



## DRAWN TO PROFESSIONALISM

Many of us have had to read text descriptions of how a sophisticated hydronic system is piped or wired. We then try to form a mental image of that system based on these descriptions. Perhaps we have even attempted to sketch a piping system on paper as it was being described over the phone.

Picture these piping descriptions: "I piped the mains to the headers and used zone pumps." "The wood-fired boiler is upstream of the buffer tank with balancing valves on both branches." "The radiators are tied in with tees in the basement and have purging valves."

"If you are serious about being a hydronics professional you need to offer professional quality drawings for your systems."

Unfortunately, many of the terms used in hydronic heating, such as primary/secondary, pumping away, balancing valves and thermal trap, conjure up different pictures in different minds. This makes it difficult to get an accurate picture of the situation, which is crucial for troubleshooting problems when you are not on site or have never seen the installation. The old adage that a picture is worth a thousand words could not be truer than in these situations.

Be it piping or electrical systems, schematic drawings are a far better language for efficiently communicating the intricacies of modern hydronic systems from designer to installer to troubleshooter. The intent of a schematic drawing is to show the relationship between several components in a system, rather than the exact spatial placement of the components when installed. However, a well-drawn schematic can still guide an installer through the spatial placement of major components.

### SYMBOLIC INQUIRIES

Many people ask me where they can get the symbols for making piping and electrical drawings. Most were looking to purchase these symbols in a form that would work with existing drawing software. Although piping symbol libraries exist, and are shipped with some CAD (Computer-Aided Drawing) programs, these symbols may not be familiar to you or those who will ultimately use your drawings in the field. Unfortunately there is no single accepted standard for hydronic piping symbols in North America, much less the rest of the

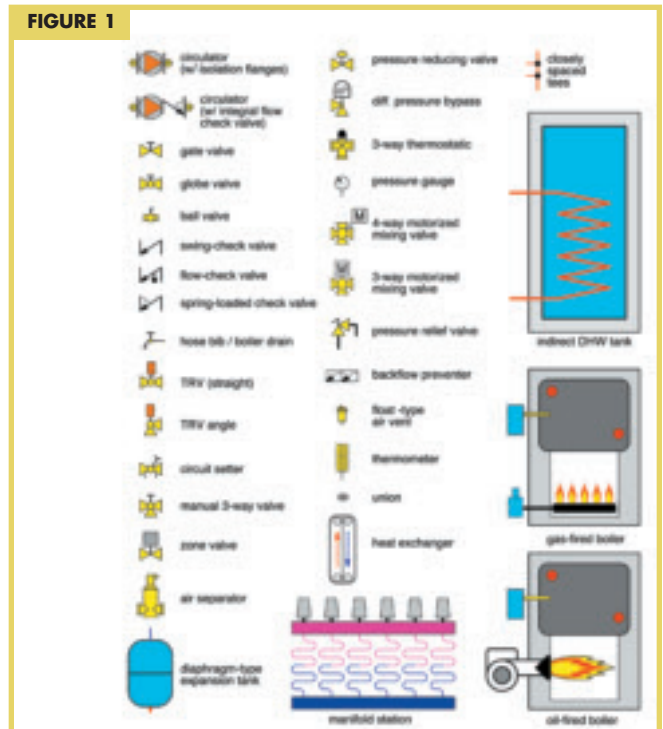
world. Even if there were, it is unlikely such a palette would be continually updated to reflect new products.

Given this, you will probably need to start the transition to computer-aided drawing by creating a piping symbol library. This is especially true if you decide to use drawing software that does not come with symbol libraries. Although people sometimes complain about having to create all the component symbols before they can actually start making schematics, it is time well spent. A quality symbol library can be used over and over to yield consistent and professional quality drawings. It can also be expanded as new devices are added to your design repertoire.

You may choose to keep your schematic symbols very simple. This may be mandated by limitations of the drawing software and/or your experience using it. On the other hand you might choose to create highly detailed symbols that are easily identified as a particular product.

