

Studio Audio - Introduction:

The Audio Technician on a studio production has several responsibilities, before, during and after the production:

- 1) **Microphones:** Selecting, placing, and testing the most appropriate unit for the type of sound to be recorded.
- 2) **Pre-recorded Sound:** Preparing, cueing, and playing-back music, sound effects, etc.
- 3) **Blending Sound:** Mixing together sounds from several different sources to create a pleasing blend (e.g.- no instrument in the band sounds louder than the others).
- 4) **Regulating Volume Levels:** Audio which is too loud can sound distorted to the listener. If volume is too low, the sound quality suffers from excess noise.

The Mixing Board:

The main tool of the audio technician is the "Mixer." This device allows individual volume control and blending of up to 24 different sources of sound. Each device (microphone, CD player) is connected to a "**Channel**" on the mixer, and each channel has a "**Fader**" to regulate its volume.

The mixer also lets the technician pipe the sound from any given channel to speakers in the studio or incoming callers on live call-in shows, and to control the quality of sound by adding bass, treble, or echo effects.

Good audio mixing requires both the ears and the eyes. The operator can listen to the sound through the **Program Monitor** speaker or headphones, and must also watch the display on the **VU Meter** -- which gives a visual readout of loudness -- to regulate the volume of sound being recorded and broadcast.

Before the Program:

The operator should discuss the audio requirements of the production with the Producer and Director. Some issues to consider include:

- 1) What type of sound will be recorded? People talking, singing, playing instruments? Will there be an audience? Will the audience ask questions, clap, laugh, boo?
- 2) If people will talk, will they be sitting or moving? Is it acceptable to see their microphones, or must they be hidden?
- 3) Will the viewers be invited to call-in and ask questions?
- 4) Will there be pre-recorded sound included in the show? Will it come from a compact disc, laptop, smartphone? The audio technician should become familiar with each segment of sound to know where it begins and ends, when it will be used during the show, etc.

After the Show:

- 1) Return any checked-out equipment to the Equipment Room.
- 2) Normalize the audio board. Set all controls to positions indicated by green dots. This step may avert an audio crisis on the next program.

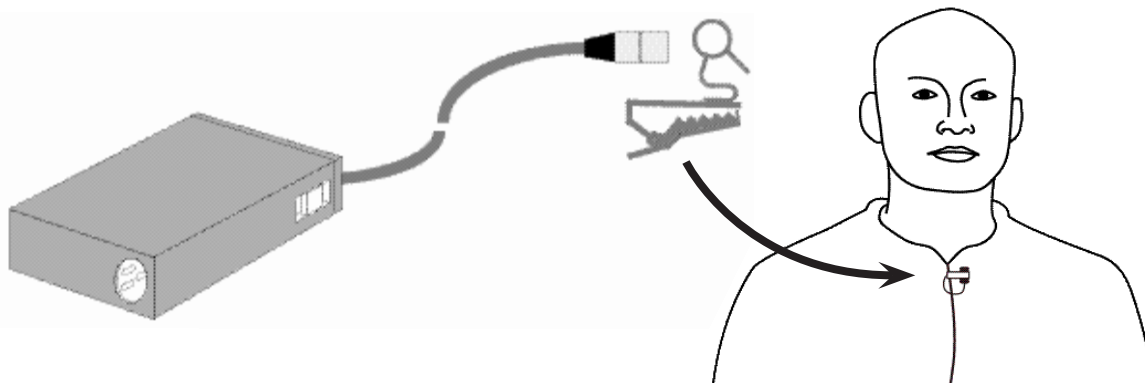
Microphones:

Two of the critical decisions in producing quality sound are:

- 1) Selection of the most appropriate microphone for the type of sound
- 2) Proper placement of the microphone in relation to the sound source.

Lapel Mics:

One of the most commonly used mics in studio production is the lapel mic. Its small size makes it barely noticeable when pinned to the clothing. The Lapel Mic is intended for use primarily in sit-down interview style productions where there isn't much movement.



