



HOW TO NOT KILL A PERFORMER ON A STAGE BY ELECTROCUTION.

Although the musicians we work with can be trying at times, and occasionally less than pleasant thoughts regarding them cross our minds, I seriously doubt that watching them fry from high voltage is something we would want to be responsible for. This article will give you some basic precautions and tests to reduce if not eliminate the possibility of electrocuting our musical friends.

Finding Common Ground

It is of the utmost importance that the console with the shortest snake distance to the stage uses the same AC ground as the backline power. Let me clarify and explain. Microphones are grounded by the “pin 1’s” of the snake and ultimately, the console(s) that your snake is plugged into. The console closest (by closest I mean “cable length”) to the stage should not be pin 1 lifted. All microphones short pin 1 to the casing of the mic itself. This “close” console provides the critical ground to your microphones.

By “same AC ground” I mean that the backline power should come from a circuit that shares a common close proximity ground with the “close” console. If you have a separate stage console, it should be plugged into the same AC distro as the backline. If you have just a single console setup, the same thing applies. The majority of buzz, hum and shock problems exist when people setting up the system use a convenient outlet rather than make sure that backline and consoles all use circuits with close proximity grounds.

Don't Even Think About It

If you were to AC ground the absolute minimal amount of things in your system it should be your stage console (FOH in one console systems) and backline power. I don't want to get sidetracked into the various system grounding techniques but I will say that you can pretty much AC lift anything you want with minimal adverse effects as long as you ground the closest console to stage and backline power. This is not to say that AC lifting various pieces of gear will not present potential hazards and I am in no way recommending that you AC lift gear (at least in this article) but solving ground loops often presents a bit of a dilemma. You want the hum to go away, you

know AC lifting is not the safest thing to do yet cutting pin 1 on every loom to a rack is not only impractical but may not even solve the particular problem. I realize there will be some AC ground lifting going on.

Dealing With the Unknown

One of the more difficult things to get a handle on is the grounding and safety of the backline gear itself. Unlike the sound system, it's pretty much something that you often have little or no control over. The affinity over "vintage" gear combined with multiple amp setups can often present quite an unwieldy situation. Though I can't cover all the possible configurations, I can give two rules of thumb that help keep your musician alive.

- 1) Whether there is one or multiple guitar (or bass) amps all connected together, at least one piece of gear in the signal chain must be AC grounded, preferably the one that the guitar (or bass) plugs into or the closest (shortest cable length) one.
- 2) When you encounter the vintage amp with a non-polarized ungrounded plug, pay extra attention to how it is plugged in, it is best to mark it. Actually it's best to replace it! These are the AC plugs that don't have the "fat" and "skinny" flat blades, both blades are "skinny". On all modern ungrounded plugs the "fat" blade is neutral and the "skinny" blade is hot, therefore making it so the plug cannot be reversed.

The Gremlin

I was on tour with a very well known band and everything was going very smooth till one day. Out of nowhere, mid show, blam the singer takes a blue light special to his lips. Dazed the poor guy is trying to finish out the song without getting shocked again. It only happened during one song and the rest of the show was fine. The stage techs investigate to no avail at the next show and a few days later it happens again. I talk to the guitar tech that religiously tests the guitar rig for shock, every show and is at a loss as to the cause.

Turns out that the guitar player had purchased a small vintage amp (with a two-prong old-style AC plug) at a pawnshop, mid tour. He plays through it one song a night. Each day the guitar tech would touch the guitar strings to the mic and if it buzzed, he would flip an ac polarity switch on the back of the amp. Sound check would end and he would go to dinner. When the support acts set up, someone would unplug the amp and use the AC box for their guitar rig and after their set put the AC box back and plug in that little vintage amp. Some days it would be plugged in one way, some days the other way and the problem was that when you reversed the plug, 120 volts would show up between the mic and the guitar. The guitar tech had no idea and the support act thought nothing of it. Needless to say we put a three prong, grounded plug on the amp and though it is no longer "vintage" it is no longer trying to kill our beloved performer.

The Test

So you managed to get your system hum-free while maintaining your solid console and backline grounds. Now you are filled with the overwhelming desire to prove beyond a doubt that you have provided a safe playground. There are four steps you can take, of progressively increasing

intensity, that will build that overwhelming trust and show that you truly stand behind your work.

1) Meter the mic to the instrument strings. Make sure you touch bare metal on the mic, some mics have painted grills and it will meter 0 volts but that small spot of chipped paint will zap the singer. Wireless guitars will always measure safe but if there is a hardwired spare guitar, you will need to meter it. If the singer does not play an instrument they should be fine but barefoot singers and/or wet stages can be a problem if the stage is metal or if there are screws in the stage that attach to a metal frame below. So meter to any metal that the performer may come in contact with. You are looking for less than 1 volt or so and check both AC and DC.

2) Turn on the guitar rig and with the guitar plugged in, touch the guitar strings to the a bare metal part of the mic. The XLR connector often provides a good bare metal connection. If the guitar rig produces an audible buzz when the strings touch the mic then you have a potential hazard. Also if the strings melt and a blue spark erupts that is also a good sign of things not being good. If this happens, do not proceed to step three without resolving the problem.

3) Now comes the fun stuff. If you're willing to let a performer touch the mic and hold a guitar then you should be willing to do it yourself or at least the potential of a lawsuit may inspire you a bit. Hold the strings of the instrument and touch the mic gently with your finger and work your way up to a your way up to a solid grab of the mic. If you measured 0 volts and got no buzz from touching the strings, then you will almost for sure be shock free grabbing the mic. The main purpose of this step is to prepare you for the next one.

4) The last and final proof that things are safe is to do as the performers will do themselves and actually put your lips to the mic while holding the plugged in instrument.

I have been called on many times over the years to resolve shock problems in a wide variety of situations. Once, at a well known Hollywood night club, a performer refused to play as she could feel electricity from her vocal mic. Swearing she was getting shocked but the AC meter consistently read 0 volts. It turns out that it was the 48-volt phantom power going to her acoustic DI and a poorly grounded snake. AC metering showed no potential because it was DC and every one kept telling the performer that it was "OK" now. After the third time of getting shocked during sound check, they were going to cancel the show.

I was called in to bring down some gear, deal with the shock issue. I replaced the DI's with passives and while she watched, licked the mic while holding her guitar. The reassurance was convincing enough to save the show, although she wanted a different mic.

I Can Feel the Backlash

I can already feel the backlash of "unsafe practices", "mic licking" and don't test electricity with your own body and all that noise. It is all well and good to be cautious and safe, and I agree wholeheartedly. What it really comes down to is that if you don't trust that your setup is safe, so safe that you will subject yourself to the situation you put the performers in, then get someone qualified in there that knows what they are doing and is willing to stand behind their work.

Final editor's note: I do not hear the ambient sound of oncoming backlash. What I hear is a lot of well-meaning working mixers' eyes widening, and them quietly saying to themselves: "I haven't really been protecting my musicians the way I could." I believe that this article may well, if not literally save lives, at least spare one or more performers a very nasty experience.

I am old enough to remember when the guitarist for the British band Stone the Crows was killed by a badly grounded system. Later in life, I worked at a club in the United States where it was discovered that a drug addict electrician had not grounded the Edison outlets. The club manager actually asked me skeptically "Chris, this grounding stuff isn't really that big a deal, is it?" I answered "do the words 'wrongful death suit' mean anything to you?"

Thanks, Dave! – C.K.