

## First in a series of Semi-useful Things to Know about Cooling

### Stack those fans...?

We're occasionally asked if you can stack fans. The quick answer is "yes", but let's dig a little deeper...

One reason to stack fans is to minimize the number of holes we have to make in a cabinet. If an installation involves an enclosure with highly restricted air flow, fans should operate in series (half used for intake, half for exhaust) rather than in parallel (all exhaust or all intake). A basic rule about airflow –

**Case 1** - When air flow is unrestricted, fans in parallel (side by side, both in exhaust or intake mode) will essentially double the air flow produced by one fan. Using one for intake and one for exhaust (series mounting) won't increase air flow much, if at all.

**Case 2** - When air flow is highly restricted, using 2 fans in parallel won't increase air flow much, if at all, but using 2 fans in series (one pushing, one pulling, meaning one intake, one exhaust) will produce about double the air flow of just one fan. (Total air flow will be lower than in case 1 (probably a lot lower), but double what it would have been with just 1 fan).

Question - So where does "stacking" come in? How does it help?

Answer - There are instances in which preexisting openings in a cabinet with restricted air flow (a "case 2") could be used for intake or exhaust fans except that they're too big or small. We can use these openings passively, and "slide" the exhaust fan through the cabinet until it's lined up behind the intake, or vice-versa. *We're stacking the fans, doing the active pushing and pulling from only one new hole.*

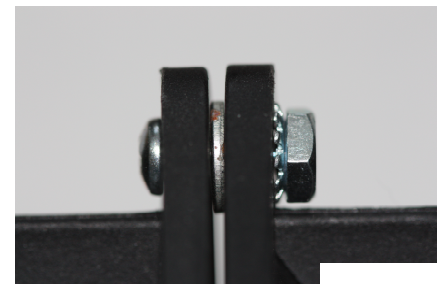
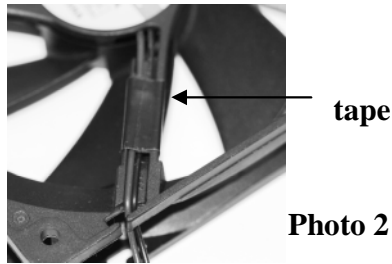


Photo 1

To do this, you'll need four 6-32 x 1/2" or 5/8" screws, flat washers, lock washers, and nuts. (Longer screws won't work.) The flat washers are used to create a bit of space between the fans, ensuring that the blades of one fan won't hit the wires of the other where they follow an arm from the frame to the hub (see photo 1). This helps, but what really prevents this is using a bit of tape to hold the wire snugly against the arm (see photo 2).



Be careful to fasten the fans together so the label (exhaust) side of one is against the non-label (intake) side of the other. Use a long piece of tape (electrical tape works well) around the edges of the fans to seal the gap created by the washers.

By following the steps above, you can mount two fans in one hole. For larger cabinets or larger heat loads, a four fan system, such as the Active Thermal Management System 2+2 Kit, can be mounted in only 2 holes.

NOTE - In most cases, the installer will be mounting fans individually, making a hole for each fan, but there may be instances in which the above hints will be useful.

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