

**Ask Jon Eakes**

# **Balancing Forced Air Heating & Air Conditioning Air Flow**

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Some rooms are colder than others, or a forced air system works well for heating but not air conditioning. Although such problems may require repositioning ductwork, or adding booster fans -- the first thing to check is that the ductwork is balanced and balanced differently for the two different seasons..

## **ONLY ONE SOURCE OF AIR**

The fan from a forced air furnace puts out a specific quantity of air. That air flow is divided amongst all of the output grills in the house, and how it gets there can make a difference. Every elbow, division or change in size in the ductwork creates resistance to air flow -- and any change in any part of the system effects all the other parts of the system simply because they are sharing the flow from one single source fan in the Furnace. So the mechanics of all that ducting is important. If you would like to read about the things that professionals must take into account when designing and installing the ducts, check out [Ductwork That Moves Air Best](#).

## **ROOM REQUIREMENTS VARY**

Also every room in the house has its own heating or air conditioning requirements. This means that you do not want the same flow of air into each room, but the quantity of air that each room requires. That sunny south facing room needs less heating air than a colder north facing room -- but during air conditioning it requires more cooling than that cooler north facing room. That also means that the same furnace fan and same ductwork needs to work differently in the winter than the summer! Most houses are simply set up to work with a compromise in both seasons -- but we can do better.

## **LOCATE YOUR BALANCING DAMPERS**

If you look carefully at the slightly complicated graphic in the right, you will see little damper handles on the sides of the "trunk" ducts -- the ducts that spread out from the furnace like an octopus. I have cut open the duct on the left to let you see that attached to that little handle is a flat plate. If the duct is rectangular, the plate fits the shape of the duct and if the duct is round, that plate is also round. If the handle is pointing down the duct, as in this graphic, the plate is flat and causing very little restriction to air flow. If the handle is positioned to point across the duct, that plate will block off almost all air flow through this duct. If the handle is pointed somewhere in-between, it will restrict the air flow more or less. These are called Balancing Dampers. (There are also dampers on each of the floor or wall grills, but changing these is difficult to maintain as both small and large kids tend to play with these.)

If you have no dampers, or they are all wide open, you are probably getting more air coming out of the floor grills in the rooms close to the furnace than in those upstairs rooms or the back bedroom. In fact, the thermostat is often close to one of these ducts with maximum air flow -- turning off the furnace long before the far away rooms have warmed up.

## **STEP BY STEP BALANCING**

A homeowner is better suited to balance both their heating and air conditioning air flow than a professional simply because they live in the house and can fine tune the balancing over a period of time. A professional will get it basically right, but constant tweaking will make it really comfortable. Remember that any time you touch one single part of the air flow system, everything changes

because there is only one air source and any small change redistributes it all -- so make a change and live with it for a few days before making another change.

We will do this whole procedure once in the heart of the heating season and once in the heart of the air conditioning season if you have air conditioning running through these same ducts. In the last step below we will record right on the duct what is the proper setting for each damper in each season -- making it easy to get it right year after year.

Here are the instructions for the heating season -- they are the same for the air conditioning season, all that changes is my mention of getting a room warm enough or cold enough.

1- Open all the dampers on all the floor or wall grills wide open. We will not be doing any adjustment with these because people can play with them or accidentally change their settings by such actions as vacuuming over them. They can be useful for temporarily turning off a grill when a room is providing too much air flow and you don't want to turn the whole system off, but generally should be left wide open.

2- Open all the BALANCING DAMPERS in the ductwork above the furnace. Now, I need to explain what "open" means. On the floor grills it is easy to see that the grill can be open or closed -- but here all you see is a handle. The handle should point along the duct, not across it. This will mean that the flat plate inside is not obstructing the passage of air at all.

3- Totally close off the one or two ducts that feed air to the rooms in the house that have no problem at all. To close them off, rotate the handle so that it is pointing across the duct. This works the same for rectangular or round ducts with internal dampers. Actually totally closing these dampers does not actually close off all the air flow (like when you close a water valve), as they are build so loose that some air goes by anyway. We will most likely open these a bit in a later step.

4- Live in the house a few days to see if the once cold rooms are now warmer and if perhaps the once warm rooms are now a bit cold. Actually you will hear that the furnace is working more than before. That is simply because it is not turning off prematurely as it takes longer for the thermostat in the now restricted room to warm up. Yes this costs more to run the furnace more, but we are approaching actually heating the whole house, not just a couple of rooms.

5- Now you start the fine tuning. Any room that has restricted air flow and is not warm enough, open the damper a little bit, then live in the house a couple of days. Any room that is warmer than the other ones, close down the damper. Don't make a lot of changes, or large changes all at once as you will find it impossible to figure out what did what. Change one thing, test, change again.

6- If after doing all of this it is still impossible to properly heat one or two rooms, then you need to add booster fans. You can check out this web page to see two types of small booster fans and a link at the bottom of the page to more powerful booster fans. If you do install a booster fan, you need to go back to step 4 and tweak the dampers until your find the right balance with both the furnace and booster fans operating.

7- Once you have the house heating evenly, take a permanent marker and draw a line on the wall of the duct extending out from the damper handle, like an extension of the handle. Now mark this line as the WINTER setting. When you do this same balancing task in the middle of the air conditioning season, you will find that the dampers have moved. Make another line and mark it as the SUMMER setting.

With Summer and Winter settings for the air flow dampers clearly identified, at the beginning of each season you can quickly set your entire system to its optimum performance by simply shifting the dampers to the appropriate positions. When you sell the house, don't forget to explain this to the new owners -- they will appreciate it.

And while we are talking about seasonal changes of dampers, don't forget that any air conditioning system that uses the furnace fan and furnace ducting requires that the humidifier be blocked off for the summer.

**Keywords:**

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