



*THE*  
**MAZDA**  
Guide to Pro Audio

# Audio



Many **Ears** Are Listening...



Many

EARS

Are Listening

Why have an audio system at a corn maze or agritourism farm?

1

Create the Ambience

2

Make Announcements

3

Play Promotional Narrations

4

Moderate Special Events

# Welcome to Pro Audio

This guide will help you understand the way Pro Audio (PA) systems are installed. Here you will find the basic terms used in the industry, as well as reasons to choose certain devices to help make your sound system sound great. Remember, this guide was specifically designed for the corn maze owner.

This edition will cover three types of Pro Audio: the Standard Voice Coil System, the Constant Voltage (70V) System, and the Radio Frequency (RF) System. Each one has its Pro's and Con's.

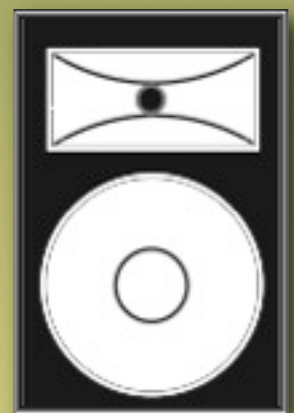
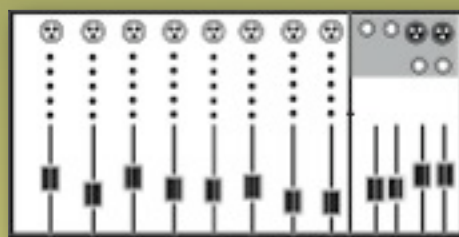
Please remember that this document is not the definitive source for all PA hookup types. The ones explored in the guide are simple, small and are most common for events such as ours. You may still want to consult an Audio Engineer to verify the best system.

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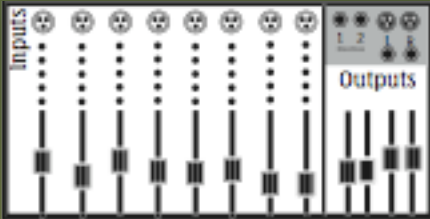
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# Basic Signal Flow

All Pro Audio systems are pushed through the following basic signal flow; Input, Processing, and Output.



## Basic Terms



### Mixer (Console)

The device that connects and gathers the input signals (mics, CD players, ipods, etc) and allows the user to set the volume levels before it's output to the amplifiers.



### Amplifier (For Standard Voice Coil Systems)

An external device that amplifies the signal (sound). Amps typically have two channels (known as Stereo, Left & Right).



### 70 V Amplifier (For Constant Voltage Systems)

An external device that amplifies the signal (sound). Typically have multiple inputs and outputs. Also known as a Contractor/Commercial amp.

## Basic Terms Continued



### Full Range Speaker

A multi-speaker box designed to reproduce all sound frequencies. Rated in Watts and Ohms ( $\Omega$ )



### 70V Speaker

A speaker typically designed for permanent install. Also known as a Contractor/ Commercial speaker. Rated in Watts and Volts.



### RF Transmitter

A device that broadcasts on either a preset or variable frequency.

## Basic Terms Continued



### RF Receiver

A device that receives broadcasted RF signals, on either a preset or variable frequency.



### Microphone

Microphones come in two basic types:

- **Dynamic**

Typically more durable and can take a lot of abuse. Not as sensitive.

- **Condenser**

Requires phantom power and is a lot more sensitive.

# Cable Types



Female



Male

## Microphone (XLR) Cable

A three pin, balanced cable that can be extremely long. Has a male XLR connector on one side and female XLR on the other.



1/4 Inch Unbalanced Male

## Instrument (1/4") Cable

A unbalanced cable that goes between a guitar, bass, or keyboard, etc. to either a guitar amp, bass amp or DI box. Has male 1/4" connectors on both ends.



