



## CALLING ALL INTEGRATORS & CUSTOM HOME INSTALLERS

**NO HUM, BUZZ, OR WASTED TIME**  
**SAVE TIME & KEEP THESE IN YOUR TOOLBOX**

### **HUM KLEANER** **\$59.95**



### **2-Channel Converter/Signal Driver/Hum Noise Killer**

It converts all inputs from unbalanced-to-balanced while increasing the signal level from 1V to 18V. This serves as a noise canceling while allowing the unit to drive signal up to 600 feet WITH ZERO HUM, ZERO BUZZ. Ground loop isolator, headphone preamp with 110dBa signal-to-noise as well as THD+NOISE under 0.003%.

### **ISO-200** **\$14.99**



### **Ground Loop Isolator / Signal Converter**

Converts an unbalanced consumer level RCA signal to a balanced professional level XLR signal and vice versa with an impedance of 600 Ohm matching that of the industry standard.

### **GLI-200** **\$15.99**



### **Ground Loop Isolator**

Eliminates hum or ground loop noise with an impedance of 600 Ohm matching that of the industry standard.

### **HLLC-200** **\$9.99**



### **Differential High Low Adapter**

Reduces amplifier output signal to a low level input (RCA or XLR). Designed to be hooked up to any type of amplifier.

- ✓ Built-in ground loop isolator
- ✓ Capable of outputting a signal sensing 12VDC to control amplifiers, drapes, .etc.

### **Earthquake Sound Corporation**

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## HOW TO TRANSPORT AN AUDIO SIGNAL UP TO 600 FEET

When transporting an audio signal more than 10 feet indoors or out, the environment could cause a major problems that manifest itself in inductive noise. THIS TYPE OF NOISE IS NOT ATTRIBUTED TO GROUND LOOP.

So how does this happen? We know that electricity is generated when a moving magnet is moved forward and backward near a long wire. So the same is true. When you have long runs of CAT5, CAT6, RCA, XLR wires, all conductors such as wires or cables that travel through space are vulnerable to this type of electrical INDUCTION. Typically you have low level signal of 1V or even 2V. As the signal travels through these wires, magnetic fields generate electricity in the signal wire.

### Example

Lets assume that you have 50 feet of wire going from a control room in a house and travels up into an attic and then back down into a theater room. The wire run is traveling between several circuits that have 110V and 220V AC. These AC circuits generate electricity into the signal wire. Lets assume that you have a 1V signal and a 50 foot run. This could easily generate 0.25V of hum noise. Now Lets refer to the table below.

| Noise Level            | 0dB  | .01         | .1          | 0.25V Signal Level |
|------------------------|------|-------------|-------------|--------------------|
|                        |      |             |             |                    |
|                        | 6dB  | .02         | .2          | .5V                |
|                        | 12dB | .04         | .4          | <b>1V</b>          |
| <b>S/N</b>             |      |             |             | <b>12dB</b>        |
|                        |      |             |             |                    |
|                        | 18dB | .08         | .8          | 2V                 |
|                        | 24dB | .16         | <b>1.6</b>  | 4V                 |
| <b>S/N</b>             |      |             | <b>24dB</b> |                    |
|                        | 30dB | .32         | 3.2         | 8V                 |
|                        | 36dB | .64         | 6.4         | 16V                |
| <b>Hum Kleaner S/N</b> |      |             |             | <b>36dB</b>        |
|                        | 42dB | <b>1.28</b> | 12.8        | 32V                |
| <b>S/N</b>             | 46dB |             | <b>46dB</b> |                    |
|                        | 48dB | 2.56        | 25.8        |                    |
|                        | 54dB | 5.12        |             |                    |
|                        | 60dB | 10.24       |             |                    |
|                        | 66dB | 20.48       |             |                    |
| <b>Hum Kleaner S/N</b> |      | 63dB        |             |                    |

If my reference in decibels is 0.25 which is the noise level and the signal is 1V, then it is clear that the S/N ratio is 12dB. This is terrible. This table shows how a 0.01, 0.1, or 0.2 volt noise is compromised by the low voltage signal of 1–1.6V. Using the Hum Kleaner will allow you to scale up a 1V signal to a 16V signal. You are now able to transport the signal (high signal low noise pickup) and once it arrives towards the end of the run you reduced it back down with the HLLC-200 to a 1V balanced signal. Please note that the HLLC-200 also has a balanced ground loop isolator as well as a high low adapter. In addition; the HLLC-200 can produce a 12V trigger to control other components.

