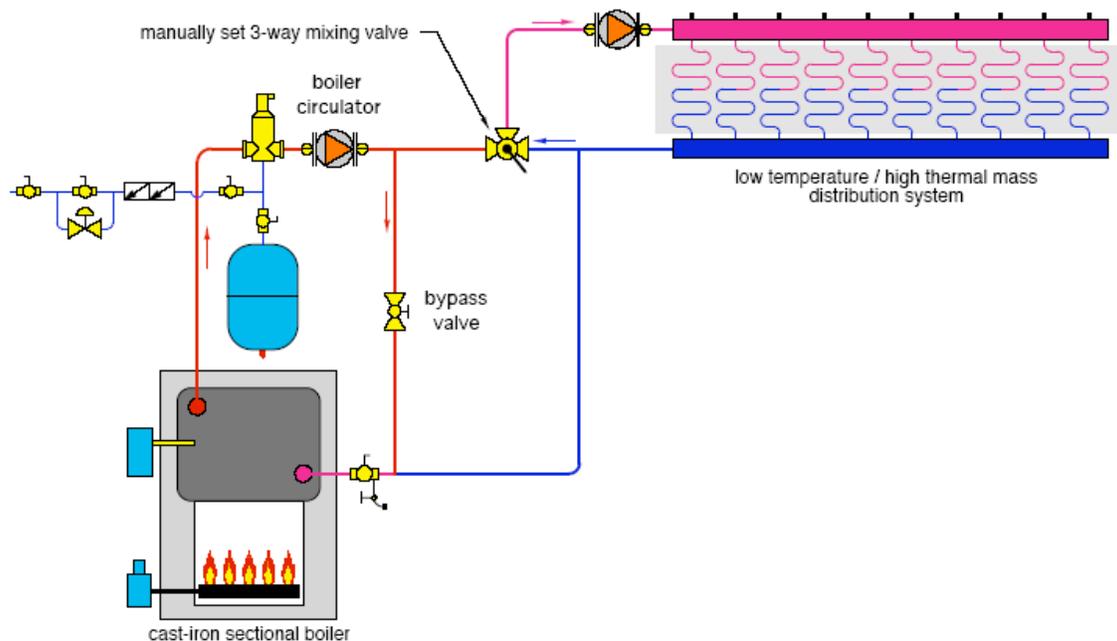


Regulating Supply Temp

The Glitch

Overview: A manually set 3-way mixing valve was installed to regulate the supply temperature to the concrete-slab radiant floor system. A bypass valve is also installed to help boost the boiler inlet temperature.

Exercise: Assume the system undergoes a few modest nighttime setback periods as it operates through the heating season. What are the problems with this design?



The Fix

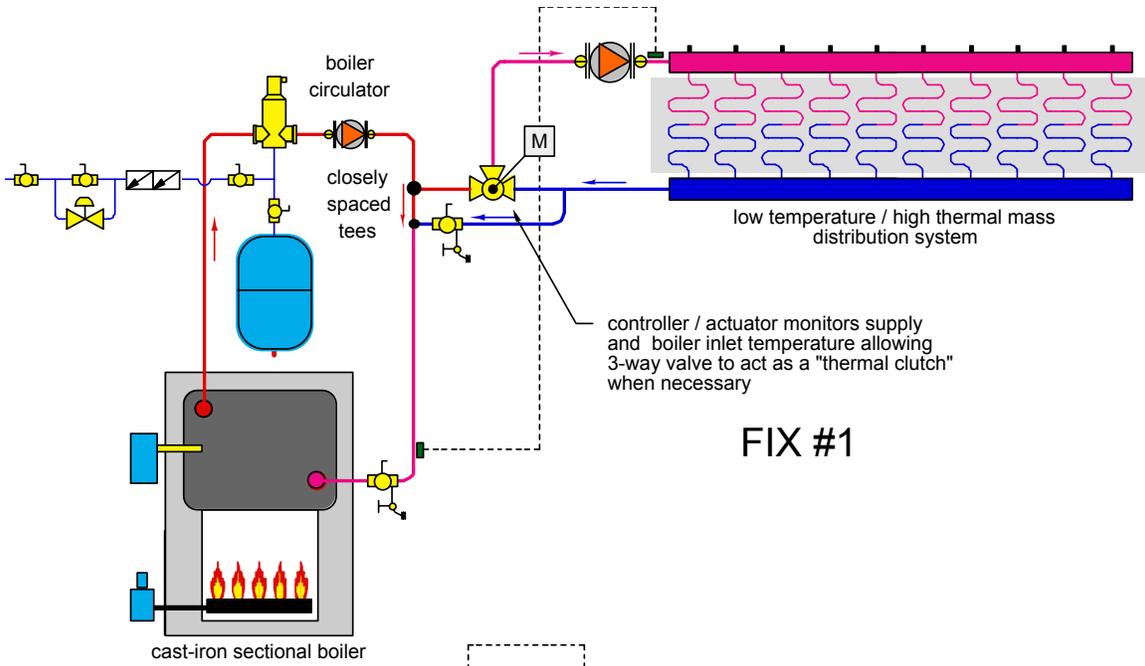
One of the problems with the design is the boiler is still not “guaranteed” to be protected against flue gas condensation. A high-mass slab can easily absorb heat from the water faster than the boiler can reproduce that heat by burning fuel. When this happens, neither the manually set 3-way valve nor the bypass will prevent the boiler temperature from dropping — quite possibly well below the dew point of the flue gases. This is especially likely during recovery from setback periods.