Speakon NL4

## Speaker (Speakon NL4 or 1/4") Cable

Cable: A heavy duty cable that goes between the amplifier and speaker. Has either male Speakon NL4 connectors or male 1/4" connectors on both ends.



1/4 Inch Balanced Male

## Balanced/Stereo (1/4") Cable

One type of cable that can be a bit confusing is the Balanced 1/4" cable. Conductively it's the same as a microphone cable but looks similar to an instrument cable (both mentioned above). The main difference between the Instrument 1/4" Cable and the Balanced Cable is that the Balanced Cable is capable of left and right stereo sound.



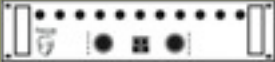
# Why Do I Need That?

People always ask, “Why Do I Need That?” So without going into any major technical reasoning, we will answer this question for each device.



## Mixer (Console)

Mixer (Console): This is the heart of any PA system. Without this, there is no control.

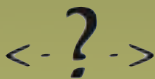


## Amplifier

If the console is the heart of a PA, then the amp is the muscle. Matched correctly with the right speakers, even a small amp can rock!



Dynamic



Condenser

## Microphone

Dynamics or Condensers, which one do I use?

- Dynamics are rugged, very road worthy- good for drums, vocals etc, etc.
- Condensers are very sensitive and great for studio work. For live sound, they're great for overheads on a drum set, acoustic instruments, and group vocals. No one style of mic is necessarily better than another; it all comes down to how well you use it.

## Why Do I Need That?

### Speaker Cable VS. Instrument Cable

These two cables can look similar but have a big difference. Picture a garden hose and a fire hose. Both can carry water but the fire hose can deliver more with much more power, and if you were to put a garden hose on a fire hydrant the garden hose would most likely burst! The garden hose is like the instrument cable, the fire hose is like the speaker cable, and an amplifier is like the hydrant. An amplifier puts out lots of voltage (water from the hydrant) and only a speaker cable can handle the pressure. Bigger is better.

### Instrument Cable VS. Microphone Cable

(Unbalanced VS. Balanced)

While the gauge (thickness) of these two cables can look the same, the insides tell another story. An instrument (unbalanced) cable only has two wires on the inside (a positive and a ground), while the microphone (balanced) cable has three (positive, negative, and ground). Because the instrument (unbalanced) cable only has two wires, they act like an antenna and can pick up radio frequencies as well as other RF (Radio Frequency) signals (bad to hear talk radio come through your PA during a moving ballad). If you made the cable really long, not only would you be creating a huge antenna, but you would lose a lot of signal running it that long. Try to keep instrument (unbalanced) cables under 20 feet in length. The Microphone (balanced) cable does not suffer from any of these problems, and hence can go really, really far.

## Matching an Amp with a Speaker

Two critical elements that need to be considered when matching an amplifier with a speaker or speakers. These two main concerns are:

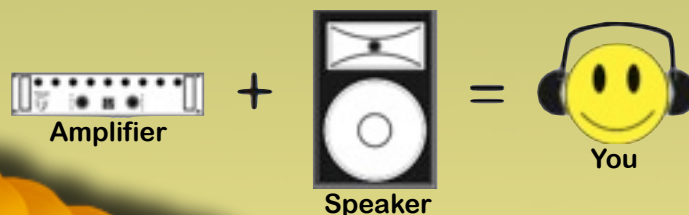
- Wattage
- Impedance (ohms,  $\Omega$ )

Both the amplifier and the speaker will have wattage and impedance (ohms  $\Omega$ ) on them somewhere. An amplifier will list its minimal load impedance ( $8\Omega^*$ ,  $4\Omega$ , or  $2\Omega$ ) and an associated wattage to those loads. As an example, a Face Audio F700TS amplifier is rated in stereo mode per channel as follows; 450 watts at  $8\Omega$ , 700 watts at  $4\Omega$ . This lets the user know how much power the amplifier can output.