## WIRING

Please note that all outputs are Active. If you use RCA on the input side then the XLR, RCA, and TRS are active and all are balanced. Turn the gain to MAX and you can then transport the signal up to 600 feet.

The Hum Kleaner is a pre-amplifier that allows for a non-balanced signal to be amplified and balanced. A 1V input on the RCA will allow up to 8 VAC output. A 1V input on the XLR will be amplified to 16V. You must select the input you intend to use.

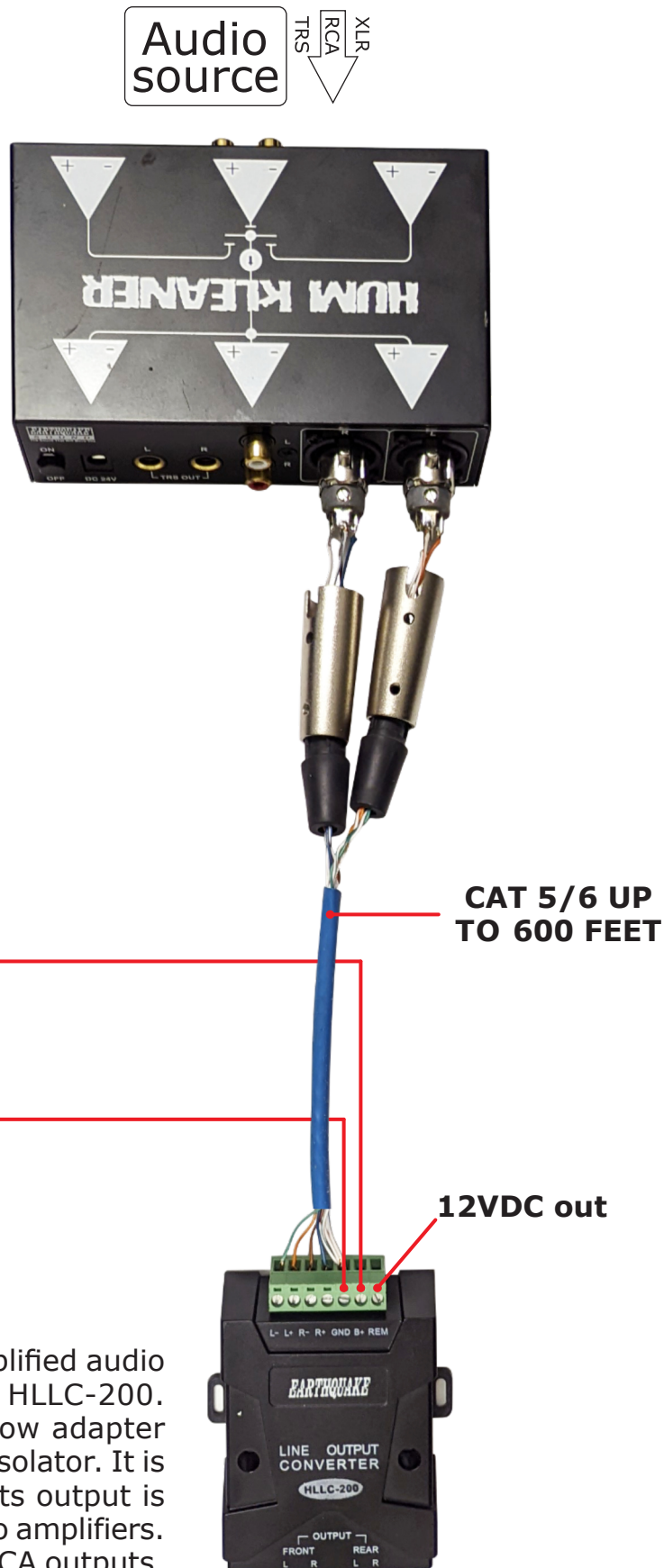
### Optional

You can use 12VDC on B+ and ground on GND. Once you have an audio signal, the REM terminal will generate a 12VDC output to control amplifiers, drapes, etc.

### Optional

I used the shielded ground here, but it is not necessary.

