

IMPROVING COOLANT FLOW

This article discusses two potential issues that may hurt the coolant flow in your Thunderbird's engine temperature control system. The first issue is the gasket installed between the water pump spacer and the timing chain cover.

Figure 1 shows the alignment of the inner surface of an OEM (Original Equipment Manufacturer) water pump spacer and the timing chain cover's water pump well. These two components define the chamber in which the water pump impeller operates. The impeller accelerates the coolant in a clockwise flow, and centrifugal force keeps the fastest moving coolant to the outer circumference of the chamber. The green arrow shows the desired coolant flow back into the volute opening.

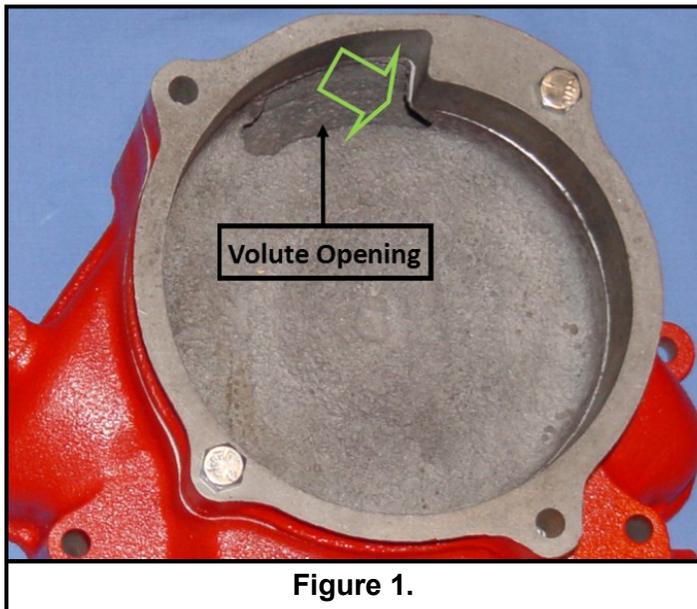


Figure 2 again shows the alignment of the spacer and timing chain cover, but with a standard Y-Block water pump gasket installed between them. The gasket is light blue and a portion of it is visible. Unfortunately, this visible part of the gasket presents an obstacle to the desired coolant flow. And this obstruction is at the most critical point in the coolant flow into the volute opening and ultimately to the engine's water jacket. The good news is this is easily corrected with a trim knife. This obstruction occurs when a standard Y-Block water pump gasket is used between either the OEM or an aftermarket spacer and the timing chain cover. If you are going to use one of these gaskets, it should be trimmed to align with the interior surface of the spacer.

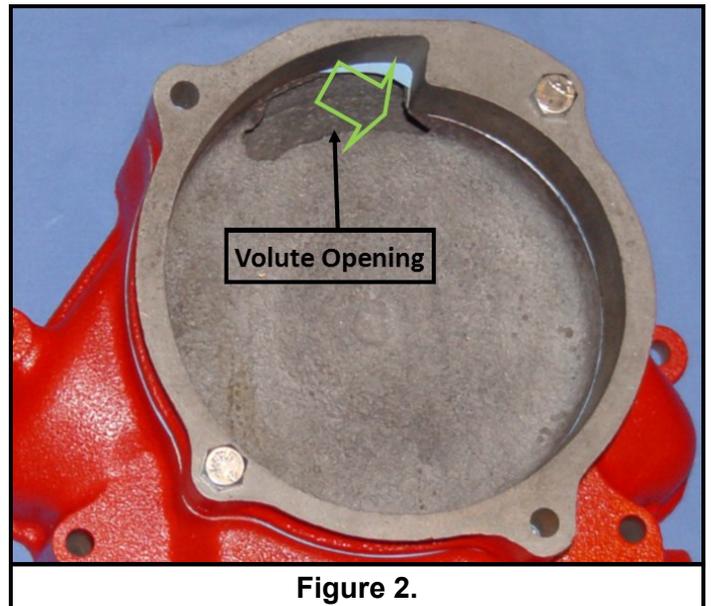
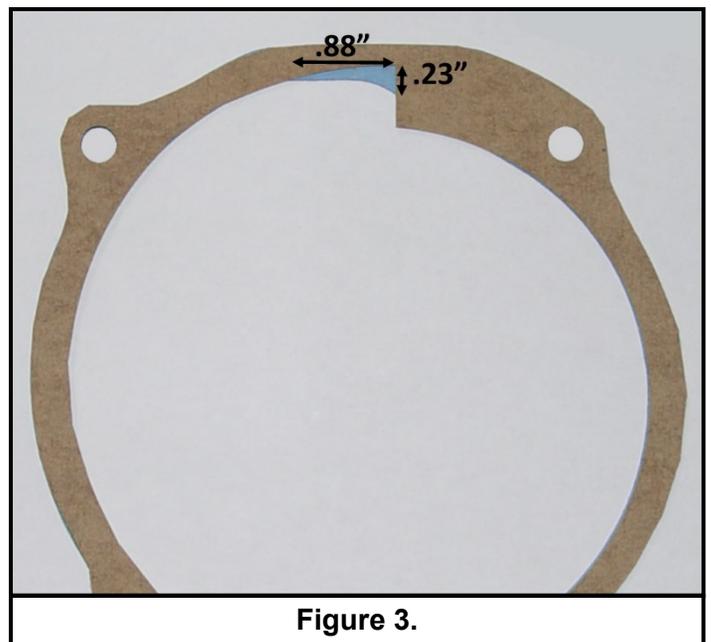


Figure 3 shows a gasket properly cut for the spacer to timing chain cover mating. It is positioned on top of a standard Y-Block water pump gasket to illustrate the location, size, and shape of the obstruction. As you can see, the is gasket obstruction is just under a quarter of an inch wide and tapers off to zero over a span of just over three-quarters of an inch.