I like to work with generic symbols. Such symbols do not necessarily imply that a specific product is the only possibility for a given application. Generic symbols also stress that the placement relationship between the devices is usually more important than the exact product used. For example, any brand of circulator should

FIGURE 1



CONTINUED ON PAGE 34

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always be located so that it is pumping away from the point where any brand of expansion tank connects to the system.

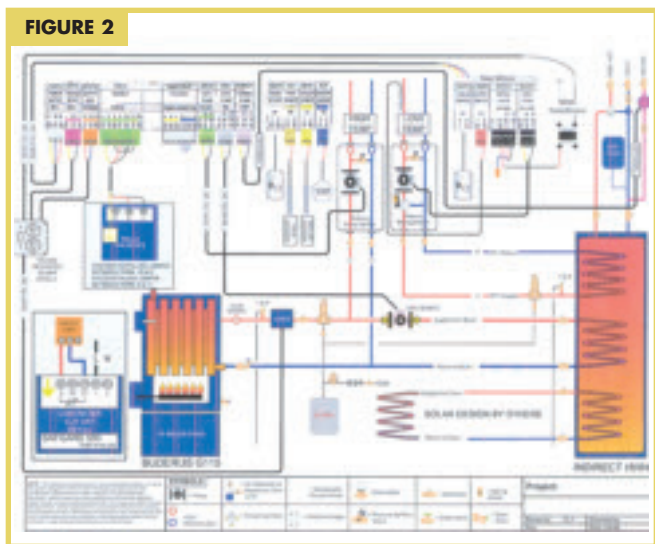
Figure 1 shows the piping symbol palette developed for the second edition of *Modern Hydronic Heating*. These are also the same symbols used in most of the piping schematics that appear in my *HPAC* articles. They are presented as a group in hopes that those searching for drawing symbols will adapt them as a standard.

If you decide to recreate these symbols using your drawing software, be sure to maintain the relative sizes. Oil-fired boilers are obviously larger than purging valves. Air vents are smaller than expansion tanks and so forth. The relative sizes of these symbols reflect this. These proportions also allow the schematic to bear some similarity to the system that will be built from the schematic.

### CAD OPTIONS

There are now dozens of software packages available for making piping and electrical schematics and more are coming onto the market every year.

If your computer uses Microsoft Windows and you are looking for an adaptable drawing tool consider looking at the latest version of Microsoft's VISIO.



Drawing courtesy Michael Olsen

Although it comes with some symbols, they may or may not be the exact symbols you want to use. Like any drawing program, it allows you to create your own symbols, which in its vernacular are called stencils. With a little time you could make the stencils look exactly like the components you sell or install. An example of such a drawing is shown in Figure 2. You could also make them resemble the more generic symbols shown in Figure 1.

### BEYOND WINDOWS

Although I will keep the discussion polite, I prefer an Apple Macintosh as my personal computer. I have used Macs for years, and try not to get too fanatical about them, other than telling people they can take my Mac when they pry it from my cold, dead fingers. Enough said.