Before you can use the amplified audio signal, you must use the HLLC-200. This is a differential high low adapter with a built-in ground loop isolator. It is set for the HLLC-200 and its output is matching to 99% of all audio amplifiers. It has 2 right and two left RCA outputs.





The Sound That Will *Move* You

# **GUIDE TO REMOVING UNWANTED NOISE FROM YOUR AUDIO SYSTEM**

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# INTRODUCTION

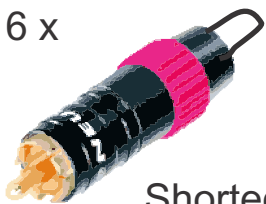
Home theater audio systems are a complex system with many components, especially on the source side. These sources are typically connected to an audio/video processor. In many occasions, as soon as the system is fired up and the sound comes out of the speakers, you will hear a HUM, often confused with BUZZ.

In this paper, we will focus on how to get rid of the hum. But first of all, let's understand the nature of HUM.

Most of you were advised that removing the third prong of the power plug is the solution. In reality, this method only masks the problem. Hum is generated when there are different grounds among the components. Such ground differences cause the audio path to seek a lower ground (0-Ohm). About 80% of hum noise is attributed to the cable box and around 15% of hum noise is attributed to long RCA cable runs.

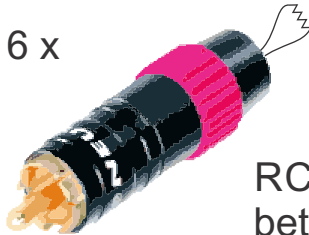
## SUGGESTED TOOLS TO HAVE ON HAND

6 x



Shorted RCA

6 x



RCA with 600Ω 1/4W resistor between the positive & ground

1 x



Ground Loop Isolator with L & R RCA inputs and L & R RCA outputs

4 x



6ft long speaker wire with alligator clamp at each end

# WHAT YOU NEED TO KNOW TO FIND THE BEST SOLUTION

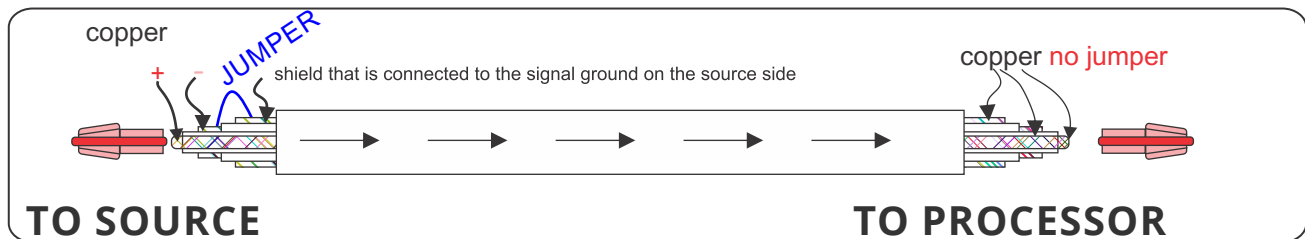
(1) The sources connected to the system, i.e. CD , DVD/Blu-ray player, etc.

(2) Does the system involve a cable box?

Typically, the ground of the cable box is above 0-Ohm due to poor grounding. One solution is to ground the source components.