- 1) **Hide the Microphone.** After seating the talent, feed the “connector” part of the lapel mic down through the subjects clothing, so only the head of the microphone and a few inches of the attached cable are sticking out above the subjects collar.

Pull the connector and excess cable out at the rear bottom of the shirt or blouse, and lay the connector on the floor just behind the subjects chair.

The microphone head should be no more than 6” below the subjects chin, centered on the chest if possible.

- 2) **Pin It On.** Slip the ring of the clip over the head of the microphone, and clamp the clip onto the subjects lapel, necktie, shirt opening, or collar.

Make sure the mic head is on the outside of the clothing, and won't rub against jewelry or fabric. Use the mic clamp to pin the cable against the backside of the clothing to help keep the cable hidden from view.

- 3) **Plug It In.** Connect a 25' audio cable (called XLR) from the connector to one of the numbered XLR connectors on the west, north, or east studio walls (behind the curtain).

Since you may be using several mics for the show, plug the mic on the person furthest left (facing the stage) into XLR jack #1, the next person into #2, etc. to help keep them organized.

Other Microphones:

When shooting performance style productions in the studio, you may prefer to use a mic which can be handheld by the performer, mounted on a stand, or even suspended from the lighting grid overhead.

One of the characteristics that distinguishes different models of microphones is called “Pick-up Pattern”. This feature describes whether the mic is most sensitive to sound in the direction it’s pointed and filters out sound from the sides and rear, or tends to pick-up sound in all directions. MetroEast offers 3 different types of mics for different uses:

Shotgun:

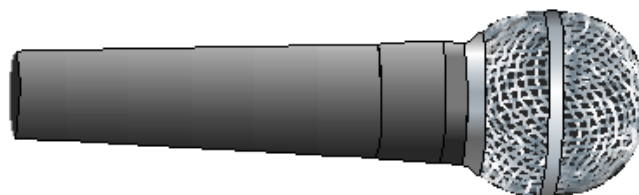
This mic is extremely directional, and so must be kept constantly pointed at the source of sound. Its ability to filter out background noise makes it the mic of choice for picking up sound from a distance. However, it has limited uses in a studio setting.

If you are producing a program that includes audience members asking questions or making comments, you might assign a crew member to keep the shotgun mic pointed toward the audience member.



Cardioid:

This is the mic of choice for singers and similar performers. It is less directional than the shotgun, but directional enough to minimize feedback where the performer needs to hear herself in a monitor speaker.



MetroEast has 2 models of cardioid mics; the one shown here (SM-58) has a “pop screen” for reducing breath noise of singers and announcers.



Omni-Directional:

