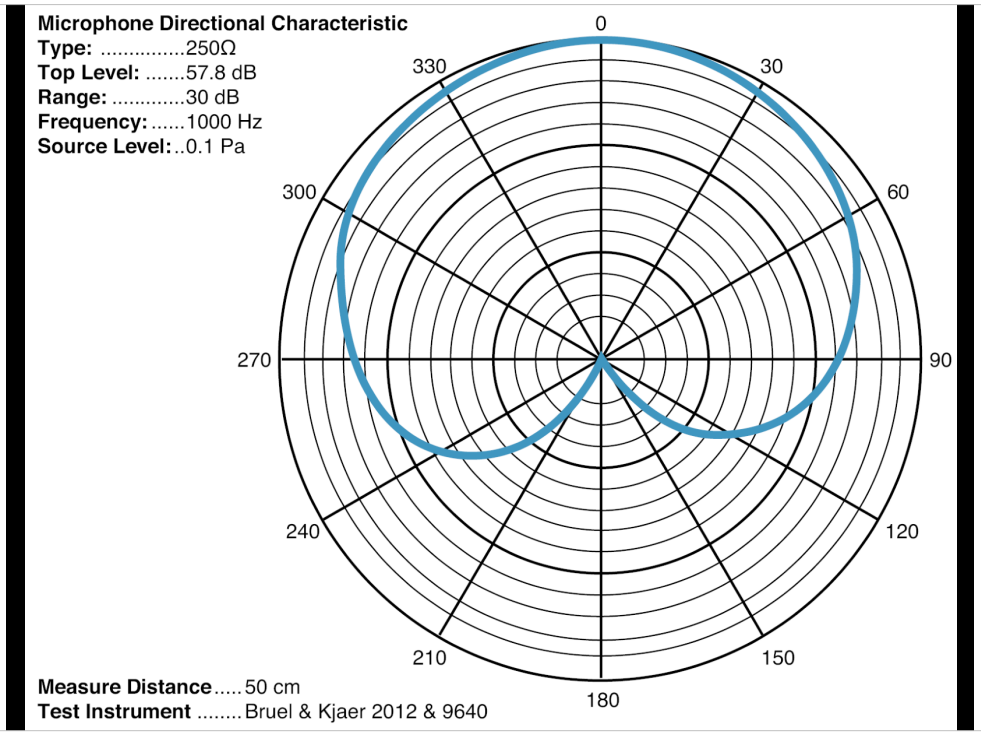
Here we have CD player #1 in the upperleft and the DVD player, CD player #2 and the Tape player

The piano via the Organ Mixer, S11 & S12, CD players, DVD player,Tape player and computer plug in to this mixer that we call The SUB MIX. There is also a 1/8” stereo plug Connected for MP3 players.

This Sub Mixer connects to the Splitters

We have 7 wireless microphones

We do not test the microphone by banging on them
They are designed to use SOUND VIBRATIONS
NOT IMPACT VIBRATIONS



This graph shows the pickup angles. 0 at the top picks up the most sound. Turning the mic away so it's 90º from the source picks up ~2/3 of the sound. Having the mics butt pointed toward a speaker means it won't pickup any sound from that source.

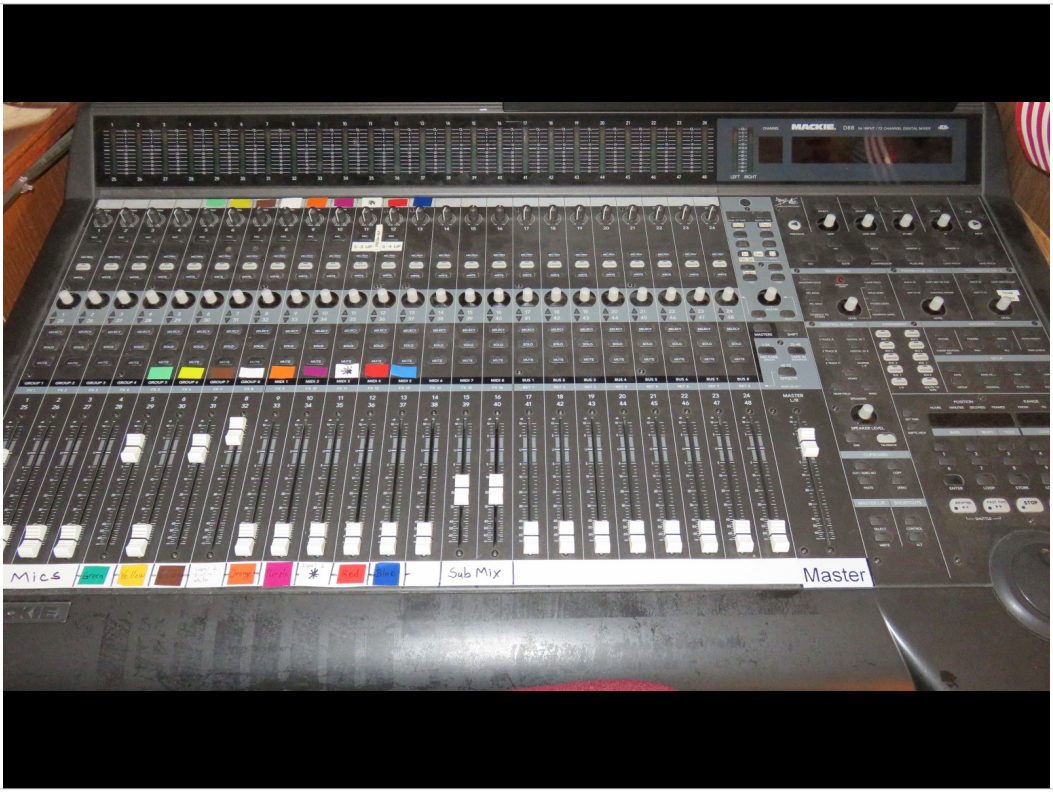
These Microphones work best when pointing directly at the sound source.

The frequency response is best when 1-2" away from the source.

And 4 wireless beltpacks

The mics and packs send their RF signals to these receivers which send the signal to the splitters

Once all the signals reach the booth, they go into 2 splitters. From there they go to this mixer in the Media Room and
<NS>



To the Main Mixer

This is “The Rack”

From top to bottom we have…
The Main Mixer Power
An Equalizer
2 splitters
Floor Wedge speaker amp
Hearing Assist Loop

The signal from the Main Mixer go to the FOH Amplifier and the Monitor Speaker Amp.

