

Grounding Schemes

Star vs bus, chassis vs signal ground, and the mistakes that cause most tube amp hum.

Layout & wiring · Hum troubleshooting

Star ground vs. bus ground, chassis vs. signal ground, and the ground-loop mistakes that cause most tube amp hum. A single reference point, chosen deliberately, is usually enough; a scattered scheme is usually why the hum is there.

Never lift the mains safety ground to “fix hum.” Disconnecting chassis earth can leave the chassis live under a fault — shock and fire hazard. Pro-audio “ground lift” switches isolate signal ground between pieces of gear; they never remove mains safety earth.

1 · Two different grounds, one word

Safety (chassis / earth)

Mains safety earth bonded to the metal chassis. Gives fault current a safe path. Protects you — not the audio signal.

Signal (circuit) ground

The 0 V reference every stage is measured against. Hum is almost always about how this path is routed.

Keep safety earth intact. Solve hum by fixing signal-ground topology, shielding, and lead dress — not by removing the third wire.

2 · Bus ground (chassis as return)

Every stage's ground solders to the nearest convenient point on bare chassis metal; the chassis carries return current to the supply.

Pros

Simple, fast to build, and how many vintage amps were originally wired.

Cons

Stages share the same conductive path. Current from one return can appear as hum in another stage's reference.

3 · Star ground (single reference point)

Each stage's ground runs on its own wire (or carefully grouped returns) to one common point — often near the reservoir / first filter ground.

Pros

Return currents do not share long stretches of chassis; easier to keep preamp reference quiet.

Cons

More wiring discipline; a sloppy star that still shares noisy returns is only a star on paper.

Practice

Separate preamp returns from power-amp and heater-related returns where practical; join at the chosen star point.

4 · Common hum mistakes

Multiple chassis ties

Several “grounds” scattered along the chassis create loops and shared impedance.

Shield currents

Shields tied at both ends through a noisy path inject current into the signal reference.

Heater elevation / routing

Heater wiring against high-Z grids, or missing elevation where needed, adds buzz.

Lifting safety earth

Dangerous — does not fix a signal-ground problem correctly.

Input jack ground

Where the input jack sleeve bonds is a classic hum source when inconsistent with the rest of the scheme.

5 · Practical approach

01 Leave safety earth alone

Confirm IEC earth to chassis continuity. Do not defeat it.

02 Pick a reference

Choose a star point (or a deliberate bus strategy) and draw it before soldering.

03 Route returns on purpose

Preamp grounds together to the star; power and high-current returns separately to the same point or as the layout requires.

04 Test for hum

Evaluate with settings that reveal residual hum — then adjust lead dress before inventing new ground points.

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