Thermostat heaters

by James S Jaffe*

You may think that it does not matter how you go about fixing something as long as it is fixed when you leave. Not true. If you don't know why the problem occurred and do not do something to prevent it from happening again, you have not really fixed anything, you merely replaced a broken part. Take the extra few minutes to find out why. If you don't, you can apply my very favorite little phrase: "You always have time to do it right the second time."

If I was working on a job with you and I told you to adjust the thermostat heater, you would probably look at me as though I was from Mars, and who could blame you. There is no such thing. But, if I asked you to adjust the heat anticipator, you would know exactly what I was talking about.

You would take out your trusted Amprobe, wrap the wire around the end 10 times, connect to the thermostat circuit, test the amp draw and divide by 10. That gives you the proper anticipator setting. Set the anticipator to the appropriate position and your done.

You have just made a system adjustment which if done improperly, or not done at all, can lead to short cycling, overheating, as well as insufficient heat problems. But what is it that you actually adjusted? Why did you do it? And how does this doohickie you just adjusted anticipate the heat.

I ask a lot of questions and have a hard time doing things that I cannot justify, but I must admit, I adjusted a lot of heat anticipators before I ever knew why, and, I bet I'm not the only technician to ever do that. Specifiction sheets give the the proper settings as well as the appropriate warning as to the conditions that can occur if not properly adjusted.

When asking fellow technicians, I get the same basic answer. Usually it sounds like this. The heat anticipator is a device in the thermostat that anticipates the heat rise of the room when the system is heating so that it can shut the system off before the room actually reaches the set point on the thermostat. This lets the residual heat in the system bring the room to the set temperature. These things are smart!

The truth is that they don't really anticipate anything. They warm up the inside of the thermostat. When you are testing the amp draw on that circuit, it is only to be sure that too much or too little current will not be going through that little heat coil in the thermostat. Here is how it works.

If you look inside most thermostats at the anticipator, you will see a coil of thin wire (some use a fixed resistor to do the same job). That coil is the heater. When the thermostat calls, it closes a switch completing a circuit to allow current to pass through it. When current passes through the coil, the coil creates resistance, resistance creates heat. Heat from the coil warms the thermostat. The more current that passes through the coil the more heat it makes and vice versa. That is why it is important to set the anticipator appropriately for the amp draw of the controlled device and not adjust it by, say, how far it is from the baseboards.

Why do we need to warm the thermostat? This is where the anticipation part comes in. If you did not warm the thermostat, it would continue to call until it sensed that the heated space had reached the set point by it physically getting warmed by the room air. That would be a problem for two reasons:

Number one, you mount a thermostat away from a heat source to try and maintain an even temperature. By the time the thermostat reads set point temperature, the areas near the heat source would be too warm (mounting the thermostats near the heat source would give you the opposite problem).

Number two, the system would always overheat the living space because of residual heat left over after shut down. For example, the extra blower cycle used to take the heat away from the exchanger after the burner shuts down.

Setting the anticipator too low causes too much current to flow through the heating coil and will create too much heat inside the thermostat, shutting the system down before the living space actually comes up to temperature. That scenario is the reason behind short cycling related calls, because when the current stops flowing, the coil cools down and the thermostat senses that it is not up to temperature and calls, starting the cycle again.

If you set the anticipator too high, the thermostat circuit does not draw enough current to cause the coil to heat up, therefore creating the overheating situation I mentioned earlier.

There you have it, the how and why of heat anticipators. I think that calling them thermostat heaters would make more sense, and make the concept easier to understand, but hey, I don't see how you can call something "jumbo shrimp" either. ❑

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