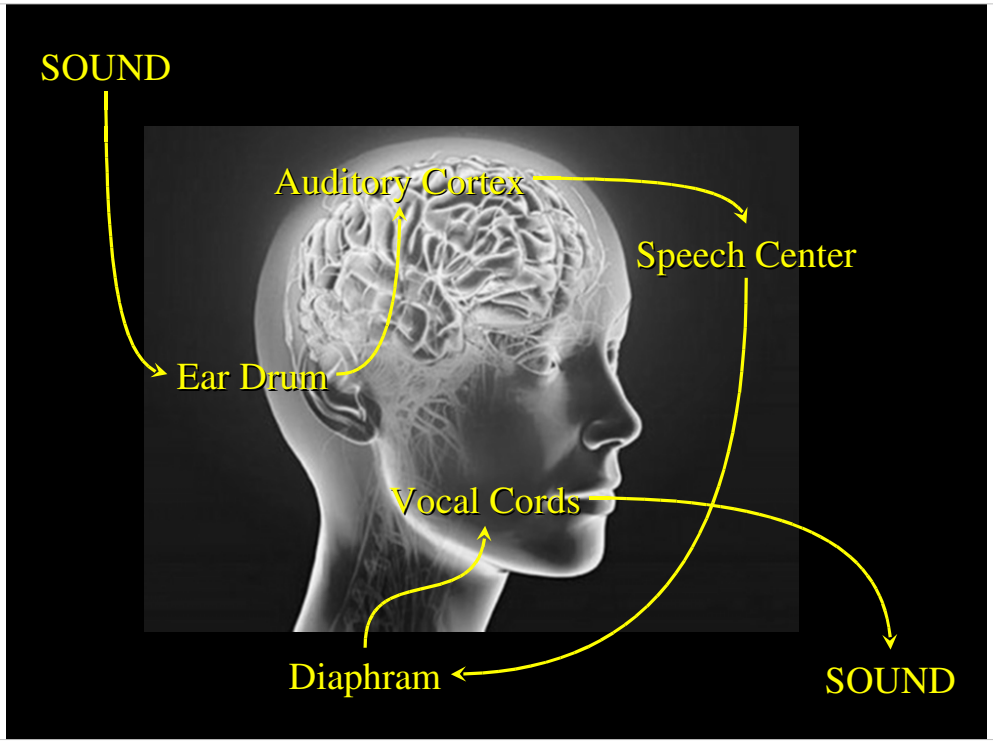
<NS>

Then off to the Front of House Speakers
These speakers have a 65º x 65º sound cone.
<NS>

And to the floor wedges or Monitor Speakers. Speaking of which, we don't have true monitor Speakers. True monitor speakers have a cone of Sound you must stand in to hear the speaker, thus preventing other mics from picking up the speaker.

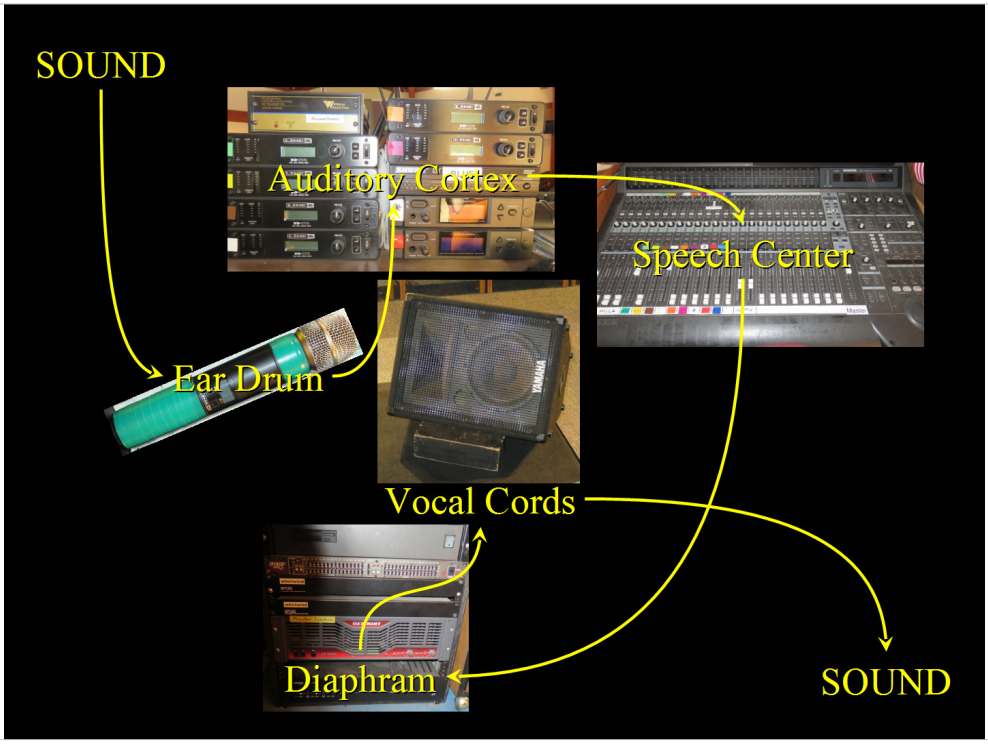
The first recorded time that a loudspeaker was used specifically as a stage monitor was for Judy Garland at the San Francisco Civic Auditorium on September 13, 1961.

So how does all this stuff work together?
Repeat after me…
"Mary had a little lamb"
What just happened?
<NS>



The sound entered your ears and was converted to electical impulses or SIGNAL by the ear drum.
That signal was sent to your Auditory Cortex for Initial processing (To figure out what I said)
and then sent to your Speech Center for duplicative processing and conversion, then to your Diaphram, making air push out of your lungs and Thus make your vocal chords vibrate to produce…
Ta Da!!! Sound!

Our audio system does the same thing!
<NS>



The sound enters the Microphone, vibrating a diaphram that converts the vibrations into a radio frequency. The frequency is picked up by the Receivers and converted into Mic Level electronic signals.
That signal is sent to the Mixer for processing at Line Level. The Mixer sends the processed signal to the Amplifiers which send the strongest signal to the Speakers which vibrate the cone, thus producing sound.
Your brain is connected with nerves, our system is connected with cables.<NS>

Equipment

CONNECTIONS

PLUGS: XLR

1/4” TRS

1/4” TS

1/8” Stereo

All the cables have plugs. Here are the four types we will typically be dealing with.

