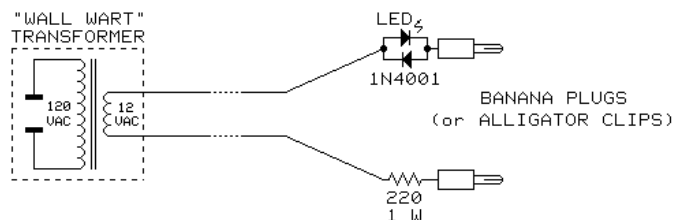


## BUILD A "HUMMER" TO HELP FIND "PIN 1" GROUND PROBLEMS\*

Based on a paper by John Windt in the Journal of the Audio Engineering Society, June 1995.



The transformer current rating can be 50 mA or more.  
The resistor limits current to 50 mA with plugs shorted.

The LED indicates continuity or current flow.  
The diode across the LED prevents damage to the LED.

THE BASIC IDEA HERE IS TO PASS A 60 Hz, 50 mA CURRENT THROUGH GROUND PATHS IN AUDIO EQUIPMENT. IN SOME BADLY DESIGNED EQUIPMENT, CURRENT FLOW IN THESE GROUND PATHS CAUSES HUM TO APPEAR ON THE EQUIPMENT'S OUTPUTS. IN PROPERLY DESIGNED EQUIPMENT, CURRENT PASSED THROUGH THE SAME PATH CAUSES NO EFFECT. EQUIPMENT HAVING THIS SO-CALLED "PIN 1 PROBLEM", WHEN CONNECTED INTO REAL-WORLD AUDIO SYSTEMS, MAY PRODUCE HUM THAT CANNOT BE CURED BY ANY REASONABLE SYSTEM GROUNDING STRATEGY. IF POSSIBLE, DON'T BUY EQUIPMENT THAT HAS A PIN 1 PROBLEM - IF YOU ALREADY OWN IT, YOU MAY BE ABLE TO PERFORM SOME SIMPLE WIRING CHANGES TO CURE IT.

### TESTING XLR Inputs or Outputs:

Disconnect all input and output cables from the equipment except the output to be monitored.

Power up the equipment.

Meter (and listen, if possible) to an output. Hopefully, the output will be gaussian noise (hiss).

Connect one "hummer" lead to the equipment chassis and touch the other to pin 1 of each input or output XLR.

If the equipment is properly designed, there will be NO increase in noise floor or hum at the output.

You can also test the effect of passing current from an input XLR pin 1 to an output XLR pin 1.

FOR OTHER CONNECTOR TYPES (balanced or unbalanced), "pin 1" is defined as the SLEEVE of phone jack style connectors or the outer contact of RCA/IHF connectors.

\* Note: The term "Pin 1 Problems" was first coined by Mr. Neil Muncy in his June 1995 AES Paper Titled "Noise Susceptability in Analog and Digital Signal Processing Systems"

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