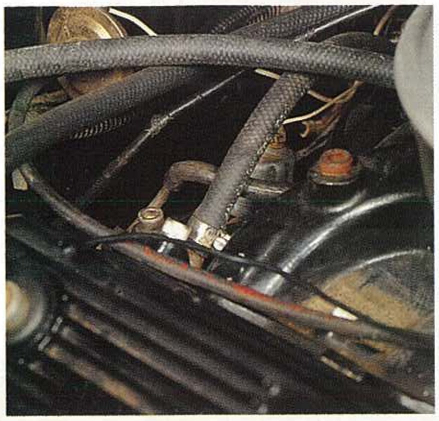
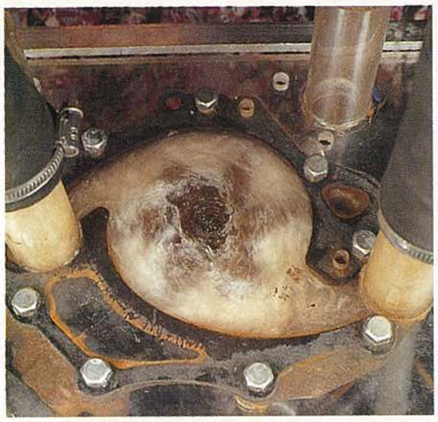


LEFT: Improved coolant flow through the system can be achieved by tapping out the rear of each head and directing the flow back into the suction side of the pump.



LEFT: Here's a standard Cleveland pump creating really wild cavitation. Note the extreme low-pressure region at the centre of the pressed steel plate impeller.

equal burning of the fuel in every cylinder and less expansion difference between various sections of the engine. These conditions translate into less engine wear and reduced fuel consumption. Often, the amount of heat the heads need to get rid of is about the amount needed in the lower sections of the engine.

NOT THE WHOLE ANSWER

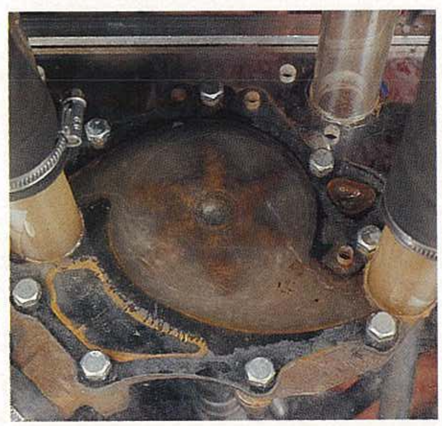
Even though the EcoTrans bypass system works well, it still won't fix your overheating problems if you have a bad pump. Many standard pumps cause cavitation as they work because their poorly designed impellers create areas of extremely low pressure on their inside edges where they're sucking. It's commonly known that boiling temperature is directly related to pressure but not many people stop to think that water will boil at room temperature if the pressure is low enough. Many pumps create just such a low pressure and if you have one you'll probably never be able to keep your running temperatures down to an acceptable level. Additionally, some pumps are so badly designed that coolant can move in reverse under certain operating conditions.

EcoTrans has taken to modifying pumps to get them to perform and meet the needs of modern high-performance engines. The exact modifications to any particular unit depend on the style of pump and engine. Basically, the original impeller is removed, certain sections of the internal flow-paths are modified and a new cast impeller of superior design is fitted. EcoTrans has manufactured gunmetal bronze replacement impellers and each is hand-detailed before fitting. The result is pumps that work extremely well. How well? We set about finding out in the following way.

Fluid will only flow from a high-pressure region to one of low pressure. Creating such a pressure difference is the job of the pump. Logically, determining the effectiveness of a pump will involve measuring the pressure differential it creates. That's to say, measuring its output pressure against its inlet suction. We went and got a few gauges from VDO to use to make these measurements. The ideal points to measure the high and low pressure regions in a cooling system are at either side of the DFC. John prepared one with drillings that allowed us to measure the pressure at the engine outlet side (high pressure) and the radiator side (lower pressure). The external bypass hose (emerging at the bottom of the DFC) has in it a brass junction block which is the filling point for the system and which also provides a convenient point to measure the vacuum on the inlet side of the pump.

ALL WE NEEDED WAS A FIRE

Initially, we wanted to see what a good healthy flow looked like, so we connected a DFC and industrial flow-meter to a fire hose. The photograph shows a flow of 200 litres per minute. This flow rate was gained with a pressure difference from one side of the DFC to the other of about 15psi.



RIGHT: Different speeds have different effects. This doesn't look nearly as bad as the previous shot. Nonetheless, it's still far worse than it should be and will lead to overheating.

RIGHT: Here's another problem with pumps. When they stop, the coolant level in them can drop, as has happened in this photograph. This can be due to steam pressure and can cause your pump to stall. When the engine is restarted, the pump may be unable to work properly because of the condition.