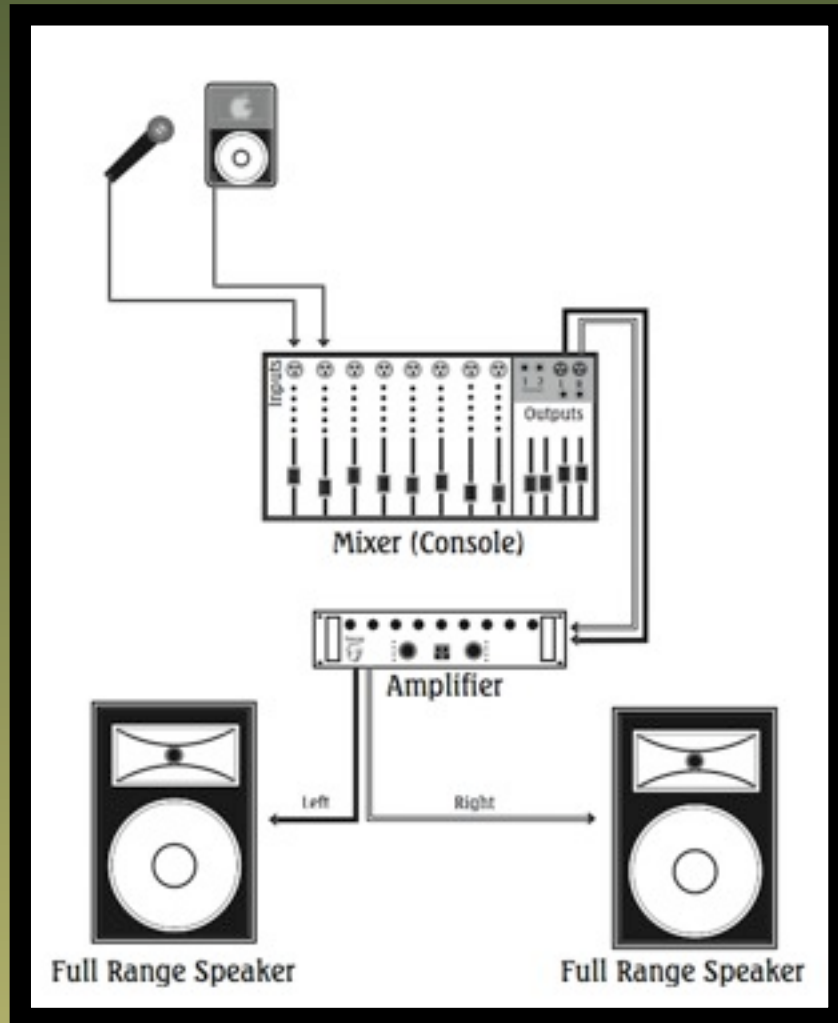
A speaker will also have ratings in wattages and ohms ( $\Omega$ ). Manufacturers will typically list the speakers with either the continuous-power rating (RMS), or program-power, and its peak-power rating. Both will be listed with the speakers impedance (ohms  $\Omega$ ). As an example, the Peavey PV115 speaker runs 400 watts program (RMS) and 800 watts peak, all at  $8\Omega$ . So what does this all mean? How much power do you need?

Using these examples, we know that the speaker runs great around 400 watts but not anything more than 800 watts. It's a safe match with the Face Audio F700TS. Because the F700TS output wattage is 450 watts at  $8\Omega$ , you can get good and loud without distorting the speaker or frying the amp.

So what happens if the amp you choose is too powerful and more than you need? Or what if you want to run more speakers off just one amp? Very good questions. If you were to use an amp rated higher than your speaker, you could possibly, distort and blow the speaker. On the other hand, hooking up too many speakers to an amp lowers the impedance so low that the amp will literally fry itself. This is because the wattage rises as the impedance lowers. Just keep in mind that as long as you keep your wattage and impedance within the specs of your equipment, you've got nothing to worry about.