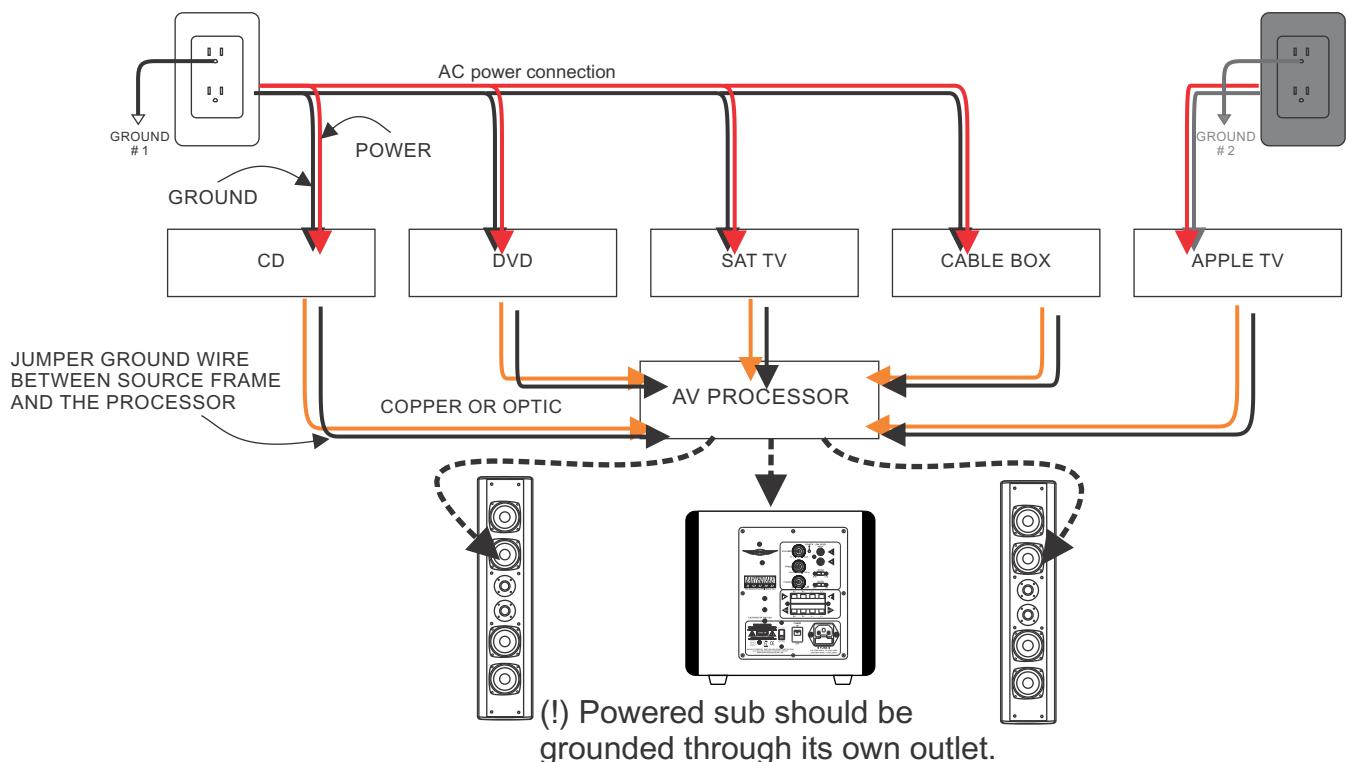
(3) The length of RCA cable used

When you have more than 6 feet (1.8m) RCA cable run, it is best to use an RCA cable that has a positive conductor, a ground conductor and a shield conductor. The shield conductor should be left open only on the receiving unit. On the source side, the shield conductor should be shorted between the ground and the shield itself. This method of noise reduction is called “Source Grounded Wiring.”



(4) How many AC power outlets are used?

When two or more AC power outlets are used, joining the frames of all components in the system will often solve or greatly reduce the hum problem. A ground loop isolator can also be used when there are difference power sources.



# STEP-BY-STEP PROCEDURE TO FIND THE NOISE MAKER & HOW TO KILL IT

## Step 1.

Disconnect all input sources from the processor, leaving only the subwoofer and output speakers connected to the processor. Turn on the system and determine whether there is noise or not. If there is noise, follow Step 2. Otherwise, proceed to Step 3.

## Step 2.

Bring the subwoofer closer to the processor and connect the sub using a 3-foot long RCA cable. If you do not hear any noise/hum, then using a source grounded RCA cable (with 3 conductors) when reconnecting the subwoofer from its preferred placement. Reducing the gain of the subwoofer and increasing the gain of the processor can also reduce the noise/hum problem.

## Step 3.

Since no noise is heard, connect one input source at a time. Each time you add a new component to the system, closely check for noise. Whichever source that causes the noise is the culprit. Simply ground the frame of the offending component to the processor's frame/chassis.

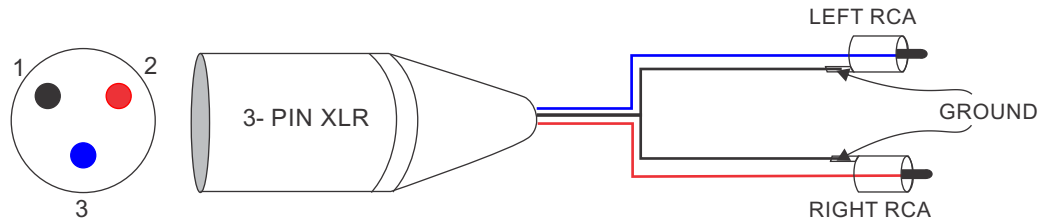
## Step 4.