XLR which is a balanced cable with one signal
(XLR = Ground-Left-Right / Extra Long Run / External Line Return / Cannon X series, Latch, Rubber)

1/4” Tip Ring Sleeve: which is balanced or unbalanced, based on the number of signals being sent 1=Balanced, 2=Unbalanced

1/4” Tip Sleeve: which is unbalanced since it can only carry one signal

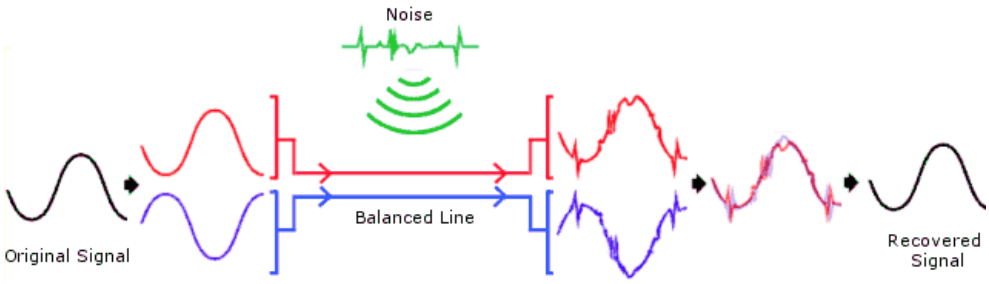
1/8” Stereo which is typically unbalanced with two signals

So what is Balanced and Unbalanced?<NS>

Equipment

CONNECTIONS

Balanced vs Unbalanced



A Balanced cable has three wires. Two signal wires to carry the signal data and a third ground wire. The two signal wires, carry the same signal, except the signal on one of the wires has a reversed polarity. So one is opposite of the other.
If any noise is picked up by the wires the noise will be identical on both signal wires.
When the inverted signal is reverted, the noise on this wire is now inverted.
The opposite noise signals now cancel each other out, leaving the original, unaltered signal.

Coiling Cables

We do NOT coil Cables the same as Cords.

A cord transmits POWER
A cable transmits DATA

Coil cables using the Over-Under technique

Electrical cords are more robust and can tolerate being twisted while coiled.

Audio cables are very delecate and have a natural coil. Try to fight that coil and bad things happen: the cable eventually twists on the inside, and when you needed it the most, the cable will fail. Because cables always fail when you need them the most.

Two methods of coiling, Grab and Release & Constant Contact.

<Demonstrate using the over-under technique>

Performance Preparation

Equipment Activation

1. Organ Sound Board
2. Front Power Strip
3. Main Mixer
4. Rear Power Strip
5. Main Speakers

This sequence eliminates the possibility of damaging the speakers.

Everytime a piece of equipment is plugged in or turned on, it sends out an electrical spike!

The power strips turn on sources and also the Amp/EQ & Splitters.

Then turn on the Main Mixer. Wait for it to complete it's software loading and Updating procedure. Ensure all faders are down and the Master Monitor is down.

Then turn on the Main Speakers.

If you don't hear a pop, that's a good thing.

Performance Preparation

Power Checks

- Power lights
- Batteries

Conducting the Power Check is the most intuitive. We all know if something is on or not. Except for the in-rack Equalizer. If you see the red dot on top of the switch, it will turn on with the power strips. There are no lights on the Equalizer that light up.
The only piece of equipment we need to manually turn on/off on the Rack is the Main Mixer.
The microphones and the receivers display a "Time Remaining". The receivers also have an LED display to show remaining power of the batteries.
The Main Speaker push button also has a Red and Green button showing it's powered status.

Performance Preparation

Microphone Placement

We need a microphone for the people who do the...

- Welcome / Prayer Request
- Tithes and Offerings
- Children's Story
- Special Music (As needed)

Let's figure out how to make this easy

Proper Planning Prevents Piss Poor Performance

Our participants are still going with how it was done. Since we've made changes with the Praise Team using Mics, there is confusion with what mic they should use.

Let's get together and figure out a streamlined system for Microphone Management.

For example, teaching everyone that the Brown mic is for Announcments and the Yellow mic is for Children's Story. This way, after Call to Worship, the Brown mic can stay at the podium and the yellow can be preset to House Right.
<NS>

Performance Preparation

Cable Management

When cables are being used in an area where people will be walking, they need to be taped down.

There are many ways to tape down cables, but only ONE way to pull them up.

<Demonstrate how to tape down a cable>

<Demonstrate how to pull up a cable>

Performance Preparation

Line Checks

*This checks for signal **into** the **mixer***

- The Gain knobs on the mixer should be PRESET or at the Unity "U" level
  (12 O'clock position)
- There should be some indication of input on the meters when providing a source signal

Presetting the Gains means if we know who is going to be using a microphone and we know how loud they naturally talk, we can set the gains accoring to them. Pastor Bill's Gain works well at the 12 to 1 O'clock position.

Providing a source signal means if you have a microphone on, and you're talking into it, it's going to provide a signal. Since it's a microphone and microphones are sources… it's a source signal

Line checks should not be confused with Level Checks and Sound Checks.<NS>

Performance Preparation

Level Checks

*This checks the **sound volume***

- Turn off the Mutes
- Set Channel and Main Faders to Unity
- Set Monitor level (12 O'clock) if required

This process is typically conducted in lieu of the Sound Check since we really don't do Sound Checks.

Normally a mixer's faders are used to adjust the volume of a channel. Since our church contains younger and older people, sound is completely relative. So we should run the mixer backwards.

By setting the faders to Unity we can establish a base line for volume. Using the Gains, we can then SEE if one signal is stronger than another.

Then using the Main Fader, we can adjust the overall volume as needed.

Performance Preparation

Sound Check

*This checks the **sound quality***

This step is only needed for Special Music and whenever a new situation exists

- One at a time, each person (vocal or instrument)
- Apply dynamics (EQ, Gate, Compression) as needed

People tend to confuse Sound Check with the Line and Level check. There is a big difference. The Sound Check is for the Sound Board Operator.

This is when they make the signals coming into the mixer sound the best they can when the signals leave the mixer.

In a band setup, this is imperative. Here, not so much.

Performance Preparation

Rehearsal

This step is only needed for the
Praise Team and Special Music

- The Resersal is for the Singers to practice
- Special Music is an exception
- Try not to interrupt
- Walk the room

The Rehearsal is for the musicians and singers

For Special Music, we conduct a Level Check, Sound Check and Rehersal at the same time. It's not right, but it's better than not.

LEVEL CHECK:
If they bring a CD to sing or play with, we need to set an appropriate level. Ask them not to sing until you've set the Main Speaker Level. Start playing the music. Set the Main Speakers to a comfortable level. Then bring up the volume of the music through the floor wedges until they are happy. We don't want to hear the wedges more than the Main Speakers. Then start the music over and tell them they can rehearse. If they want to hear themselves, bring up their voice in the wedge last. Balance their voice over the music. Especially with the Mains.

SOUND CHECK:
Then add any EQ, Gate and Compression as needed.
Get out of the booth! Walk around the room to determine how it sounds overall.