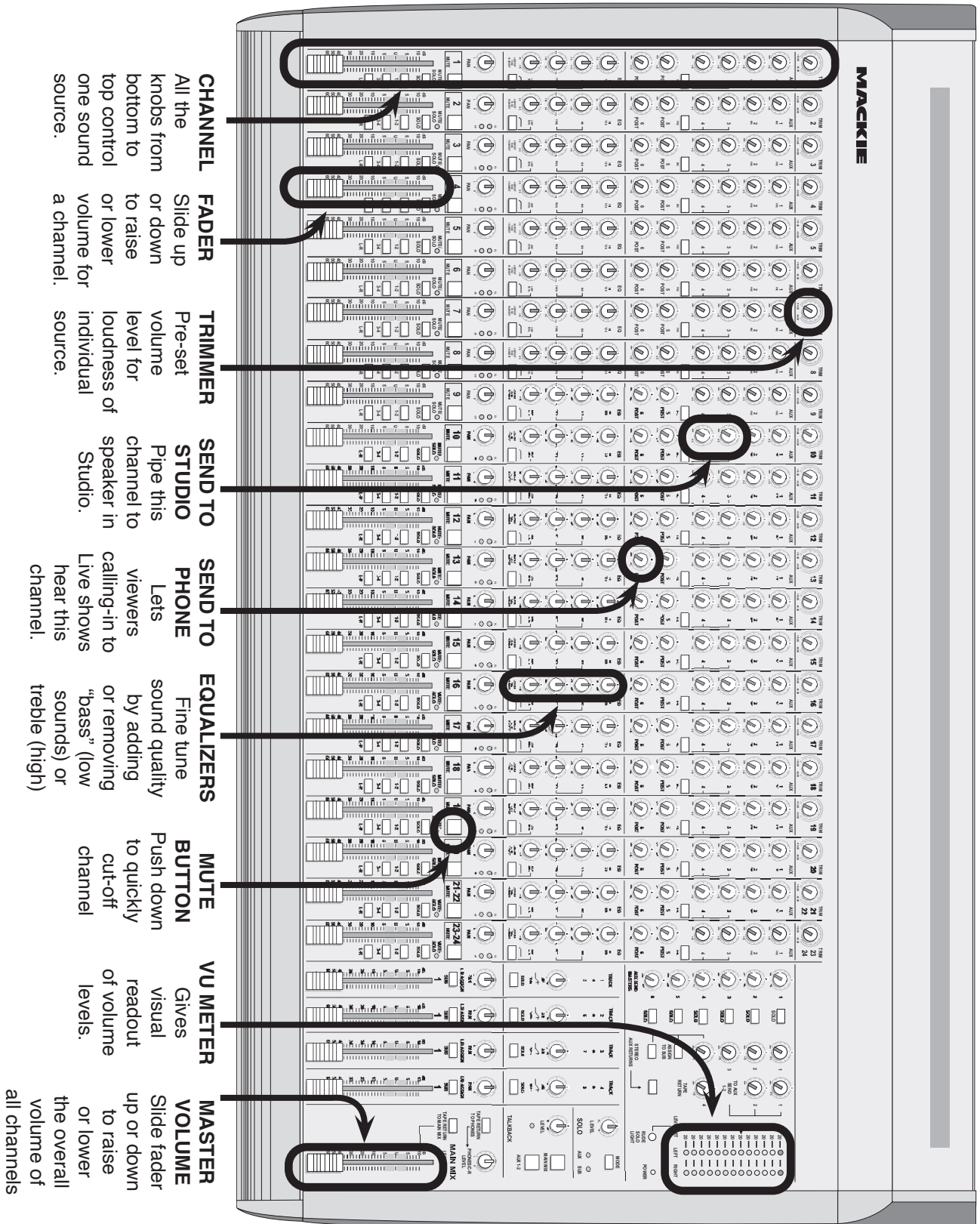
The least directional of the three mics shown here, the “omni” is useful for picking up sound over a larger area. If shooting a play, for example, where the talent are moving around while they speak, the omni will do a better job of “hearing” the performers when they aren’t standing right in front of the mic.

Other Mics:

MetroEast also can provide **Wireless Microphones** for productions where the talent needs to be able to move around a great deal and still be heard. The wireless consists of a small transmitter pack which is clipped to the belt, and a receiver unit which remains stationary, up to 200 feet from the performer.

Mixer Overview:

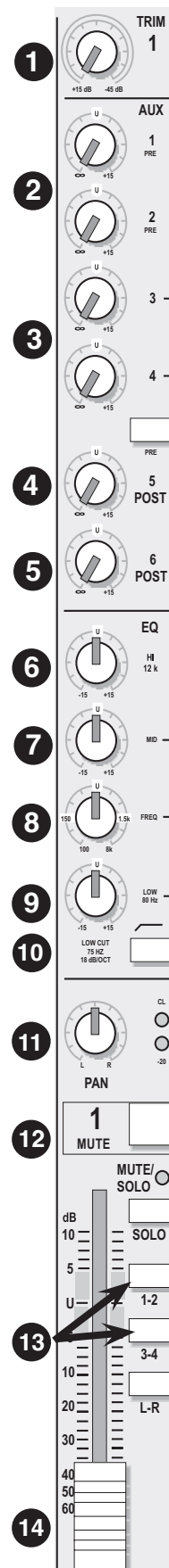
Although it looks daunting, once you understand the controls in one channel, they are simply repeated over and over for 24 channels. Here's the basic layout of the board:



