HUM and Noise solutions by G E "BUCK Rogers Sr K4ABT

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Hum & Noise Solutions

by G. E. "Buck" Rogers Sr; K4ABT

NOTICE: We ship WINDOM and G5RV antennas worldwide, *However;* Due to excessive damage, we cannot ship HF Mobile or VHF Base antennas outside the continental USA !

Solving hum problems in PC soundcards and Ham Transceivers

Before we get too deep into this discussion, let's look first at the primary source of hum and noise problems in PC soundcards and Ham Transceivers.

As a starting point; In laptop sound card audio, hum and noise is created by poor regulation within the battery charger/eliminator (hash) getting into the laptop soundcard:

A lot of noise is introduced when the laptop battery eliminator/charger unit is plugged in, then the noise goes away when the unit is not plugged in. This is a sure give-away of poor power supply regulation. It never fails to appear when using the external laptop power supply.

I've learned to keep a second/spare hot battery ready as a backup to the laptop battery, and NOT use the power supply with the laptop while I'm operating the digital modes (SSTV, PSK31, Packet, etc).

I've tested literally hundreds of laptops, and more than 85% exhibit noise and hum on the transmitted audio signal while connected to the laptop battery charger. The noise and hum will disappear when the Laptop AC charger is removed from the laptop.

This same scenario applies when running your transceiver from a wet-cell or gel cell (marine) battery that has a poorly regulated battery charger attached. *To get away from this "dirty" power source, use a good quality power supply (Astron or similar) that provides enough current and voltage to power the attached transceiver.*

We run several 100 watt transceivers here in our lab at BUX COMM. The DC demand for each 100 watt (output) transceiver is 14 to 17 Amperes @ 13.5 volts. Sure, a 20 ampere, 13 volt DC power supply can handle a 100 watt transceiver, but I prefer a bit more

head-room, and use 13 volt DC power supplies, with current ratings of 35 amperes.

Other Computer Soundcard Problems:

When, and if, the computer is connected to a separate power outlet which may or may *not* be connected to a common (same) bond as the transceiver supply, it can result in a potential difference between the PC and the transceiver. This is where many ground loops are formed, causing hum to be superimposed on the transmitted audio.

If the sound card audio ground is indeed connected to the AC (utility) ground, and a high pitched sound or squeal is heard on other receivers, then look for RF feedback (base rectification) at the input or output of the PC sound card. Often a ferrite bead placed around the audio line will act as a block to ingress or stray RF. One of the best grounds (pardon the PUN) for using a ***BALUN at the feed point of the antenna*** is to keep RF at the antenna and prevent re-radiation back down the coax shield and into the HAM shack.

In some cases where the remedy mentioned above fails, the addition of a by-pass capacitor may be required. The value of the by-pass cap may be approximately .001 ufd to .01 uf. Under no circumstances will the by-pass cap be larger than .02 uf. A greater value than .02 uf mayroll off in-band audi frequencies, and result in loss of audio output level.

BUT that is only part of the "ounce of prevention"

"Ground loops will cause horrendous hum, buzzes, and other noises, especially when connected to computerized gear or lighting equipment. The hum and noise are caused by differences in voltage potential from one end of the cable to the other. One remedy, of course, is to use audio isolation transformers in the interface devices similar to those we use in our RASCAL GLX. As Broadcast and design engineers, we understand ground loops. In fact, a major c consideration in broadcast (Radio and TV) stations is to prevent ground loops. When done correct, there are no ground loops and no hum or other noises caused when using audio isolation transformers.

Designers of personal computers are not usually audio engineers and evidently have never heard of ground loops. In fact, given the noise of the fans, CD ROM spinning, and blaring noise made by disk drives in the PC, it is a wonder they can hear at all. All that noise forces some PC users to keep the computer in another room.

Another source of hum and Noise:

The typical ground loop hum problem often occurs when you connect your computer (PC) sound card to a transceiver which is connected to an AC outlet that is *not* connected to the same bond or ground as the PC.

Finding ground loops is not always easy; Once found, the solution may be effortless. Solving ground loop problems in typical HAM radio and PC sound applications may be as simple as applying practical logic. If you have your transceiver and PC connected to different power outlet/circuits, *you may be closer to the solution than you think.*

Try connecting both the transceiver and PC to one "grounded" multi-outlet with a "third-wire ground" (bonded outlet), and then plug this multi-outlet into a grounded (bonded), wall AC outlet.

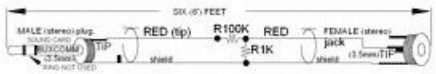
This usually solves eighty-five percent (85%) of all hum (ground-loop) problems, simply because you've created a star-point grounding scheme for both the PC and Amateur Radio transceiver. If this scheme does not cure the ills of the hum-loop, it could be that no bond or third-wire ground exists in your AC (utility) wall outlet.

If the by-pass cap is to be used, install it from the transmit audio line to the shield/ground. This is sometimes easiest achieved at the transceiver input connector (or jack).

As an adjunct to all the above, we can also employ the use of a line IN and/or line OUT isolator.

As a final note: Many times, an over-driven interface with no attenuator or 40 db pad, can be construed as noisy or

distorted on-the-air audio. In more than 85% of the soundcard or digital mode cases, the cure for this problem is to simply add a 40db pad as shown below. ***For the operator with sound card I/O, and a high-level SPEAKER OUT. Use a 40 db attenuator . $ 7.95 Order 40DBPAD***



May you have clean and clear audio, and *73 de Buck Rogers; K4ABT*

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