

Sticking Thermal Element Can Cause Thermal Failure

4R / 5R55E / 5R55W / S/N Cooler Bypass System



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Ford's 4R/5R55E and 5R55N/W/S transmissions use a hydraulic cooler bypass system that can cause a system meltdown if the thermal element or fluid cooler bypass sleeve sticks.

If the sleeve sticks part way it'll restrict cooler flow and cause internal component damage; meanwhile it may not set any fluid temperature codes. Very often the fluid will be burnt and

the overdrive planetary assembly completely destroyed.

Blocking the thermal valve sleeve in the stroked position will prevent this from happening. Some aftermarket companies supply a block to keep the fluid cooler bypass stroked in the normal temperature position. Another way to accomplish this is to move the return spring to the opposite side of the sleeve.

This same problem may also cause intermittent lockup code P0741. The accompanying hydraulic diagrams show the function of the thermal element and sleeve:

Figure 1 shows the thermal valve at rest (4/5R55E; orange) in the cold temperature position. In this position, the valve directs oil through the fluid cooler bypass sleeve (green), which allows the oil to flow to the cooler

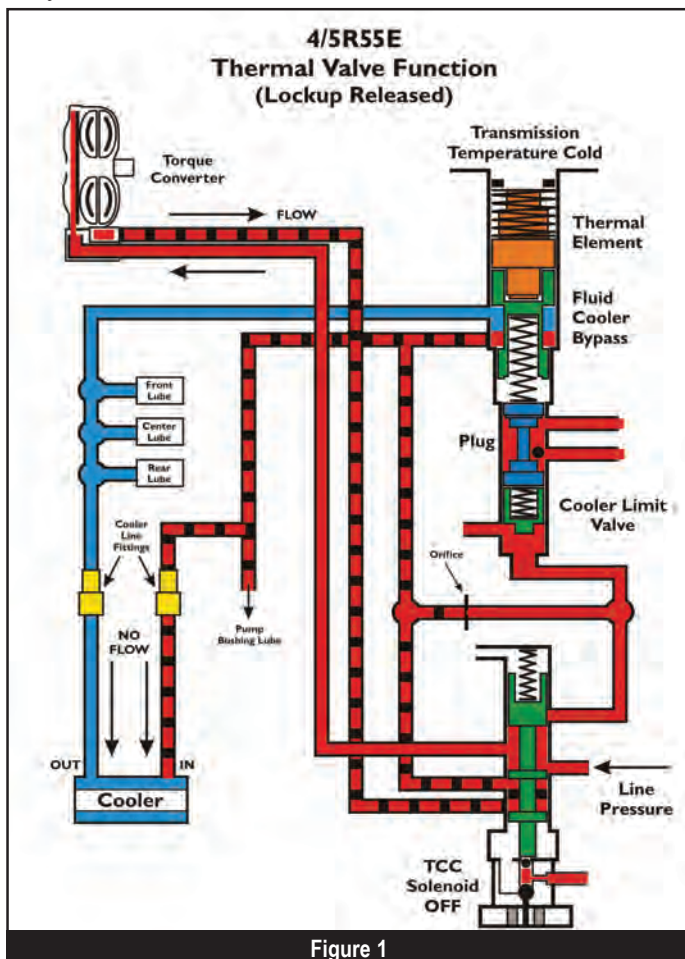


Figure 1

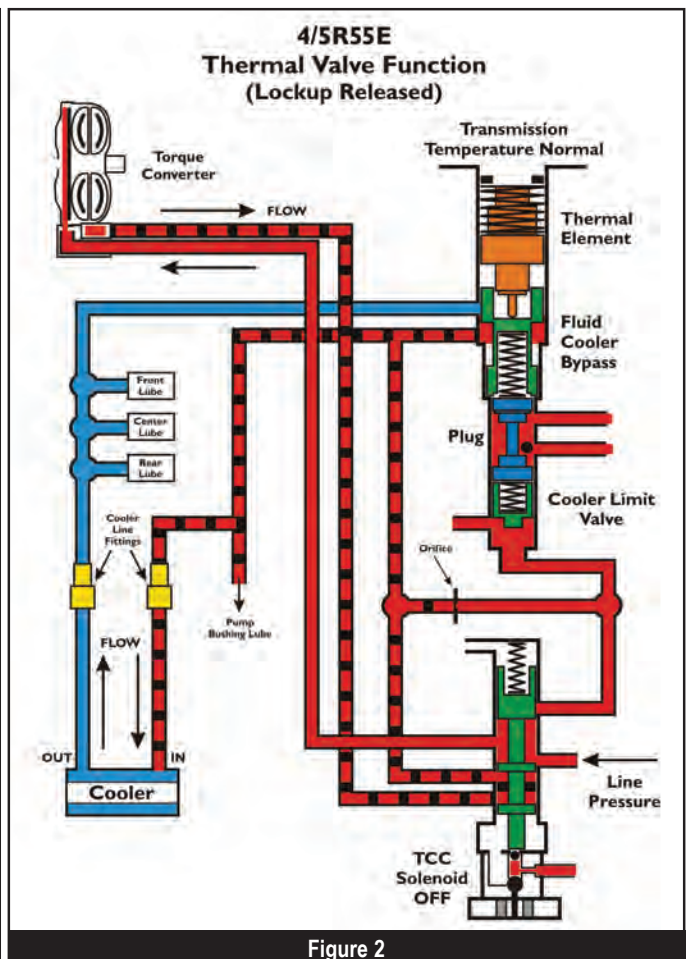


Figure 2

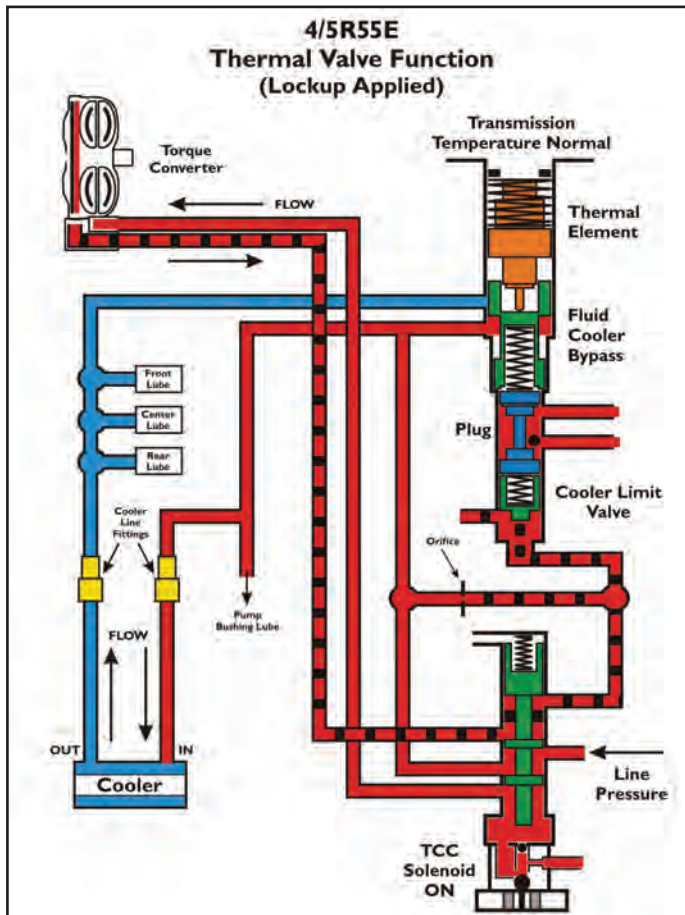


Figure 3

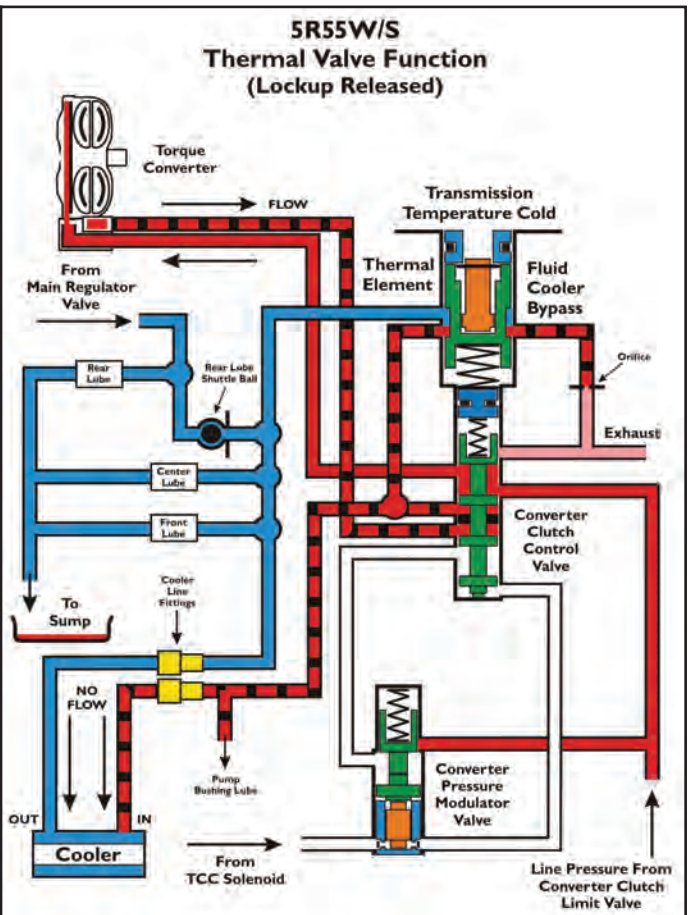


Figure 4

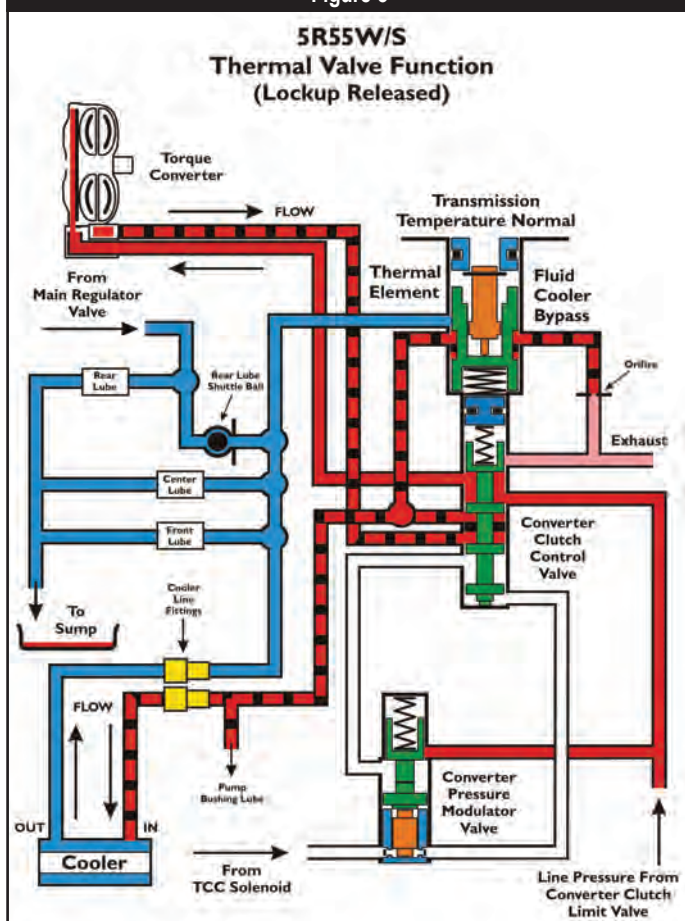


Figure 5

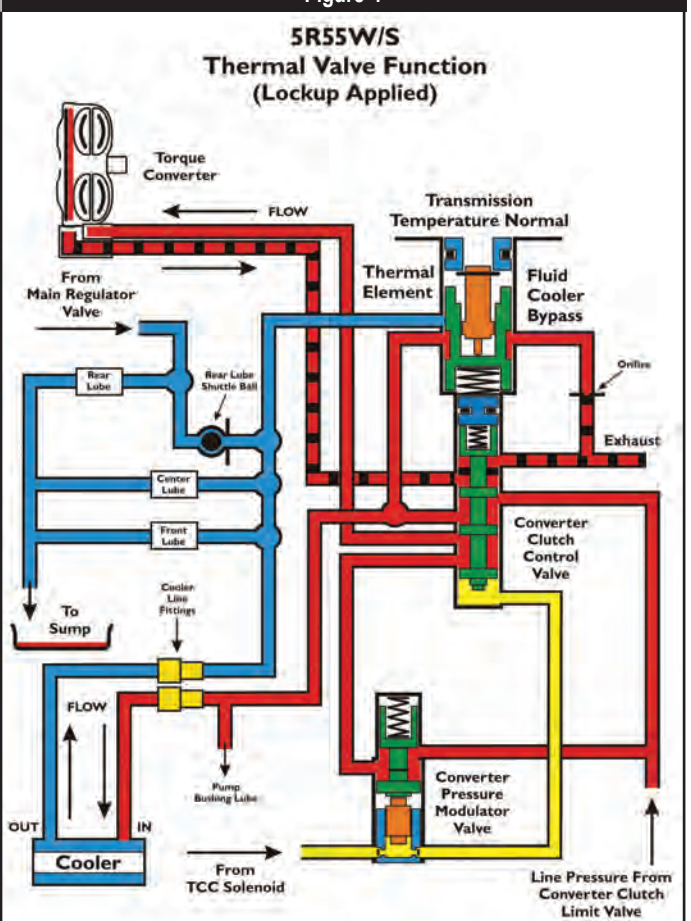


Figure 6

through both cooler lines at the same time. Since there's no return, there's no cooler flow. This helps the transmission reach normal temperature faster in colder climates.

Figure 2 shows the transmission at normal temperature: The thermal element moves the fluid cooler bypass sleeve (extended pin), blocking off the oil being applied to the upper cooler line fitting. In this position, oil flows to the cooler through the lower cooler line and returns through the upper cooler line. Figure 2 shows the lockup converter flow in the released position at normal temperature.

Figure 3 again shows oil flow to the cooler at normal temperature, but with the lockup converter flow in the applied position. If the sleeve gets stuck — completely or part way — it can restrict cooler flow in the converter clutch release pressure circuit. This can set DTC P0741.

Placing the cooler bypass sleeve spring on the opposite side of the sleeve locks the sleeve in the normal temperature position, preventing a cooler flow problem.

The diagrams for the 5R55W/S (figures 4, 5, and 6) and the 5R55N transmission (figures 7, 8, and 9) show cooler flow working the same way. The only difference is the thermal element, fluid cooler bypass sleeve, and converter clutch control valve lineup aren't in the same bore.

But blocking the fluid cooler bypass sleeve in the normal temperature position, such as by relocating the spring to the opposite side of the sleeve, will still keep the cooler flowing properly and prevent overheating problems.