The Channel:

Each of the 24 “Channels” are virtually identical in layout. Here is a close-up view of one channel, and the “normal” setting for each:

- 1) **TRIM:** If the talent on Channel 1 speaks more loudly than the person on Channel 2, use the TRIM knob to pre-adjust their volumes so that the FADERS (#11) can be set to the same position for both. Normally set to about the 5 o'clock position for mics, 12 o'clock for everything else.
- 2) **AUXILLIARY CHANNELS 1-2:** To Master Control (these are in addition to the normal feed sent with the Master Volume control)
- 3) **AUXILLIARY CHANNELS 3-4:** Feed the sound from a channel to the left or right speaker in the studio. On live call-in shows, for example, the talent in the studio can hear the voice of a caller. Turn down any “send to studio channels you don’t need.
- 4) **AUX 5 (Send to Studio):** Feed the sound from a channel to a speaker in the studio. On live call-in shows, for example, the talent in the studio can hear the voice of a caller. Turn up phone channel, turn down others.
- 5) **AUX 6 (Send to Intercom):** Lets camera operators hear program audio through their Intercom headsets (currently not active)
- 6) **EQ “HI”:** Add or reduce high frequency sound on channel. When centered, sound is not affected. Turn clockwise from center to add, and counter-clockwise from center to reduce. The EQ knobs (6-9) should normally be set to the 12 o'clock position.
- 7) **EQ “MID”:** Add or reduce middle frequency sound on channel. The human voice falls mainly in this range. Like the “HI” knob, center is neutral, clockwise to increase, counter-clockwise to decrease.
- 8) **EQ “FREQ”:** Selects what frequency is affected by the MID knob.
- 9) **EQ “LOW”:** Add or reduce very low, bassy sounds. Works like “HI”.
- 10) **LOW CUT FILTER:** Like the EQ knobs, when pushed down, this button filters out most of the sounds near the bottom range of human hearing. Leave this feature on for most sound sources.
- 11) **PAN CONTROL:** When centered, sound from this channel is equally distributed between the 2 audio tracks on the videotape recorder. This permits the technician to create a “stereo effect” with multiple mics.
- 12) **MUTE:** Push down to instantly cut-off a channel. This button should normally be left popped-up. A small red light indicates a muted channel.
- 13) **SUB-MASTER ASSIGN:** Can be used to “group” several channels together so that all can be faded with a single control.
- 14) **CHANNEL FADER:** Slide up to increase the volume of a channel. When volumes are pre-set (with trimmer), this slider can normally be set to the “U” position for each channel.



Understanding Levels:

One of the most critical, but misunderstood, jobs of the audio technician is the control of volume levels. Levels which are too high (loud) will sound distorted to the audience, both on the live broadcast, and on the videotaped replay of the program. Levels which are far too low will add significant amounts of “noise” (hiss, hum, buzz) to the audio.

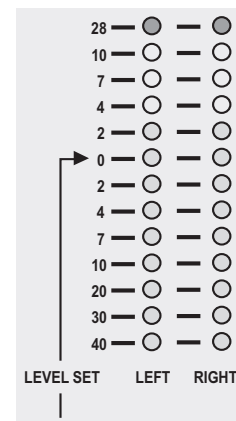
The V.U. Meter:

Surprisingly, the most important sense for setting audio levels is sight, not hearing. The tool that permits you to “see” the loudness of the sound is called a “Volume Units” meter.

The tiny lights on the 2 vertical rows respond to the volume of sound passing through the mixer; the higher up the scale it lights, the louder the sound. The level shown is the combined volume of all 24 channels of the mixer.

The scale is marked with a range of reference numbers which run from -40 at the bottom to +28 at the top. The ideal level -- the setting which will produce the highest sound quality -- is at “0” on the scale (the point marked with an arrow and the words “Level Set”).

