

After reading about the pump modification by Jack Ralph in the March-April 2005 issue of *Early Bird* it made me wonder about the benefits of such an arrangement. After receiving a couple of phone calls from customers asking if I thought it would work and if CASCO had any plans to produce a pump with similar modifications, I knew we had to devise a test and see what benefits there were.

I discussed the project with John Lonsberry, our restoration shop manager, at CASCO and he said, "It will be like the show *Myth Busters*" and was immediately interested in working on the project with me.

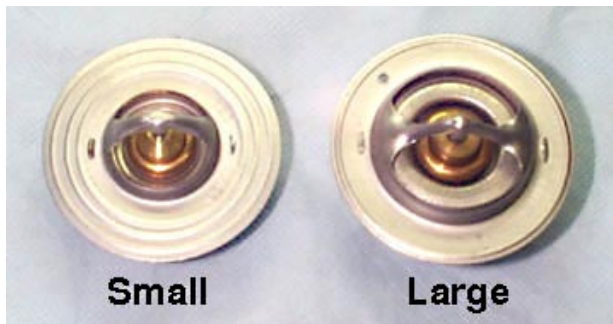
We started our investigation by asking some radiator manufacturers if more flow through the radiator was a good thing. They agreed that the more flow the better. When we asked if there was a point of diminishing returns one manufacturer said, "When you have so much water flowing into the radiator that it blows the top tank apart it's time to think about reducing the flow rate." So we set out to design our test apparatus with the goal to find the pump configuration that gave us the highest flow rate. In particular we were concerned about the flow rate at or near idle speed since this is the most common time to have overheating problems. In the case of parades, it's also the most embarrassing to have these problems.



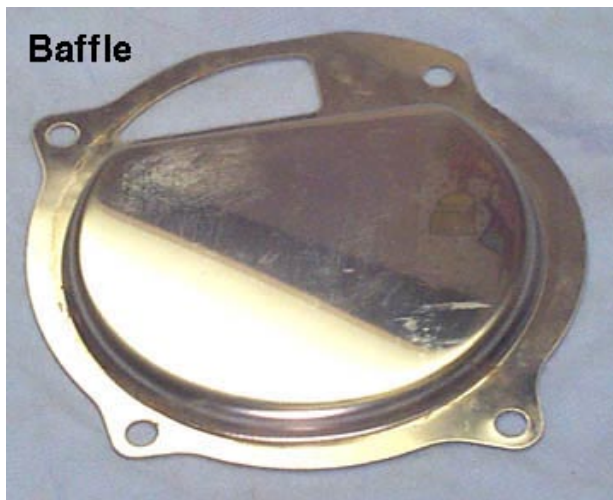
Our test assembly used two 30 gallon plastic tanks connected to an engine on our shop's engine test stand. The two plastic tanks were connected together with 2" pipe with a ball valve installed. One tank ran to the inlet of the water pump, and the other tank was connected to the water outlet on the engine. We filled both tanks with 15 gallons of water. Then we closed the ball valve that connects the two tanks and started the engine. While the engine was running it pulled water out of one tank and pumped into the other tank. We recorded the time it took to pump 10 gallons of water. It was surprising to see just how much water is being moved by the water pump that we have questioned for so long.

We tested the flow rates with these four variables:

1. **RPM:** We ran tests at 550rpm and 1500rpm.



2. **Thermostat size:** There are at least two different size thermostats currently available to the hobby. The one with a small opening is available in 160 and 180 degree and has an opening of .887 square inches. We refer to this thermostat as the small thermostat. The other thermostat which is available in 170 degree has an opening 1.724 square inches, referred to in this study as the large thermostat.

