We take a somewhat different approach when troubleshooting hot water systems...

The basic premise is that we are dealing with physics, not the occult. Every action by itself is simple and predictable (although it can get interesting when a handful of them are thrown together). So, if metaphysics doesn’t solve your problem, the following practical suggestions may help.

Gathering enough information is the key. It’s important not to decide what the problem is until you actually go and look. You’ll waste time trying to justify your conclusions without seeing the facts in front of you. Listen to your clients. They live with the problem and are far better acquainted with its effects than you are. They can tell you the history of the system and describe how the trouble began. (Was it about the time their six-year-old nephew played hide-and-seek in the mechanical room?) Take it all in before setting out in any one direction.

Next, try to envision the system’s various movements. Use your imagination to follow its water flow and its heat transfer. Shift into fast forward and watch the corrosion processes. Can you see the plug of rust developing at each copper-to-steel connection? In the same way, watch the build-up of scale and sediment. (Could that be why the disc in that swing check valve is stuck open?) Then pretend you’re water. As the hydronics wizard, Dan Holohan, says, “Wander through the pipes… Unleash the power of imagination you had as a child.”

Try the system with a pump on and then off - or a valve open and then closed. Never assume a part works just because it should. (Have you ever opened up a suspicious valve to find the stem broken off and the gate missing? For whatever reason, the plumber before you didn’t replace the valve when the stem snapped off in his hands.) Try not to get tripped up by such mental land mines. Do a thorough examination. Don’t allow yourself to be hurried. If the system won’t release its secrets to you when you ask what’s wrong, ask what’s right. Check these items off your list as you find they behave correctly. Part of the fun is anticipating the results of various tests you devise.

Once you have a clear grasp of a system’s functions, its malfunctions and their causes will become more apparent. You will probably be juggling a great deal of information at this point, and you’ll find it easier to see if you make a detailed schematic. The more accurate your schematic, the easier it will be to spot the effects of variables such as convection or air in the lines.

Don’t disdain the printed word. The answer to your challenge may actually be hiding in the instructions for a piece of equipment, or it might be waiting for you in the technical section of a used book store. Old books can really hit the mark with their common sense answers to “new” problems. (Example: a 1951 book by Watts Regulator recommends installing tempering valves with heat traps to reduce valve scaling in hard water areas. This will also eliminate the full-time cross connection that can occur when a tempering valve “sees” the heat of the stored hot water and scales up in the open position. How many tempering valves do you come across where Watts’ advice was followed?) Relevant information can come from more than just the jobsite.

The steamy toilet problem did get fixed. The man had two water heaters with a hot water recirculation line tied back into one of them. Although the tanks were side-by-side, plan changes during construction caused the cold supplies to be separated. When the recirculation pump came on, it pushed water back through the cold inlet of one tank, around, and into the other, heating the entire cold line between them. So, while cold water was expected at the toilets and other fixtures, heated water arrived instead. Once the cloak of mystery had been lifted, a spring check valve was installed in the cold supply of the tank which had the recirc line attached. This kept hot water from backing into the cold line and solved the problem.

The original and somewhat misleading question was “Troubleshooting: Art or Science?” While it’s clear that troubleshooting can be an art, its foundation must rest firmly on method and science. Successful troubleshooting relies on a real marriage of both art and science.