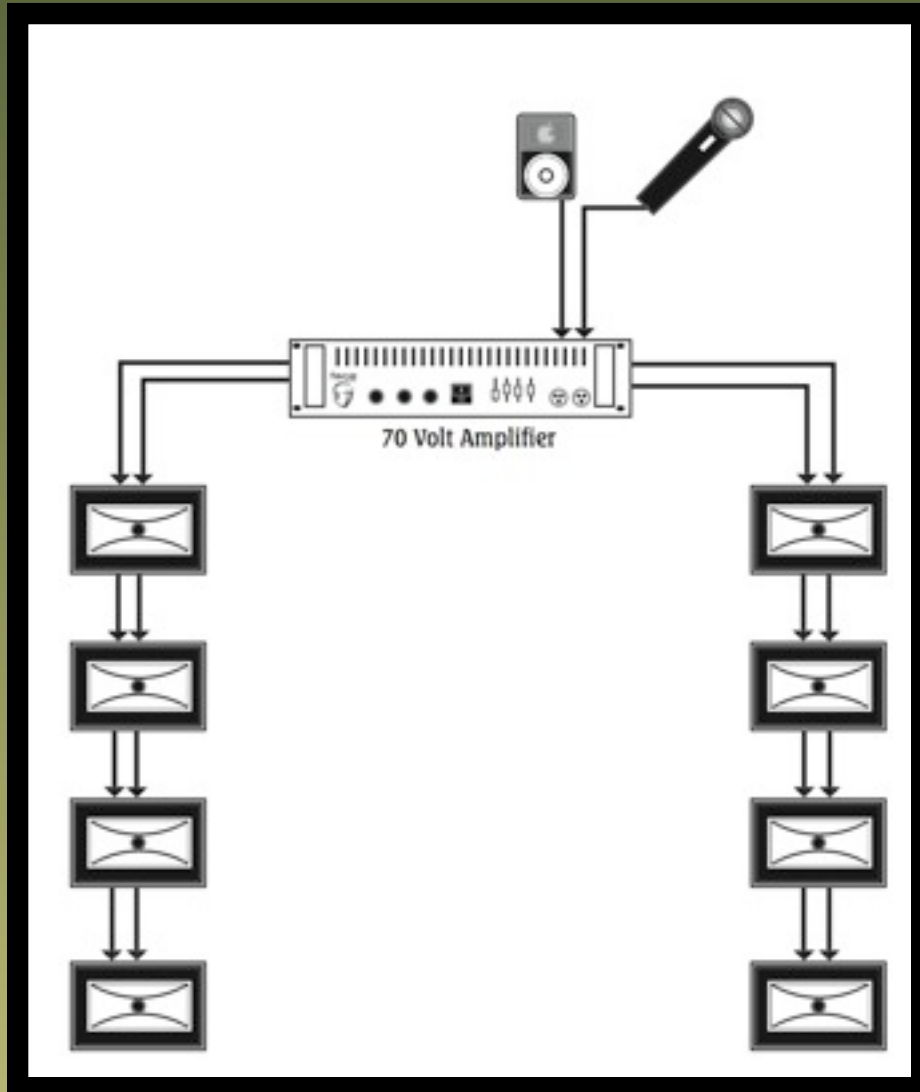


## Standard Voice Coil System



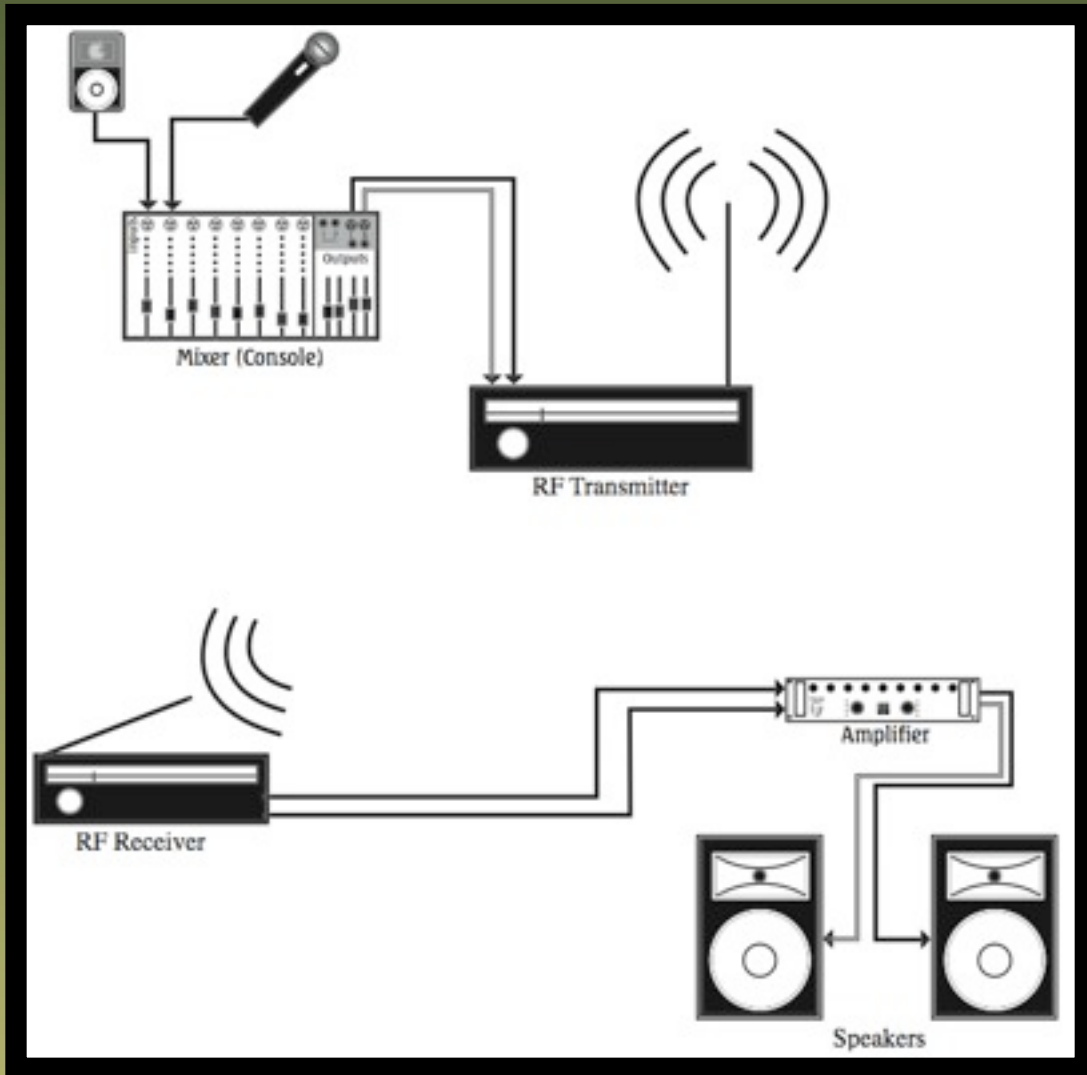
The Standard Voice Coil System is the most common and available system. Used for everything from DJs and Rock Concerts, to business meetings and backyard parties. The main components are a Mixer (Console), Amplifier, and speakers. This system is the most flexible and configureable. It is also the best sounding system, allowing for full frequency response. Disadvantages are that the speaker cables are not recommended to exceed 250 feet, and the Amplifier typically requires at least a 15 amp circuit.

## Constant Voltage (70V) System



The Constant Volt System or 70V system is a great choice for permanent installation. The system allows for extremely long cable runs and a low amount of power. It's typically used in churches, restaurants, schools, etc. The disadvantage is that it requires a fair amount of knowledge to wire correctly and it's not always the best sounding system.