For levels which constantly change (which includes speech, music, and just about everything else), the audio technician should adjust volume levels so that the normal “peaks” of sound bounce up to the “0” mark. Levels should never be allowed to reach the top of the scale. Also, if the levels are never reaching 0, the channel volume should be raised.



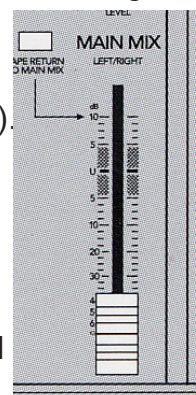
Pre-Setting Levels:

Before the show begins, the audio technician should pre-adjust as many volume settings as possible. Using the actual talent who will be performing, follow these steps:

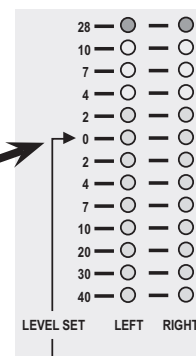
- 1) **Turn up the Master Volume.** Slide the main volume control (lower right corner of the board) up, so that the center is aligned with the “U” (“Unity”).

UNITY is the normal setting for all faders. The idea is that once you’ve preadjusted volume levels, you’ll be able to simply slide any fader up to the “U” position, and the level will be correct, rather than having to try to remember 24 different settings for all the faders.

- 2) **Turn up the Channel Fader.** Locate the channel for the particular sound source to be adjusted (check the label just above the trimmer row), and slide the fader to the “U” position.



- 3) **Have the Subject Speak/Sing/Play.** Ask her to keep talking for at least 20 seconds to allow time to get a representative reading.
- 4) **Adjust the Trimmer Knob.** While watching the VU meter, turn the trimmer knob up or down until the sound “Peaks” at 0 on the scale.
- 5) **Repeat for Each Channel.** Turn down the slider you just pre-set. Then repeat these steps, one-at-a-time, for every other channel you expect to use during the production.



All About “Sends”:

One of the concepts that can be difficult to grasp about audio mixers is the “SEND.” Most audio mixers are designed so that each channel can be fed simultaneously to several different locations.

Master Fader:

The most obvious of these sends are the channel faders at the bottom of the mixer; when you slide up the fader, the sound from that channel is sent first to the Master Volume Control (along with all the other channels), and from there to the audience.

Channel Sends:

Unlike the Master Fader, “channel sends” feed the sound from individual channels to various locations, rather than the combination of all channels. Several different channel sends are available, for various purposes:

- 1) **SEND TO STUDIO.** When turned-up, this knob feeds any selected channel to a speaker mounted in the studio. For example, on live call-in programs, the “talent” in the studio can hear the voice of the caller (the telephone is one of the channels on the mixer), and respond to their questions or comments.

Generally, it’s a good idea to NOT send a channel to the studio unless needed. For example, if you send the sound from a microphone in the studio back to the studio, you may create ear-piercing feedback.

In general, it’s a good idea to turn down the Studio Send on all channels, except the telephone channel.

- 2) **SEND TO PHONE.** This control feeds the sound from a channel to the phone system, so that a viewer calling-in to ask a question can hear the program through her phone.

The normal position for this row of knobs is the opposite of the Studio Send; It’s best to leave all channels turned-up, except for the telephone channel; sending the callers voice back to her over the phone will probably result in some very ugly feedback noise.

NOTE: The phone is not available by default. Let the equipment room know in advance so that it can be set up if needed.

Pans and Sub-Masters:

These 2 functions add flexibility to the audio mixer, and make complex productions easier .

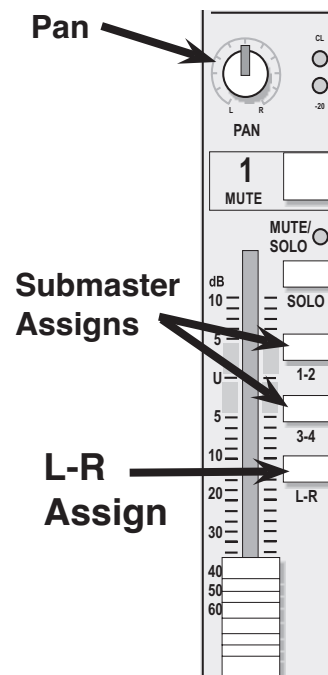
Using Pan Controls:

The digital videotape recorder used in the studio can record 2 separate “tracks” of audio, generally called channels 1 and 2. Any of the 24 channels on the mixer can be recorded on both channels simultaneously, or sent to only one.