During Performance

Observing

- Watch for different people speaking
- Constantly observe input levels
- Inputs should be ~ 2/3 of meter's mid point
- Keep an eye on the audience for signs of not being able to hear or if it's too loud

STAY FOCUSED

Our most common error is missing a cue. If a mic is on, but not in use, we should have it muted. We don't want stage noise, ambient noise or the main speakers' sound coming back through the system. By following the "program" we can anticipate when someone else is going to speak. Stay Alert, don't get distracted. The Pastor, Speakers and Singers all need to trust that their mic is going to work.

Watch someone when they get on stage, they pause for a moment and they wonder if they can talk. Unmute their channel and give them a Thumbs Up

During Performance

Listening

- Cracking: Signal too strong
- Hissing: RF interference, weak signal
- Popping: Static or broken wires

STAY FOCUSED

During Performance

Adjusting

- Adjust Gains to keep signal in proper range
- Keep music lower than vocal

STAY FOCUSED

This step is vital during the Call to Worship.

The Praise Team members may move the mic closer or farther from their mouths. Therefore a Gain adjustment is needed.

One may sing louder because they know that part of the song better. A Gain adjustment is needed.

The piano may play louder or quieter because of the mood of the song. A Gain adjustment is needed

Not every song will sound the same.

Post-Performance
Equipment Reset

- Reset Gains to the LOWEST positions or the Unity “U” level
- Lower **Channel** and **Main** Faders to Minimum
- Lower Main **Monitor** volume

Post-Performance

Equipment Deactivation

- Main Speakers
- Rear Power Strip
- Main Mixer
- Front Power Strip
- Organ Mixer

Post-Performance
Equipment Stowage

- **Ensure** Wireless BeltPacks are **OFF**
- **Ensure** Wireless Hand-held Microphones are **OFF**
- Recharge batteries as needed
- Lock it up

If we have used mic stands, stow them back in the cabinet.

Coil cables properly when no longer needed.

If the floor Wedges are in the way, put them back.

Here’s one way to get everything to fit.

Video

Equipment

Computer w/Dual Monitor & Projection

What's the Password?

- Video Switch
  - Main Projector
  - Dual Rear Displays
- Remotes
  - Projector
  - Rear Displays
- Clicker (Right-hand Monitor MUST be "active")

Projector Remote:

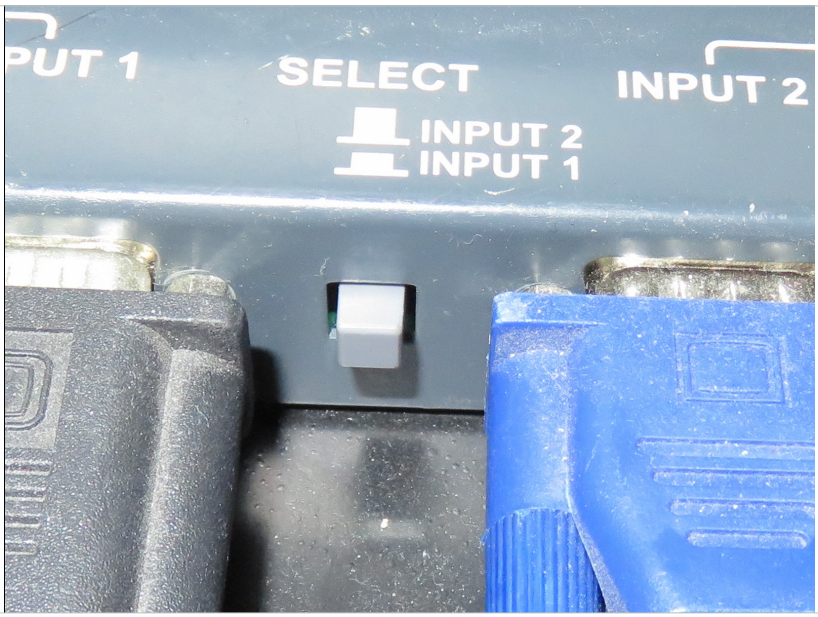
The green button places the projector in standby mode. Need to press twice.

The red button turns on the projector and it takes a minute for the bulb to warm up.

This video switch box is on top of the computer.

If the switch is in, it will display the right-hand monitor display of the computer.

If the switch is out, it will display whatever is connected to the blue VGA cable.


PUT 1
SELECT
INPUT 2
INPUT 2
INPUT 1

Remotes for…

Rear Display

Projector

Projector Reveiver

Clicker (Cased and Uncased)

END OF A/V LESSON
CONTINUE WITH THE
SOUND BOARD???

In Depth

The Mackie D8B
Digital Mixing Sound Board

Terminology

MIXER TERMS

INPUT: A plug connection to connect equipment

CHANNEL: A pathway through an audio device, along which an electrical signal flows

BUS: The pathway to an output, along which an electrical signal flows

FAT CHANNEL: Provides Digital Signal Processing (DSP) *(Frequency Adaptive Transform)*

DYNAMICS: High Pass Filter*, Gate, Compressor, Limiter*, Equalizer

** Not available on the D8B*

Terminology

MIXER TERMS

INPUT LEVELS

MIC INPUT: The lowest, or weakest, level signal of the four and requires a preamplifier to bring it up to Line level.

INSTRUMENT INPUT: Are between MIC and LINE level signals and have the most variation. You typically see this kind of signal come from an electric guitar or bass. A preamplifier is required to bring the signal up to line level.

Terminology

MIXER TERMS

LINE INPUT: The highest level signals *before amplification*. This is the type of signal that typically flows through your recording system after the preamplifier stage and before the amplifier that powers your speakers.

Be careful not to send a line level signal to a preamplifier expecting a mic or instrument level signal.

