

1. Grounding info for the EMX512SC - how it seems to work

For the record, in case it's of use to anyone, here is some info how I believe the grounding scheme works on the unit that I have been working on, and how to complete the grounding paths in order to get the unit working out of its case without any difficulties - *e.g.* to avoid the protection circuit operating. **If attempting this, do be sure to take all necessary safety precautions to avoid possibly lethal shock.**

There are two basic supply grounds from the SMPS:

- The one for the PA output-stage supplies (i.e. +-B and +-BL) - I'll call this GB.
- The one for all other supply voltages (i.e. +-15, +12 and +5) - I'll call this GA.

These two grounds are not interconnected on the SMPS board.

- GB connects from the SMPS board to the PA board *via* the black leads that run between the boards - one takes it from the SMPS to the OP board, then another takes it from the OP board to the PA board.
- GA connects from the SMPS board to the PA board *via* the ribbon cable that goes there (on pin 2). It also connects from the SMPS board to the Mixer board *via* the ribbon cable that goes there (on pin 2).

If you run just the SMPS and PA board outside the case, without the Mixer board connected, there are two problems:

5. The PA board is getting GB and GA - but it also needs two other grounds. These are the signal grounds, marked SG. They are separately fed to the PA board *via* pins 5 and 9 of the ribbon cable that comes from the SMPS board - but those grounds don't actually come from the SMPS. They are not interconnected with GA on the SMPS board. Rather, they come from the Mixer board (*via* its ribbon cable, on pins 5 and 8), where they are

interconnected with GA. The SMPS board just provides a link-point for them, between the two ribbon cables. So, you can fix that problem either by connecting the Mixer board (by its ribbon cable), or by making a temporary link between the two SGs and GA.

6. Even having fixed the issue above (by either method mentioned), there is still no interconnection between GA and GB - and that interconnection is necessary. The reason is that, in the assembled unit, that interconnection is by the following route:
 - a) The OP board's GB connects with the rear panel by contact with the two threaded lugs on the the OP board (held by their screws).
 - b) The rear panel makes contact with the metal air duct (that sits around the PA board & heatsink), held by several screws.
 - c) The metal air duct makes contact with the two larger "springy straps" that are screwed to its other side.
 - d) Those straps make contact with the two aluminium foils that are attached to the Mixer board & front panel assembly.
 - e) Those foils make contact with the GA at the Mixer board (that arrived there via its ribbon cable). So, if you have the Mixer board connected, you can fix this second problem by making a temporary link between one of the foils (*e.g.* using a fairly strong croc clip, to make good contact) and one of the two threaded ground lugs on the OP board. If you don't have the Mixer board connected, then as well as addressing the issue in 1. above you will also need to temporarily interconnect GA and GB, *e.g.* at the SMPS board.

[Note that, in my opinion, the 4 brass threaded stand-offs attached to the PA board (& its heatsink) are *not* part of the normal interconnect path between GA and GB - they just provide grounding of the heatsink (*via* the rear panel), which although possibly important (*e.g.* for stability) isn't essential for the unit to basically work. Neither are the two short black leads, with ring tags that attach to the metalwork near the fan, involved. They are capacitively connected on the SMPS board, and are perhaps for RFI suppression purposes only.]

For completeness I should also mention two other points:

- The Mixer board needs two other grounds besides GA, namely LGND and DGND. But it gets these, along with GA, as soon as you connect its ribbon cable to the SMPS (*via* pins 12 and 13 respectively), where they are interconnected with GA.
- The safety ground of the power inlet connector is wired only to the rear panel. Normally, that provides its contact with all the other grounds via the routes explained above. With no rear panel in place, you have no safety ground. (Though how important that is depends on how you are powering the unit. If, for safety, you are powering it through a true isolating transformer - which is highly advisable if you are running it disassembled - then a safety ground at the unit will not fulfill all its usual functions.)
Always take proper account of all possible shock risks.