And the location of this obstruction is significant. It blocks the corner of the chamber offset where the
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highest velocity coolant has just perpendicularly impacted the offset portion of the interior surface of the spacer.

While the gasket currently installed between your spacer and timing chain cover is probably presenting an obstruction, I will leave the decision to remove the water pump to install a proper gasket or not to the reader. I would suggest that any time the water pump is removed, it should be reinstalled with a proper gasket.

The second potential issue is not as likely to exist in your Y-Block and results from a "bad" break at the Cleveland Foundry. It appears that part of the timing chain cover casting was broken away in the manufacturing process to form the volute opening. Unfortunately, some of the breaks were not as clean as intended and resulted in some of the casting protruding into the volute opening. Figure 4 shows a timing

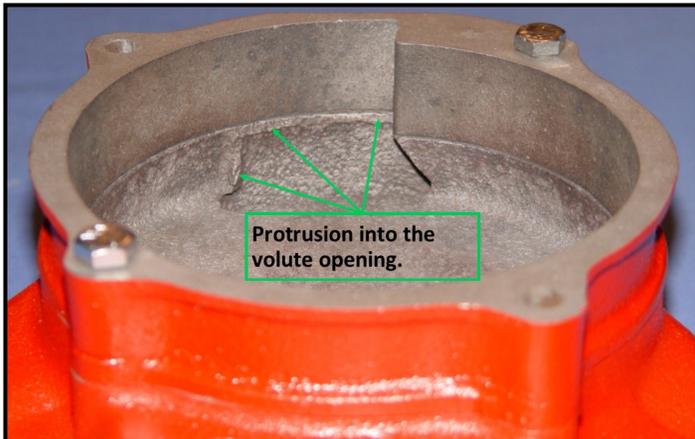


Figure 4.

chain cover with an example of a casting protrusion into the volute opening. With the timing chain cover installed on the engine, a casting protrusion is not something you would see unless you were specifically looking for it.

I had removed and reinstalled my water pump several times with various spacers during flow testing and never saw the protrusion. After I became aware of this potential problem, I removed the water pump to check and found a protrusion close in size to the one pictured in Figure 4.

An angle drill with a 1/2 inch rotary file as shown in Figure 5 is an excellent tool to grind the protrusion away.



Figure 5.

7771619. After the grinding is complete, the water jacket must be thoroughly flushed to remove all grinding debris.

Figure 6 shows the inner surface of the timing chain cover with which the volute opening should be flush.

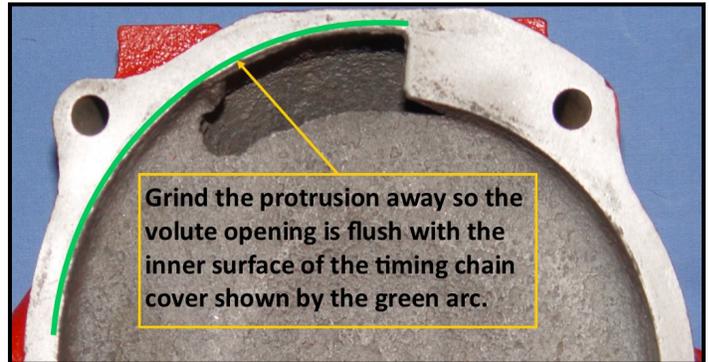


Figure 6.

The protrusion shown in Figure 7 is the worst I have seen to date and had gone unnoticed for over 60 years. Because this issue has only recently come to light, most of us have no idea how clean the break on our timing chain cover is. I suggest you make a note to check the next time you remove the water pump. Also, there is no better time to check for and remove any protrusion that exists than when the timing chain cover is uninstalled. So don't miss this opportunity when you are rebuilding your engine.

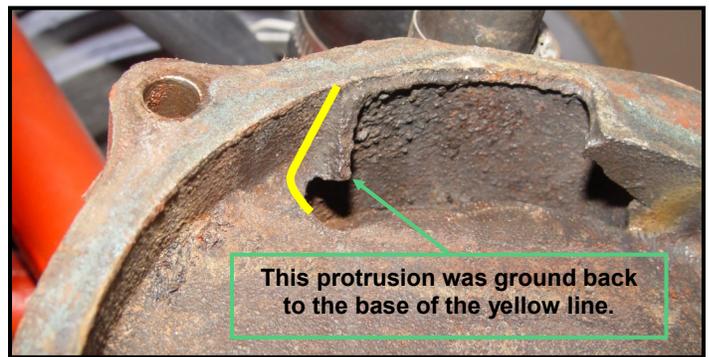


Figure 7.

One final point on this issue is that while its effect is more significant on Thunderbirds because of the spacer installed between the water pump and the timing cover, it applies to all Y-Blocks.

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