SPEAKER LEVEL: The highest level of the four signals that come out of an amplifier

Terminology

MIXER TERMS

BUSSES

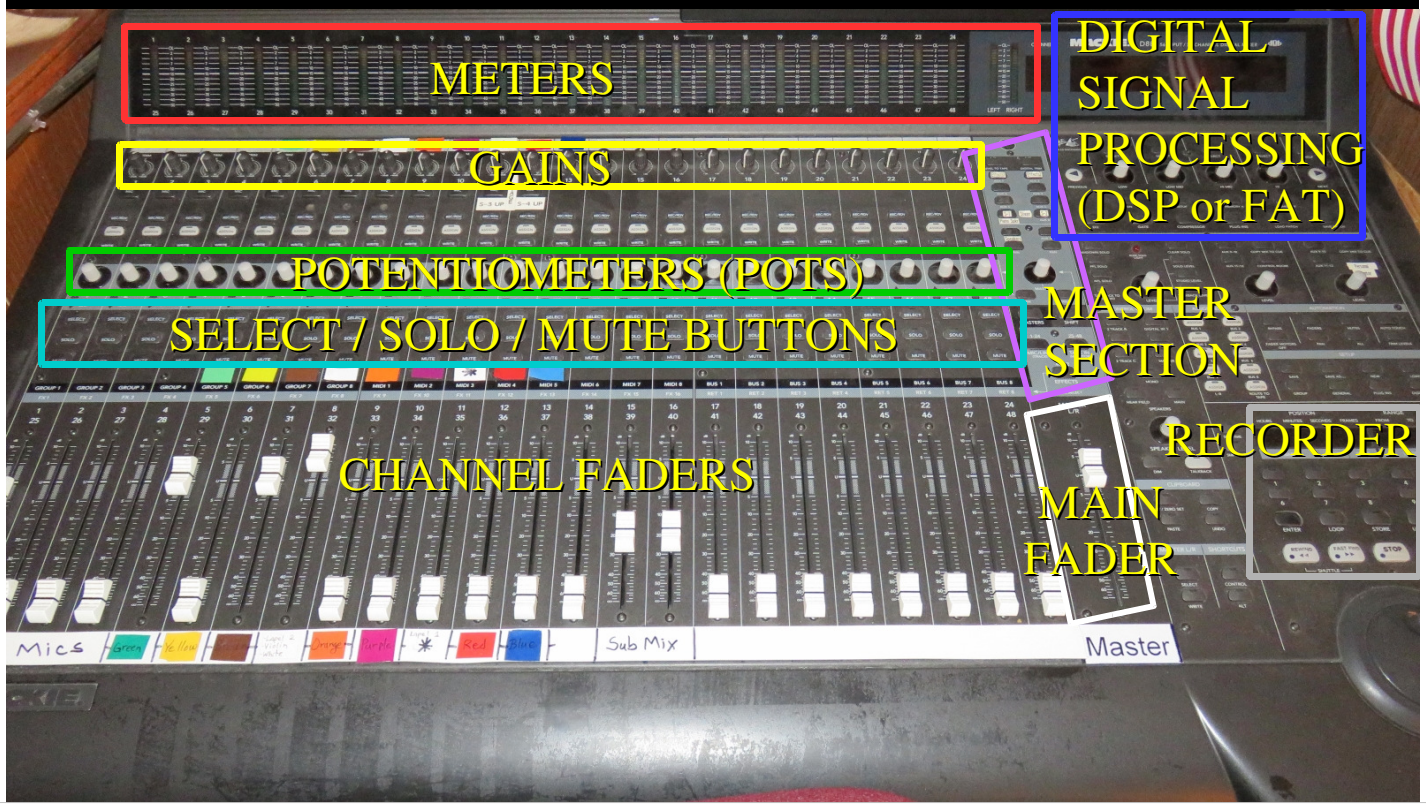
MAIN BUS: The primary output to the House Speakers' amp

AUX BUS: An auxilary output ie. to a Floor Wedge Speakers' amp

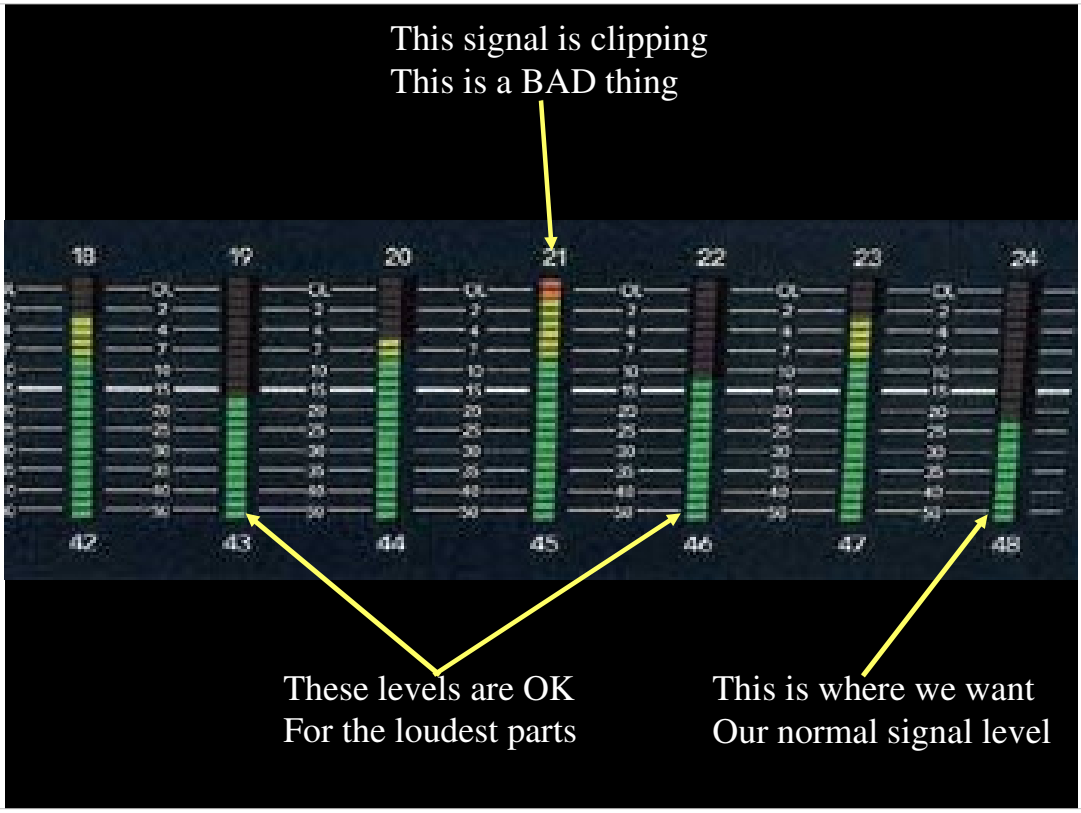
FX BUS: A path signal takes to add effects

DYNAMICS BUS: (Also the FAT channel) A path signal takes through digital signal processing (DSP)

Mackie D8B Digital Mixer



METERS: Display the signal input levels
GAINS: Alter the strength of input signal
POTS: Alter various aspects of the signal
SELECT BUTTON: Selects the related channel for signal manipulation
MUTE BUTTON: Allows or Prohibits the signal from passing through the faders.
CHANNLE FADERS: Alter the amount of signal per channel to the Main Fader
MAIN FADER: Alters the amount of signal to the amps
DSP or FAT: Manipulates various aspects of the signal
MASTER SECTION: Distributes signal to Aux busses
RECORDER: Stores 99 scene Snapshots to a data file.



