

# Stage Audio, an Overview

Sound is one of the invisible arts in the theatre. The most people see of sound systems are microphones and sometimes speakers. In many ways, sound is also the most visible. If something is too loud or too jarring, the sound technician is one of the first to be blamed. This sound manual will cover 5 Areas: Safety, Equipment, Procedures, Reference and Terms & Definitions.

## Section 1: Safety

As with any aspect of operations in the Auditorium, safety comes first. Because sound deals with electricity, safety is very important. Technicians should be familiar with the following sets of safety rules.

### Safety & Audio Equipment

A good sound technician follows several simple rules when working with the various pieces of sound equipment found in the theatre:

1. Never pull a cable from a jack by the cable. Use the connector.
2. Never set up feedback loops.
3. Never run levels above PEAK settings constantly.
4. Never patch a mic or device into the intercom patch bay.
5. Never play music or effects at excessively loud levels for long periods of time.

## Section 2: Equipment

When working on sound, there are several tools that will come in handy.

### Cable

Every piece of sound equipment had a cable connected to it. The cables come in multiple sizes and ends.



### XLR Cable

XLR cables have a connector at the end that either has three prongs (male end) or three holes (female end). XLR cables are microphone cables and will run from the XLR (female) microphone jacks mounted in floors and walls in the facility, to the end of the microphone (male).



### 1/4" Cable

1/4" or quarter inch cables have a metal probe on both ends of the cable. This cable is one quarter inch wide, hence the name. These are also known as phone plugs.



**RCA Cable**

RCA Cables are the cables that you generally use at home for VCR's, TV's, Stereos, etc. They have red and white plastic ends with a small metal probe inside. These are also known as phone plugs.



**Mini Cable**

These are the types of cables that connect a headset to a computer, MP3 player or cell phone..

Cables in Auditorium are color coded for length.

<b>Color</b>	<b>Length</b>
White	10 foot.
Yellow	15 foot.
Red	25 foot.
Blue	50 foot.
Green	100 foot.

These cables are XLR and 1/4" exclusively.

### **The Crab**

The Crab, or more accurately the IWE EJ-10 Multi-Input Adapter Box is used to change and amplify signals. What it is designed to do is to take any audio/video device, regardless of the jacks built in, and covert the signal over to be used through the microphone lines run. The EJ-10 is called a Crab because every type of audio adapter cable, and jack are built into it. If we need to convert the audio signal from a VCR, or even a walkman into the house system, the Crab will do it for us.

The Crab has a volume control and a hum squelch control as well. No power is needed for the crab.

To use the crab, identify which type of cable you are going to need to feed out of the Audio Out of the device that needs amplification. Usually you'll want to use the RCA Cables or the 1/4" phono plug. Plug the appropriate cable into the device. Next, trace the cable to find the opposite ends, plug these ends into the appropriate port on the Crab. Next plug the Crabs XLR cable into any of our line or mic ports. Turn the volume control to the 12 o'clock position for level setting. If there is hum or a buzz present when the device is playing, throw the hum switch to try to eliminate it.

### **Microphones**

Microphone is a generic term that is used to refer to any element which transforms acoustical energy (sound) into electrical energy (the audio signal). A microphone is therefore one type from a larger class of elements called transducers - devices which translate energy of one form into energy to another form.

The fidelity with which a microphone generates an electrical representation of a sound depends, in part, on the method by which it performs the energy conversion. Historically, a number of different methods have been developed for varying purposes, and today a wide variety of microphone types may be found in everyday use.

Microphones come in many transducer types and many different kind of "pick up" patterns. We will only be using a few types and a few patterns, so only those used are discussed below.

For a more complete description of Microphone types, consult the reference section.

### **Pickup Patterns**

Microphones are classified not only by the method of transduction but also by their pickup pattern. The pickup pattern is the way in which the element responds to sounds coming in from several different directions, and there are several different standard patterns that are used.

### **Omnidirectional**

Omnidirectional elements, as their name implies, pick up sound more-or less equally from all directions.

One might think that omnidirectional microphones are never used in sound reinforcement, since they offer no protection from feedback. This is generally the case, but not entirely so. There is a myth that cardioids are better, but omnis have better low frequency response, and are less susceptible to breath noise and wind noise. Because omnidirectional mics tend to have a smoother frequency response than directional mics, there are fewer peaks to trigger feedback, so sometimes a good omni is as useful (or more so) as a mediocre directional mic. Lavalier mics (mics worn on a lanyard around the neck, or clipped to a shirt) are often omnis. Omni mics are quite useful in recording, and virtually every studio owns at least a few of them.

### **Cardioid**

The cardioid is unreservedly the most popular of all microphone pickup patterns.

The shape of the pickup pattern is heart shaped, hence the name “cardioid.” The cardioid microphone is most sensitive to sounds coming in on the primary axis, and rejects sounds from the sides and rear of the microphone.

The directional qualities of the cardioid make it a natural choice for sound reinforcement, since they help in reducing feedback and increasing system gain. This effect is overrated, and omnidirectional mics are often a better choice for close work than is a cardioid. Cardioid tend to have more coloration when sound does not arrive on axis because their directional qualities vary with frequency.

Cardioids are quite common in recording, since they can be used to diminish unwanted sounds arriving from off axis. Their frequency response is usually rougher than that of an omni and they are somewhat more sensitive to wind noise and breath popping.

### **Supercardioid**

The supercardioid is a highly directional microphone element.

Where cardioid mics get their name from a heart shaped pick up, supers pick ups patters are more mushroom shaped. It thus supplies far less rejection of sounds coming in directly from the rear that does the cardioid. The forward pickup area is far more

concentrated and the supercardioid offers superior rejection of sound coming in from the sides.

### **Phantom Power**

When talking about condenser microphones, we touched on phantom power. Phantom power is very important and if mis-used can damage equipment.

Condenser microphones require a polarizing voltage and power for their built-in amplifiers. Sometimes provision is made to supply this voltage directly through the microphone cable. The procedure is called phantom powering, and the most common phantom supply voltages available in mixing consoles is 48 VDC, although 24 V supplies are widely used (Auditorium uses 24 VDC). Most phantom powered mics can operate on a wide range of supply voltages from as little as 1.5 or 9 volts up to 50 volts.

In a phantom power system, the polarizing supply voltage is placed on both the signal lines in a balanced connection, with the same polarity on each line. Dynamic microphones connected in a balanced system with a phantom power input are then protected from damage, theoretically, since the results in a net zero DC potential across the coil. A dynamic mic connected unbalanced to a phantom power input may be destroyed, however. So **only activate phantom power on condenser mics.**

Wow, so that's a lot of really technical info on how and why mics work, so what does it mean to a technician at Auditorium? It tells you how and why we use our mics in the applications that we do.



### **SHURE MX202 Condenser Choir Microphone**

These mics are hung by thin cables from the catwalk and Border 3. They are used to cover the stage for vocal and choir pickup. They require phantom power.

These mics are used for:

1. Choirs
2. Plays and Musicals.