When the PAN knob is centered (pointer in the 12 o'clock position) the selected channel is split equally on both record channels. Turn the knob counter-clockwise from center to send the channel to record channel 1, or clockwise to send to channel 2.

For programs which will be edited after production in the studio, the audio technician can separate two sources to different channels on the recorded videotape. This permits the editor to control the 2 channels independently for readjustment of volume levels.

MetroEast currently broadcasts programs in Mono, so panning the channels won't have any noticeable effect on live productions, as both channels will be blended together “on the air”.

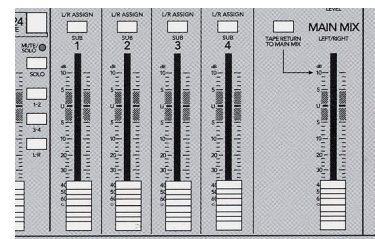


Sub-Masters:

This function can make complex productions easier to manage. Say, for example, that the production involves two separate sets in the studio: One is a talk show with a host and 3 guests, and the other is a 4-piece band. You've selected lapel mics for the talk show participants, and set up 6 cardioid mics on stands for the band.

When the host of the show introduces the band, you'll need to quickly bring down the faders on the 4 lapel mics, and simultaneously bring up the faders on the 6 stand mics. Submasters let you to accomplish this complex feat with only 2 faders.

The submasters are the 4 fader controls just to the left of the Master Fader.



To use the Submasters:

- 1) Determine which channels you wish to group together. Set levels for each channel as you normally would (Fader at “U” and trimmer adjusted so channel peaks at 0dB).
- 2) On each channel, select either the 1-2 BUTTON or the 3-4 BUTTON. Choose the same button for each of the grouped channels.
- 3) Pop up (off) the “L-R” button (just below the submaster assigns)
- 4) Turn the PAN KNOB to narrow the selection to only one fader. Pan left for channels 1 or 3, and right for channel 2 or 4.
- 5) Leave the individual channel faders set to “U”, and the chosen submixer down.
- 6) When needed, bring up the assigned submaster to turn-up all channels in the group.

All About Patching:

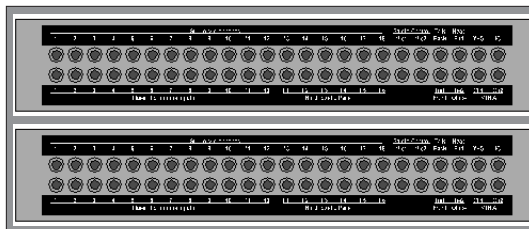
The Audio Patch Panel is designed to make the audio equipment more flexible by letting the user “rewire” the existing system for out-of-the-ordinary uses. Most productions won’t require any patching; the current configuration will handle the majority of uses.

While placing a patch cable incorrectly is unlikely to cause any damage, it may cut-off audio from someplace it needs to go. If you think you may need to make a patch for your project, you may wish to consult staff for assistance.

The Layout:

The Patch Bay consists of 4 rows of 24 jacks each, grouped into 2 rows. Each of these connectors represents a cable running to or from a piece of audio equipment.

In most cases (but not all), the upper row of jacks are “connected” to the jacks just below, even without a patch cable running between them.