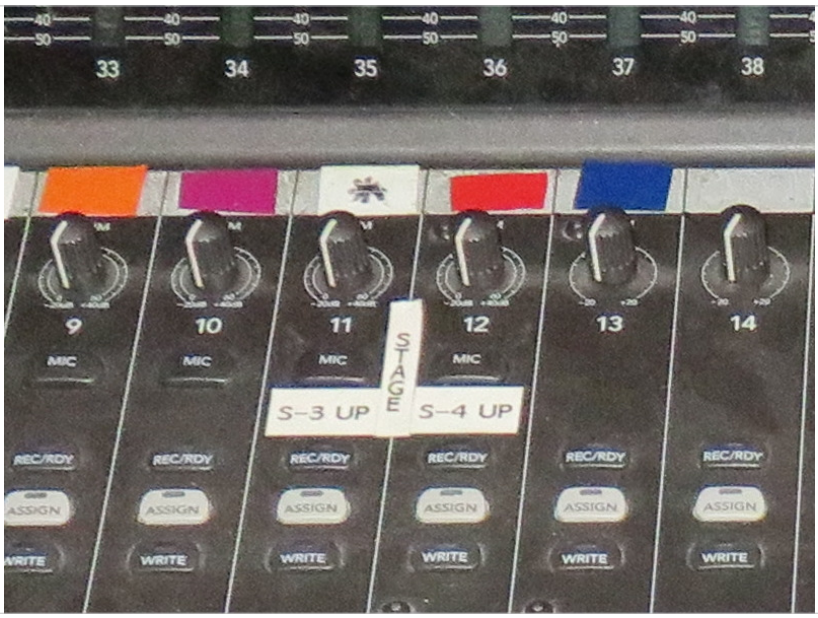
The Gains control the amount of Input Signal.

We want the normal range to peak at -25dB

Louder parts can reach the -15dB line.

We don’t want the Meters reaching the yellow
And certainly not the red areas.

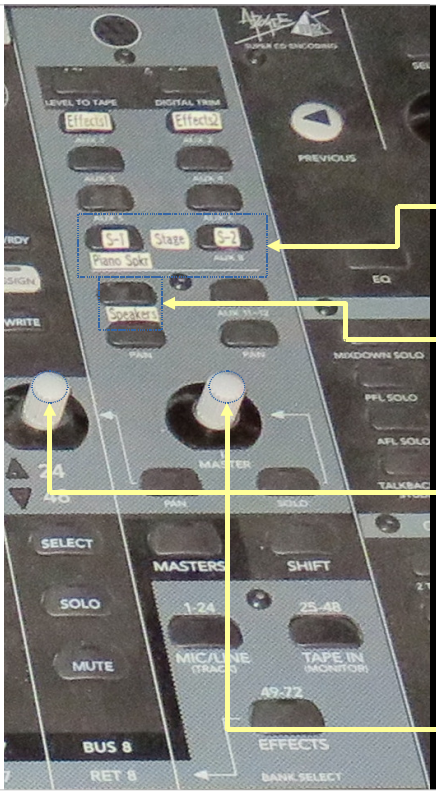
All these meters have PEAKS but only one is CLIPPING



Channels 11 & 12 also receive line inputs from the S-3 and S-4 inputs on the stage.

If the MIC button is DOWN, the mixer will receive inputs from the RF receivers.

If the MIC button is UP, the mixer will receive line input from stage inputs S-3 & S-4.



MASTER SECTION

By selecting the S-1 & S-2 Buttons,
We can also send channel signal to
The stage S-1 & S-2 outputs

Press SPEAKERS to select the
Floor Wedge AUX BUS

Turn the POT on the required
Channel to adjust the amount
of signal to the floor wedge speaker

Turn the POT on the MASTER
To adjust to overall volume

DSP or FAT CHANNEL

SELECTED CHANNEL

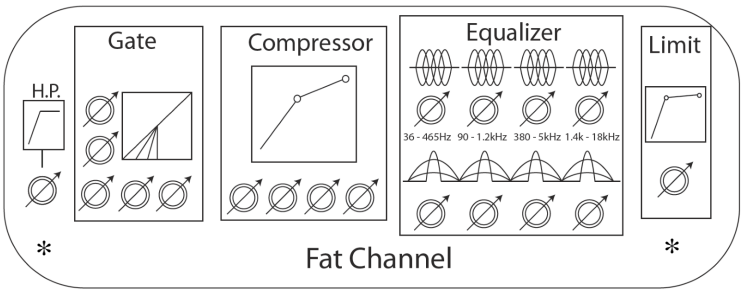
DIGITAL DISPLAY

POTS

EQ GATE COMPRESSOR

FAT Channel / DSP

Typical flow of signal is through…



HIGHPASS FILTER* – GATE – COMPRESSOR – EQUALIZER – LIMITER*

** Not included on the D8B*

The signal through the FAT channel or DSP is typically…

Highpass Filter

Gate

Compressor

Equalizer

Limiter

High Pass Filter / Low Cut Switch

The Main Mixer does not have this feature.
The Mixer in the Media Room does.

- This feature will cut lower frequencies, allowing the HIGH freqs to PASS through the channel.
- Some boards have a fixed freq ie 75 or 150Hz
- Others have variable freq settings.

The HighPass Filter allows us to stop low freqs from entering the system from undesired sources so we can hear the Bass Guitar properly. Another example is when the bass drum gets picked up in the cymbal mics.