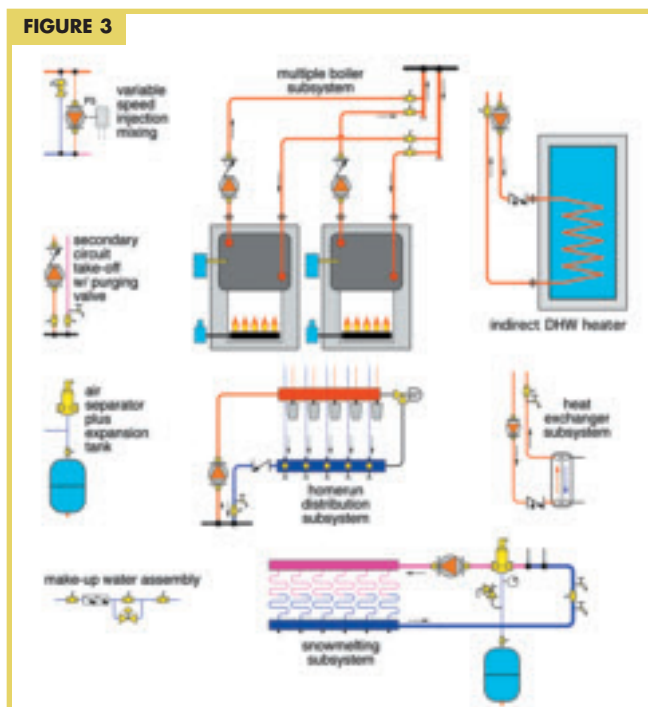
Over the years I have tried several Mac-based drawing packages. They have each had strengths and weakness. About three years ago I came across a product called PowerCADD, which proved to be a very capable yet easy to use package. All the drawings you have seen in my *HPAC* articles over the last three years were produced using PowerCADD. You can check out PowerCADD and download a demo at [www.engsw.com](http://www.engsw.com).

Pixel-based computer drawing programs for generating piping or electrical schematics do not excite me. Although it is possible to generate some simple shapes and fill them with wild colours, the resulting drawings lack professional appearance. Pixel-based programs were never meant for preparing detailed technical drawings. They lack the snapping, scaling, rotating and other geometry manipulation tools needed to produce clean, accurate, and some times complex schematics.

### CUT AND PASTE

Regardless of the CAD software you use, the name of the game in drawing schematics using a computer is to reuse the same symbols over and over. The concept of copy and paste is the key to being productive. Once you have a good symbol palette established, you will very seldom need to redraw a piping component. If you need the symbol at a different size just use the scale command in the CAD software to shrink or enlarge it.

Regardless of the drawing software you choose, create a starter drawing for both piping and electrical schematics. Set up the line widths, colours, layers, you prefer, then paste in your full symbol palette. Make your drawing by copying symbols from the palette, and dragging them into position on the drawing.



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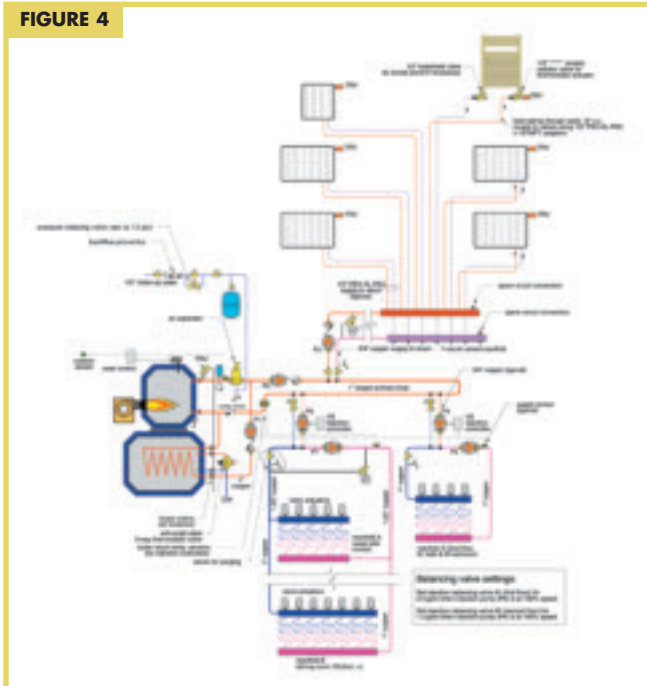
I like to attach symbols with solid fill colours directly onto lines representing piping or wiring. Because they are filled with a colour, these symbols cover up or mask the underlying line. This lets you quickly reposition the symbol along the line without having to go back and heal any gap where the symbol was originally located. It is a real time saver.