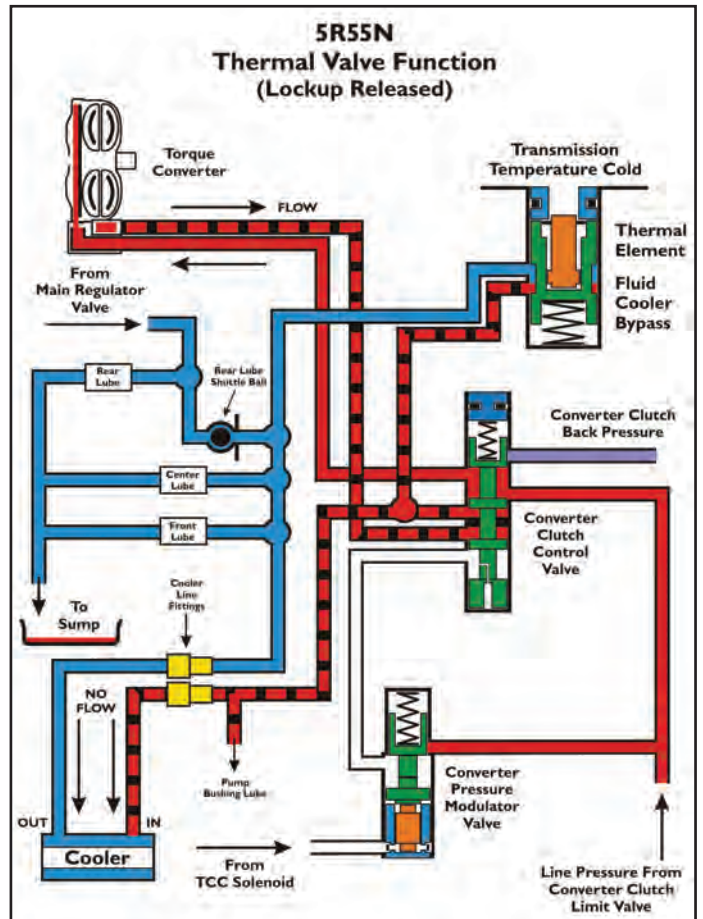


Figure 7

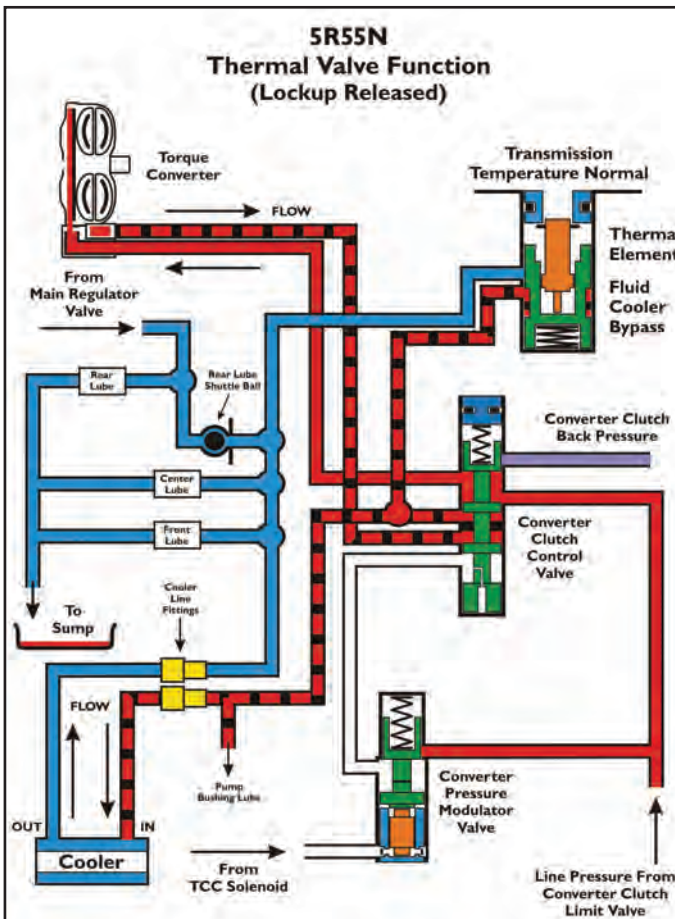


Figure 8

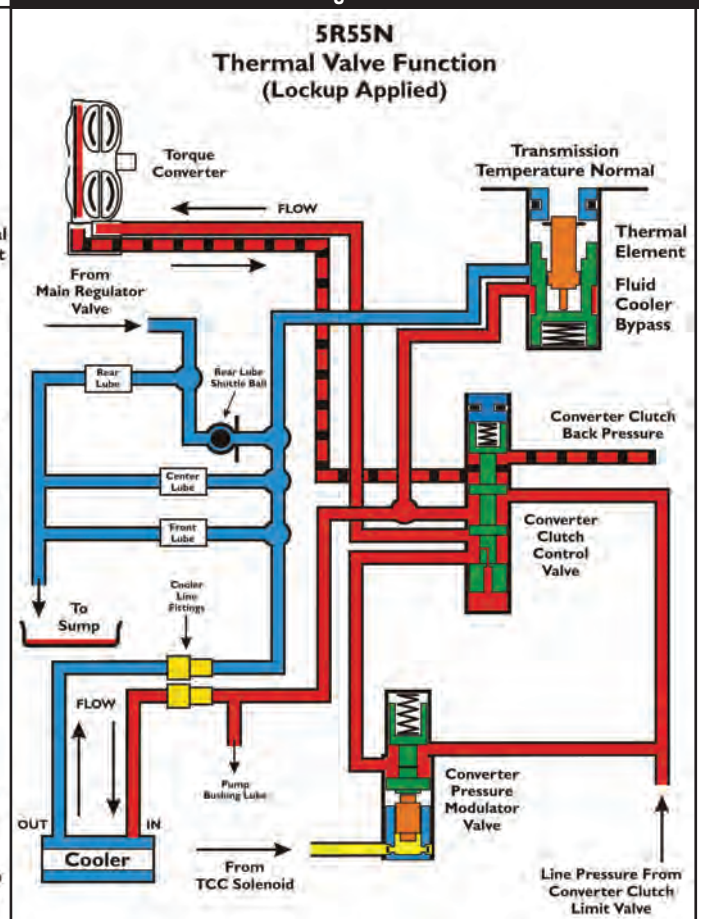


Figure 9

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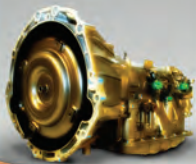
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