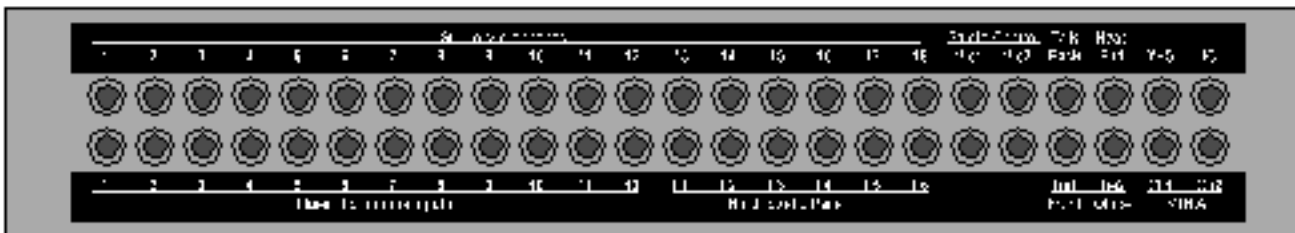
In general (but again, not always), the upper row represents sound “coming from” a source, and the lower row represents where the source of sound is going.

A Patching Demo:

Lets say that you’d like to plug in a mic in the studio in jack # 1, but you’d like to control it on the audio mixer with Fader #5 (no, I’m not sure why you would want to do this):

- 1) Connect one end of a patch cable from **STUDIO MICROPHONE #1** (on the upper row).
- 2) Connect the other end to **MIXER MICROPHONE INPUT #5**

Your patch is now complete!



A Word of Caution:

It’s important to note that the patch you made above had 2 other effects:

- 1) Fader 1 on the audio mixer now has nothing going to it. To remedy this, you would need to run another patch from a source to **MIXER MICROPHONE INPUT #1**.
- 2) Mic Jack #5 in the studio is no longer reaching the audio mixer. To remedy this, you would connect a patch cable from **STUDIO MICROPHONES #5** to any of the **MIXER MICROPHONE INPUTS**.

TIP: The lines running from the jacks in the studio can run sound in either direction. That is, you can easily send sound out to speakers in the studio over the same lines.

Step-by-Step Audio Guide:

Before the show begins:

- 1) Talk with the producer to determine the audio needs for the show.
- 2) Select the most appropriate type of microphone for the sources involved.
- 3) Place the microphones in the studio, and run XLR audio cables to the 12 jacks on the wall behind the cyclorama curtain. Note which mics go to which numbered jacks.
Make sure cables are neatly dressed and out of camera view where possible.
For lapel, wireless, or shotgun mics, make sure the power switch is turned on.
- 4) Place a strip of masking tape across the space at the bottom of the mixer, and mark it just below all the faders you'll be using during the production.
- 5) Check each knob (from top to bottom) for each channel you'll be using, making sure the settings are where you want them.
- 5) Get another crew member to help you test each microphone for function. Bring up the numbered fader for one of the mics you've connected as your helper speaks into it. Listen for any buzz, crackling, etc. that might indicate a problem with the mic or cable.
- 6) Bring down the fader for the mic you just tested, and repeat step 4 for each additional mic you connected in the studio.

TIP: Only raise one fader at a time while testing, so you don't accidentally pick-up sound through one of the other mics in the studio.

- 7) For live call-in shows, get an additional helper to place a call from the lobby to the call-in number (503.667-8555). Let the helpers on the phone talk to one another making sure that: (a) the caller can hear the studio talent through the "send to phone" knob, and (b) the studio talent can hear the caller through the "send to studio" controls, and (c) Both the studio talent and callers voices are peaking at 0dB on the VU meter.
- 8) Next, check each source of pre-recorded sound (CD, smartphone, roll-in) to make sure you're hearing them, and set the trimmer control so that each is peaking at 0dB on the V.U. meter. It's also a good idea to get familiar with each recording, so you're aware of any sudden changes in volume, ending cues, etc.
- 9) When the actual talent arrives, set final audio levels for mics in the studio.

During the Show:

- 1) Always keep an eye on the VU Meter!
- 2) Turn down any faders which are not currently in use to avoid accidentally sending out unwanted audio "over-the-air."
- 3) If a member of a group isn't speaking, turn them down 30% but no more. If you turn them all the way off, you may miss it when they start to speak.
- 4) Anticipate what's coming next; If you need to cue up a song on the CD player, or bring up a mic, try to prepare before you actually need to make the move.