It also can be used to clear up speech

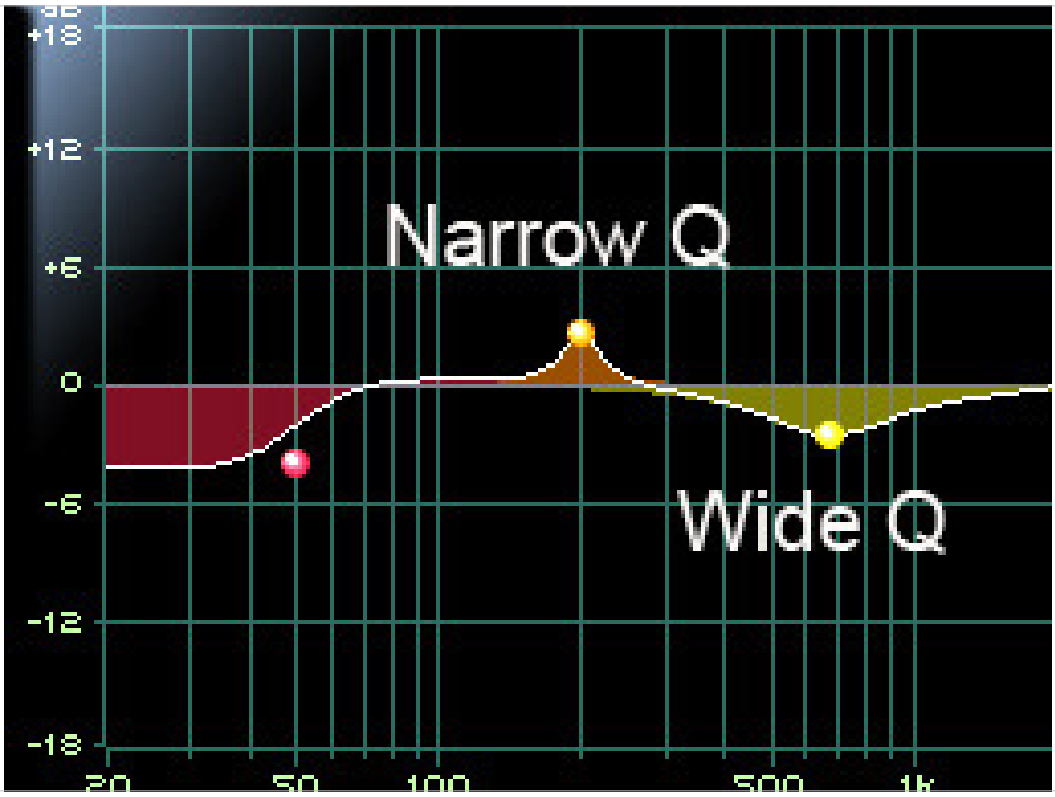
Equalizer

TYPES

FIXED: A preset Freq and Spectrum (Q) where the gain may be adjusted.

SEMI-PARAMETRIC: An Adjustable Freq but a fixed Spectrum (Q) where the gain may be adjusted

PARAMETRIC: An Adjustable Freq and Spectrum (Q) where the gain may be adjusted



This graph shows a Parametric EQ in use. In the middle, we see an orange dot on the 200Hz line and it's gain has been increased 3dB. It has a narrow "Q" of about 100Hz.
On the right, we see a yellow dot near the 700Hz line. It's gain has been reduced 2dB. It has a wide "Q" of about 1.5KHz.
The red dot on the left is on the 50Hz line and it's gain reduced to 4-5dB. You can see there is no "hill". This is called "Shelfing" since the "shelf" feature is on. This mixer has no "shelf" feature.

This image simply shows the variables available. There is a Gain, Freq and “Q” for each of the four bands.

This mixer does not have a 31 band EQ.

We can adjust the EQ using this feature on the computer or using the POTS and Digital display on the mixer.

The Gate, allows or prevents signals from passing through the channel.

If a singers mic is picking up the piano, the piano signal will normally be weaker than the singers. We can set the Gate's threshold, to make it stay closed, to prevent the piano signals from passing through when the singer is not singing. When the singer does sing, we can have the gate open, allowing the singers loud voice to pass through the channel.

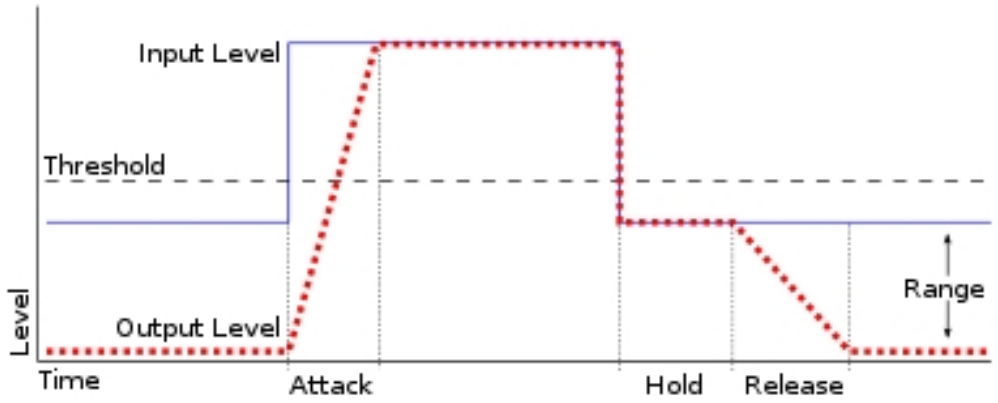
Gate

THRESHOLD: The level at which the Gate opens, It is calebrated in dB, ranging from -60 to -1dB

ATTACK: How quickly the Gate opens, It is calebrated in milliseconds (ms), ranging from (10-600)

RELEASE: How quickly the gate closes, It is calebrated in ms, ranging from (10-2500)

RANGE: Determines the change in output level as a function of the change in input level. This is sometimes called downward expansion. It is calebrated in dB, ranging from 0-100dB.



This graph shows the blue input level is lower than the threshold, so the gate stays closed, not allowing the output to pass. When the input passes the threshold, the gate opens (attack). When the signal drops below the threshold, the gate closes (release). This mixer has no “hold” setting.

Considering the Gate prevents weak signals from passing into the channel, the Compressor reduces strong singnals.

A doorway is 7ft high. A 6ft man has no problem going through. However an 8ft man must duck.

