

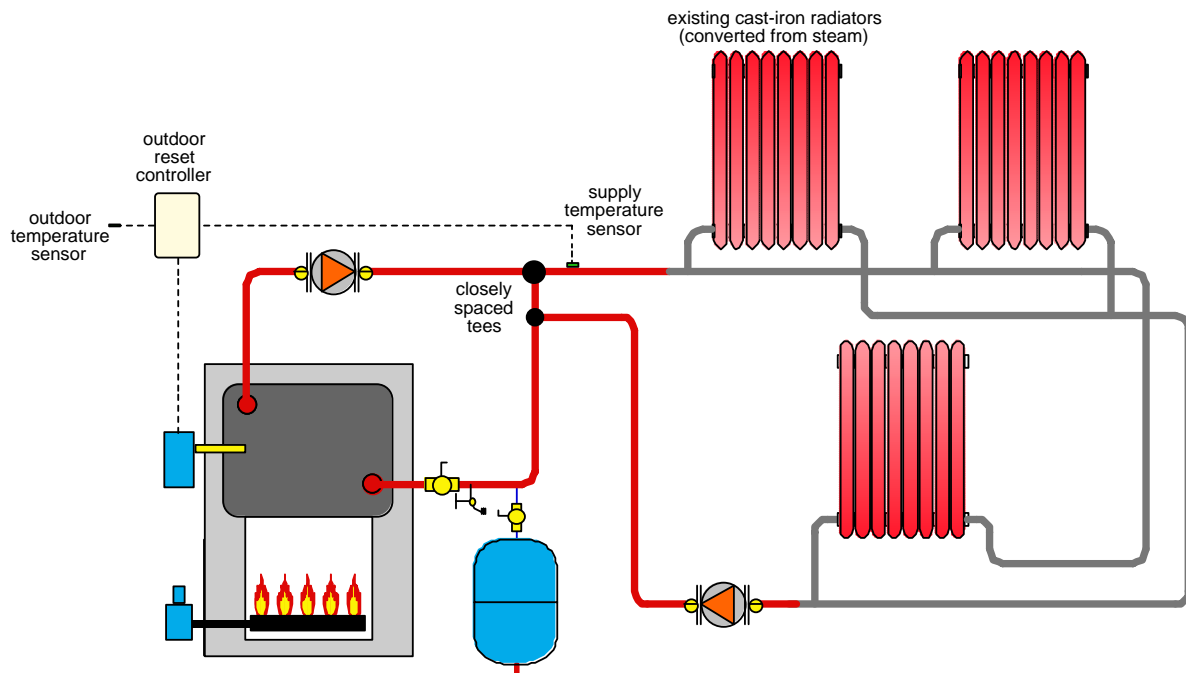
## Steam To Hot Water Renovation

### The Glitch

**Overview:** An old New England home has been heated with a 2-pipe steam system serving plenty of sturdy cast-iron radiators. As part of an extensive renovation and insulation upgrade, the owner decides to upgrade the heat and convert the system to hot water.

The piping system, installed by the local plumber, is shown below. It leaves as much of the 2-pipe distribution in place as possible. A new gas-fired boiler is installed and operated on outdoor reset control.

**Exercise:** What are some design details that you think are incorrect or missing?



### The Fix

Over decades of use, a lot of "mud" can build up in a steam heating system with cast-iron radiators. It's really a shame to push that mud into new portions of the system.

I'd recommend a high-quality dirt separator on the receiving end of the flowing mud, and installed at a low point in the piping whenever possible. Be sure to leave room for a blow down valve at the bottom because you'll surely be using it. Also, be sure the flow velocity into the dirt separator is at or less than 4 feet per second.

Another concern with these systems is low return water temperature to a conventional boiler. Those steam radiators represent a lot of surface area. They may not require water temperature above, say, 130 degrees F even on a design load day. This is even more likely when the building's thermal envelope has been upgraded and thus its heating load substantially reduced.

Just as with low-temperature floor heating, there should be a mixing device between the boiler and distribution system. The controller for that mixing device should monitor boiler return temperature and respond by decreasing heat flow to the distribution system (by adjusting the mixing valve) as necessary to prevent flue gas condensation in the boiler.

Other details that are incorrect:

1. If you expect hydraulic separation between circuits, DO NOT install closely spaced tees as shown in the glitch drawing. Instead, provide a minimum of 6 pipe diameter of straight pipe both upstream and downstream of the closely spaced tees.
2. There should always be a good microbubble air separator on the outlet of the boiler.
3. The circulator is shown at the low point of the distribution system — the most probable location for sediment to collect.
4. Install an air vent on each radiator.