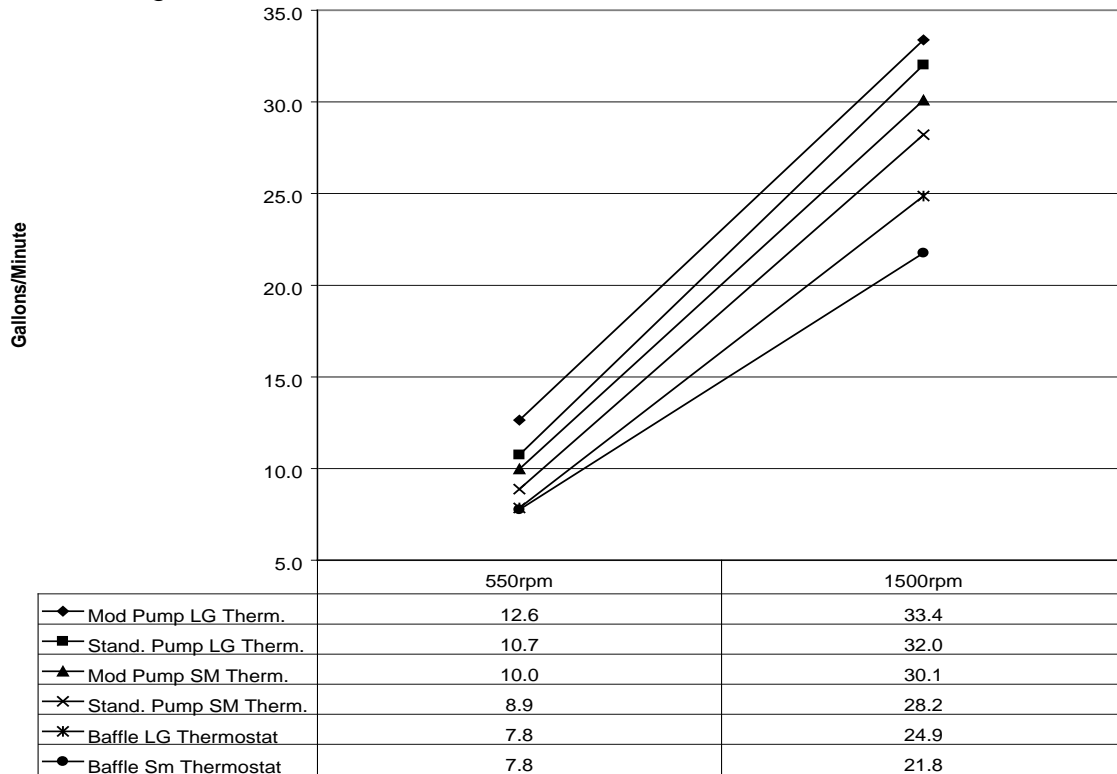


3. **Baffle:** Since there have also been ongoing discussions among hobbyists about the effect of using the baffle, we tested it at the same time.



4. **Pump modification:** We ran tests with a standard water pump and also with the same pump modified with additional vanes on the back side of the impeller. In a similar arrangement to Jack Ralph's modification.

Since we were pumping water above the level of the engine's water pump, the data shown in the graph may not represent actual flow rates through a closed coolant system. However we feel comfortable making comparisons between each configuration.



**Discussion:**

The poorest performance is shown by the two bottom lines. These two lines are with the water pump baffle installed.

The middle two lines show the performance difference between the standard pump and the modified pump using the small thermostat.

The top two lines show the difference between the standard pump and the modified pump using the large opening thermostat.

**Conclusion:**

Assuming that increased water flow results in better overall cooling performance, we can draw these conclusions:

GOOD: Do not use a baffle

BETTER: Use a large opening thermostat.

BEST: Use a large opening thermostat and a water pump with a modified impeller.

So how do we answer our customer's question whether or not CASCO will produce a modified pump? It looks like there is some real benefit to be gained from this modified pump arrangement and therefore we will be giving the production serious thought. However it is important to point out that when working on engine cooling we can't ignore, proper ignition timing, a good clean radiator (or aluminum), proper fit of the fan in the fan shroud, a thermostat that is opening fully (especially the large one), and possibly auxiliary electric fans if you have air conditioning.

*Update: CASCO introduced part number 8501HO in June 2005 and has sold several hundred units. Customers consistently claim better cooling at low RPM.*