Compressor

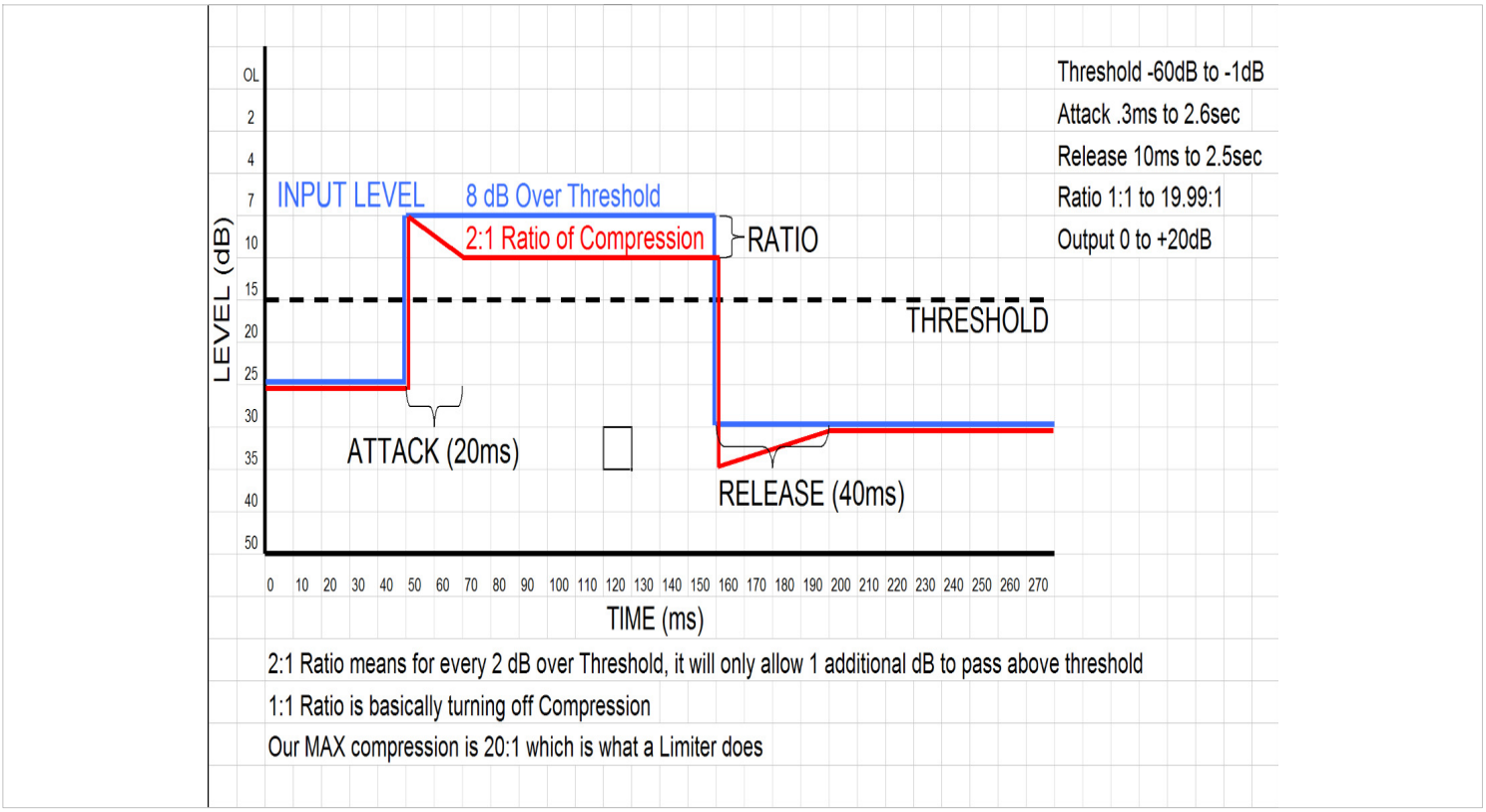
THRESHOLD: The level at which the compressor activates

ATTACK: The amount of time in Miliseconds (ms) it takes for the compressor to activate

RATIO: The amount of compression

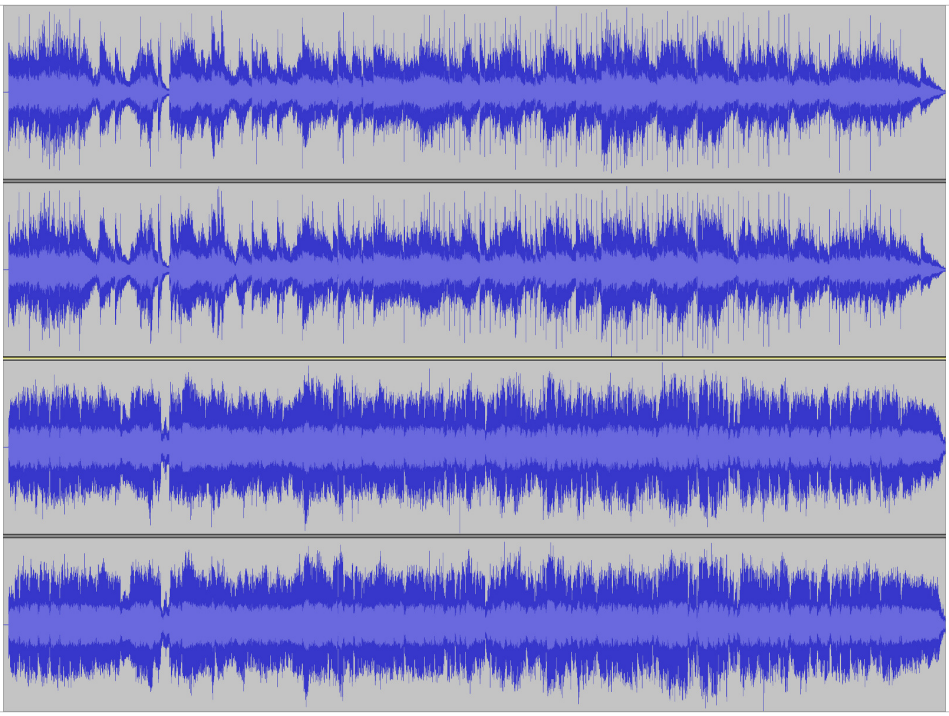
RELEASE: The amount of time in Miliseconds (ms) it takes for the compressor to deactivate

OUTPUT: Compensates for lowered levels



We can see in this graph, as long as the blue input level is below the threshold, the compressor will not affect the output level. When the input does exceed the threshold, the compressor takes 20ms to activate, or reduce the output level by the ratio of 2:1. The compressor will allow 1dB of signal to exceed the threshold and pass through the channel, for every 2dB that's over the threshold. When the input drops below the threshold, the compressor will take 40ms to match the input level.

A ratio set at 10:1 means the input signal must reach 10dB over the threshold, for the compressor to allow 1dB over the threshold to pass through.



This image shows two wave forms. The two tracks on top have no compression. Showing the wide range of Dynamics. The Dynamic range is just the difference between the loudest and quietist parts.
The two on the bottom do have compression. You may be wondering why the bottom two are fatter. This is where the “Makeup Gain” or “Output” setting comes in. The compressor reduces the Dynamic Range of a signal. A lot of compression will make the signal weaker. We can compensate with the Output level to Makeup the Gain lost.

Limiter

Our mixers do not have this feature.

- This feature is a ceiling for signal strength
- It's basically a preset Compressor

A Limiter is very useful for preventing a boisterous speaker from hurting our ears.

Where the compressor take time to activate and deactivate, a limiter is instantaneous.

This area allows us to store our mixer settings in “Snapshots”. We can make a file on the computer that stores 99 snapshots. To store a Snapshot, press the Snapshot button then type in the Snapshot# from 01 to 99. Then press Store and then Enter. This only stores the Snapshot to the file. The file must then be saved by pressing CTRL+S on the keyboard.


That’s all folks!

Documents for Additional Learning

http://www.anadrac.com/church_files.htm

- Lesson
- Handouts
- Mixer Manuals
- Receiver Manuals