The first time you save the drawing, use the save as command and give the drawing a new name. The starter drawing file is then preserved and ready to start a new drawing. As you progress with the drawing be sure to save it several times. Some CAD programs will prompt you to save every few minutes, or automatically save the file on a periodic basis.

The more schematics you draw, the faster you will produce them. You will quickly discover that entire piping assemblies, rather than just component symbols, can be copied and pasted. In many cases, a piping schematic can be drawn by modifying an existing drawing rather than starting from scratch. *Figure 3* shows some examples of possible piping subassemblies that could be used in hydronic piping schematics.

If you need to produce circuit layout drawings for radiant floor heating installations try LoopCAD from Avenir Software. You might start the circuit layout drawing by creating the building floor plan using the general drawing tools in the program. Or, if you are fortunate enough to have a floor plan file prepared in another CAD program that sup-

FIGURE 4



ports DWG or DXF files, you can import the floor plan file and save even more time.

Once you have the floor plan as a template, LoopCAD can automate much (but not all) of the circuit generation procedure. The finished drawing file is then sent to a printer or plotter. The circuit layout drawings produced can save hours of head scratching in the field and will probably recover the software cost on the first tubing installation planned using it.

#### GETTING OVER THE HUMP

With good CAD software and a reasonable commitment to learning, you will soon find your brain focusing on what you are drawing rather than how you are drawing it. Your fingers will subconsciously invoke the necessary keystrokes, pull down menus, and mouse clicks. Still, without patience and a commitment to learn the drawing software you will not reach the productivity goals you initially expected.

If you are accustomed to manual drawing and trying to switch over to CAD, there will surely be times when you will be tempted to go back to the drawing board. This is especially true if you expect to achieve instant results with little effort. After spending 13 years behind a drawing board, I know that it is a hard habit to break. If you persist, you

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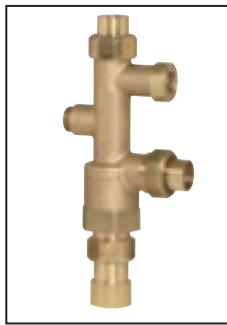
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will make it over the “hump.” At that point you will never look back at the old drafting table as a productive drawing tool. Your attitude will quickly change to why didn’t I do this a couple of years ago?

**SHOW ME THE MONEY**

I have yet to find CAD software with which you press a couple keys and generate a complete and properly designed hydronic heating system. CAD software is simply a great productivity tool to be directed by a trained mind. You might compare it a power saw versus a handsaw in terms of potential productivity, but it is still just a dumb, high-speed, geometry engine that requires your time to generate anything useful.

Please do not get so excited about CAD that you eagerly produce and hand out fully detailed drawings with every quotation. The time you spend generating drawings must be factored into the cost of the job. Never give proposed system drawings to a client until you have a commitment on that project. You can imagine what some folks will do with your proposed system drawing in their hot little hands. Instead, show prospective clients examples of drawings you have prepared for other similar installations. Keep a portfolio of drawings for this purpose both on paper and on your laptop. *Figure 4* shows one of the drawings I use for this purpose.

Once you have a signed contract, the time spent producing system schematics is not time lost, or time spent, it is time invested. Time that will easily be repaid in higher productivity, fewer mistakes in the field, permanent documentation for long term troubleshooting, and impressive materials for professionally marketing your company. If you are serious about being a hydronics professional you need to offer professional-quality drawings for your systems. Investigate software programs; make a decision; buy the software; and set-aside time to learn it well. You will soon impress both your peers and your clients with great looking drawings.

**HPAC**

■ *John Siegenthaler, P.E. is principal of Appropriate Designs and co-developer of HydroniCAD, a new software package specifically for producing hydronic piping schematics, and Hydronics Design Studio software. For more information visit [www.hydronicpros.com](http://www.hydronicpros.com). He can be reached at [siggy@dreamscape.com](mailto:siggy@dreamscape.com).*

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