If all else fails, use a ground loop isolator. Ground loop isolator will help in finding a source (CD, DVD, etc.) which has a problem with its internal ground. When installing the ground loop between the source and the receiver, the copper connection is broken. If the hum noise disappear, then the unit has a bad grounding internally.



# What IS XLR & WOULD USING IT REDUCE THE NOISE?

## Stereo UNBALANCED XLR



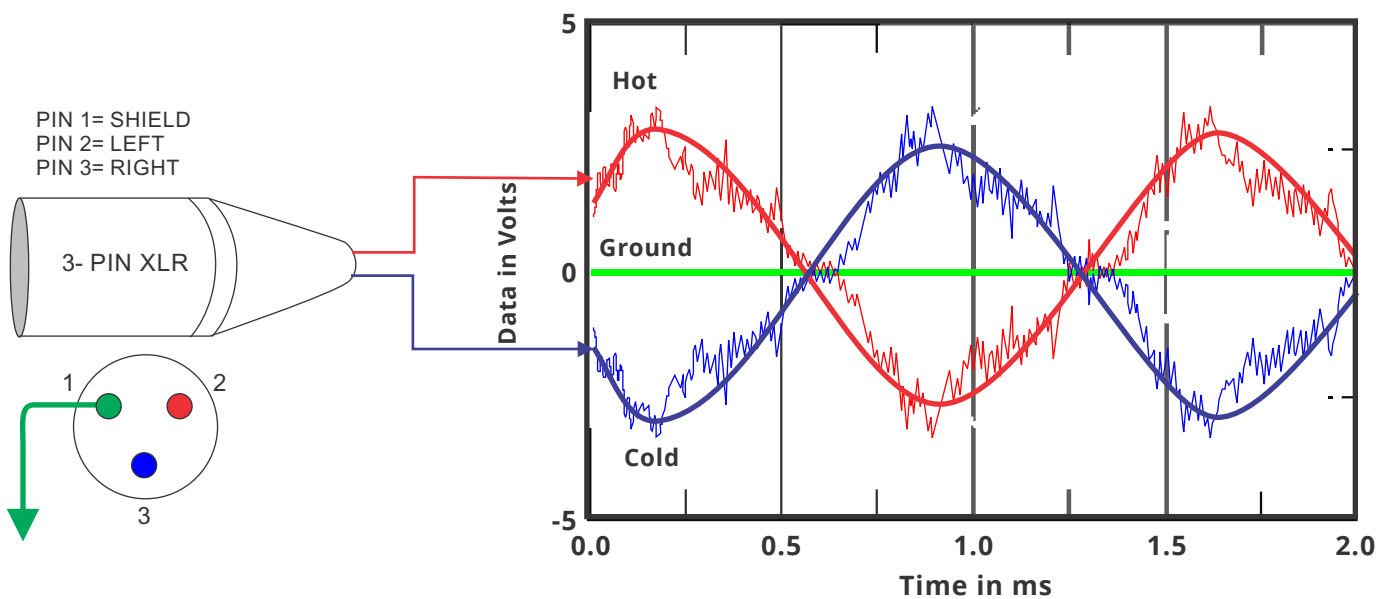
### INTERNATIONAL STANDARD

PIN 1= SHIELD/GROUND

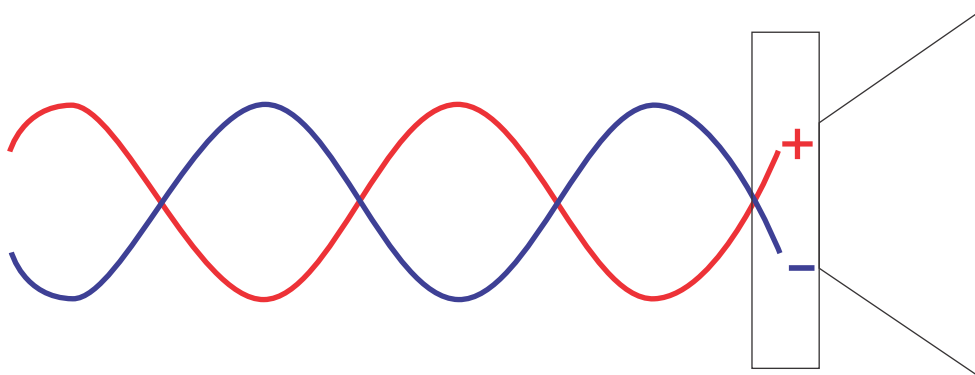
PIN 2= + RIGHT/HOT/REGULAR POSITIVE

PIN 3= - LEFT/COLD/OUT OF PHASE

Balanced input XLR: in this situation, pins 2 and 3 are carrying the hot and cold of the same signal whereby the noise on the hot is canceled by the noise on the cold.



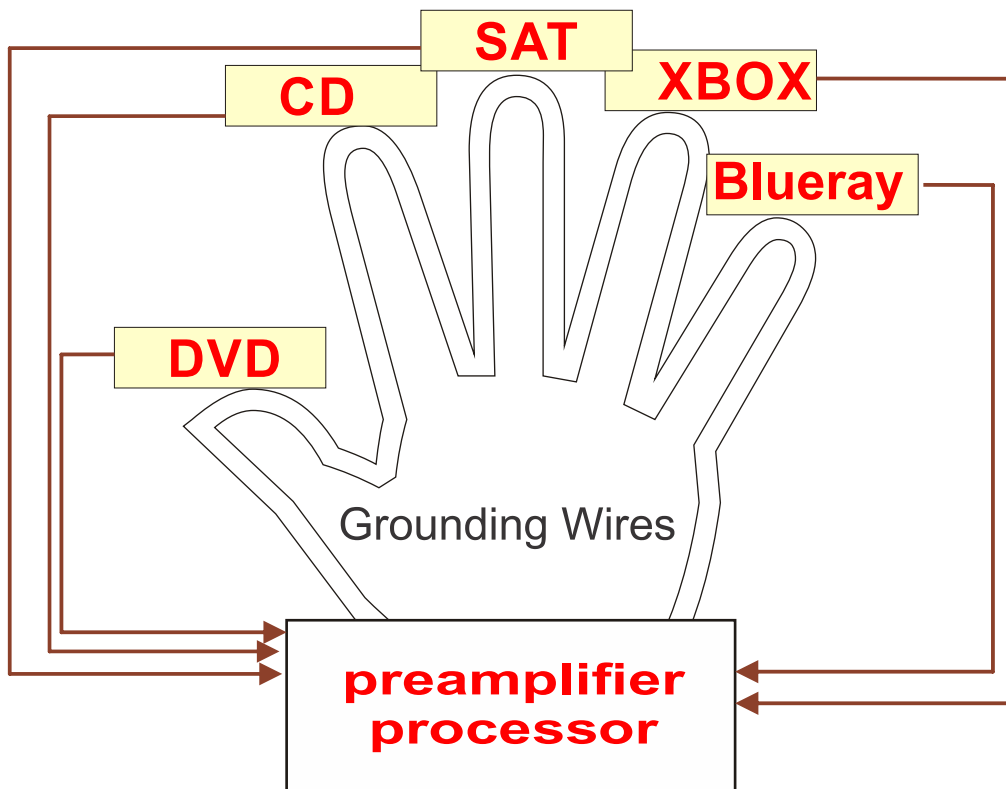
CLEAN  
SIGNAL  
NO RIPPLE





# ONE THING TO REMEMBER: STAR GROUNDING

It is good practice to ground all input source frames to the equipment rack. If there is no equipment rack, then connect the frame of each source to the processor as depicted in the STAR GROUNDING method below.



## IMPORTANT SAFETY INFORMATION

Do not defeat the safety purpose of a polarized or grounding-type AC plug. A polarized plug has two blades with one wider than the other. The grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult a licensed electrician for replacement of the obsolete outlet. Earthquake Sound Corporation is not responsible for any bodily harm or property damage due to insufficient wiring or improper handling of its products.

**Earthquake Sound recognizes that not all hum or buzz noise situations are the same and strongly encourages you to contact tech support if you require further assistance.**

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