To correct this situation, the 3-way valve needs to have some “smarts.” Equipping it with an actuator/controller that monitors boiler inlet temperature allows the 3-way valve to operate as a thermal clutch when necessary to prevent flue gas condensation. This is shown as Fix No.1.

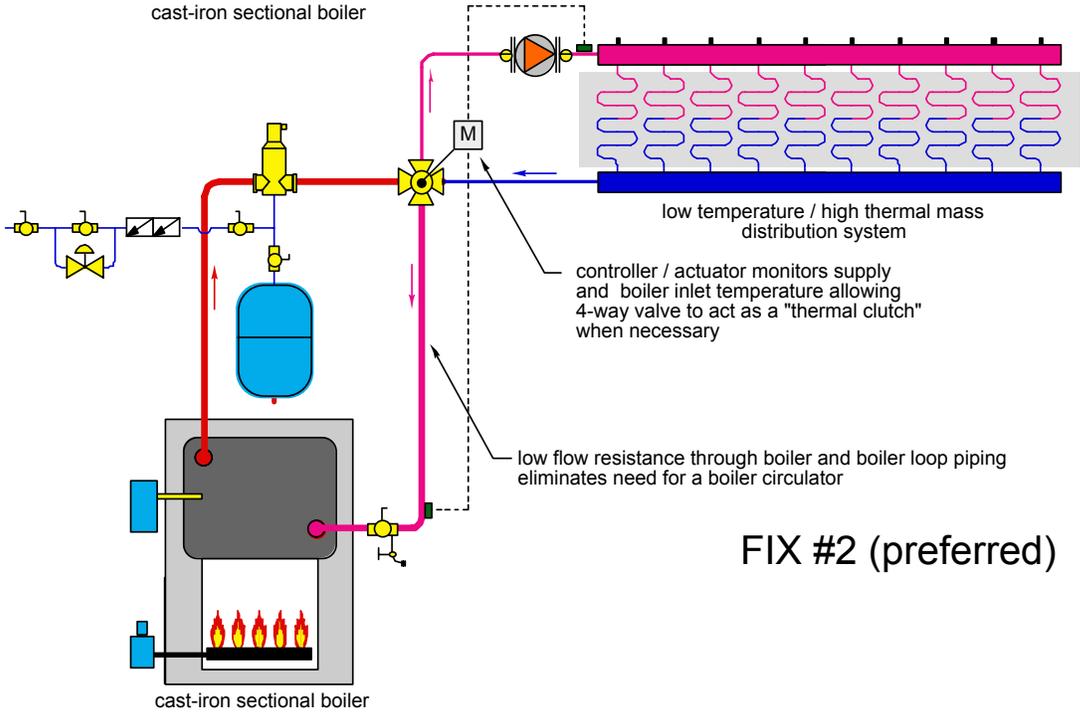
Assuming the boiler has low flow resistance and significant thermal mass (both typical of cast-iron sectional boilers), the boiler circulator can be very small and thus operate at low wattage.

A set of closely spaced tees ensures that the flow dynamics of the distribution system are hydraulically separated from those of the boiler loop.

An even better solution is to use a 4-way motorized mixing valve with the same sensors and eliminate the need for the boiler circulator (shown as Fix No.2). Just be sure to keep the valve close to the boiler and minimize the head loss in the piping connecting the boiler to the valve. Why use an extra circulator when you don't need to ...



FIX #1



FIX #2 (preferred)