# Radio Frequency System



The Radio Frequency (RF) System is a simple wireless broadcast system. It's made of two principle parts, the Transmitter and the Receiver. The advantage to the RF system is that you don't have long speaker cable runs. The disadvantage is that there are lot of things that can interfere with the broadcasted signal, like other FM radio stations and certain lighting. Also, the system is restricted to the broadcast strength of the Transmitter.

# Pros and Cons

	Standard Voice Coil System	Constant Voltage (70V) System	Radio Frequency (RF) System
Pros	<ul style="list-style-type: none"> <li>• Full Frequency Response</li> <li>• More Power (louder)</li> <li>• Easily Configurable.</li> </ul>	<ul style="list-style-type: none"> <li>• Permanent Install</li> <li>• Long Cable Runs</li> <li>• Inexpensive</li> </ul>	<ul style="list-style-type: none"> <li>• Simple Setup</li> <li>• Can be integrated into both the Standard Voice Coil and 70V systems.</li> <li>• No Speaker Cable Runs</li> </ul>
Cons	<ul style="list-style-type: none"> <li>• Expensive</li> <li>• Limited Cable Runs</li> <li>• Requires More AC Power.</li> </ul>	<ul style="list-style-type: none"> <li>• Permanent Install</li> <li>• Limited Frequency Response</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive</li> <li>• Power to all Receivers</li> <li>• RF interference</li> <li>• Limited broadcast range</li> <li>• Power required at all Receiver locations.</li> </ul>

# Frequently Asked Questions

**Q. How much will a sound system typically cost?**

**A. It all depends on which system you decide to go with, but here are some average prices:**

- A basic Standard Voice Coil system (microphone, mixer, amp, and four speakers) \$1800.00.
- A simple Constant Voltage system (microphone, amp, and six 20W speakers) \$950.00
- An RF system (Transmitter, two receivers) \$2000.00
- Also figure at least \$250.00 for cable (Speaker cable, microphone cable, etc.).

Try finding used audio equipment. Used equipment will usually be less expensive.

**Q. How far can I run a speaker cable?**

**A. Using 12 gauge speaker cable about 250 feet.**

Make your own cable, it will be less expensive and you can customize the over all length.

**Q. What about weather, are the speakers waterproof?**

**A. While there are speakers that are completely waterproof, most are not. Choose a speaker that is make of plastic or has a water resistant finish. Avoid speakers covered in cloth or fabric.**

**Q. What is the best audio system for my attraction?**

**A. It depends on your location. Ask yourself the following questions and, if possible, speak to an audio engineer/designer to help choose a system appropriate for your event.**

- Is your event happening in a permanent area?
- Is your event taking place on leased or rented land, and is it subject to contracts and change?
- Do you have a permanent electrical power source or will your event run off generator produced power?

The RF and Standard Voice Coil systems are best for constant location changes.





## Frequently Asked Questions

**Q. What type of power source does an audio system require?**

**A. All of these systems will run on 110V 15A circuits.**

**Q. What's the maximum number of speakers I can run from an amp?**

**A. Most Pro Audio amplifiers can have two speakers attached to each channel. Most Pro Audio amps have two channels. Some have four.**

**Q. How do I make announcements over the audio system?**

**A. Some mixers offer auto ducking (quieting all other channels while leaving the mic channel on) but most mixers will require you to pull down the volume on each channel and turn up the mic channel.**

**Q. How can I play different sources of music on one audio system?**

**A. Some mixers are simple, and have dedicated input to output features, most will only have a main Left and Right output. To play different sources you simply need to have a splitter cable or a mixer with more than one input.**

**Q. Do I need a separate cable for each speaker or can I link the speakers together?**

**A. This depends on which system you're installing, what amplifier you are using, and what type of speakers you are powering.**

- In a Standard Voice Coil system most speakers have two inputs (known as Parallel Inputs), which means when one input is used for an input the other functions as an output. Remember that you can only have two speakers connected to an amp channel at a time.

- In a Constant Voltage system the speakers are all run together.

# Contacts

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