External Electric Water Pump Installation

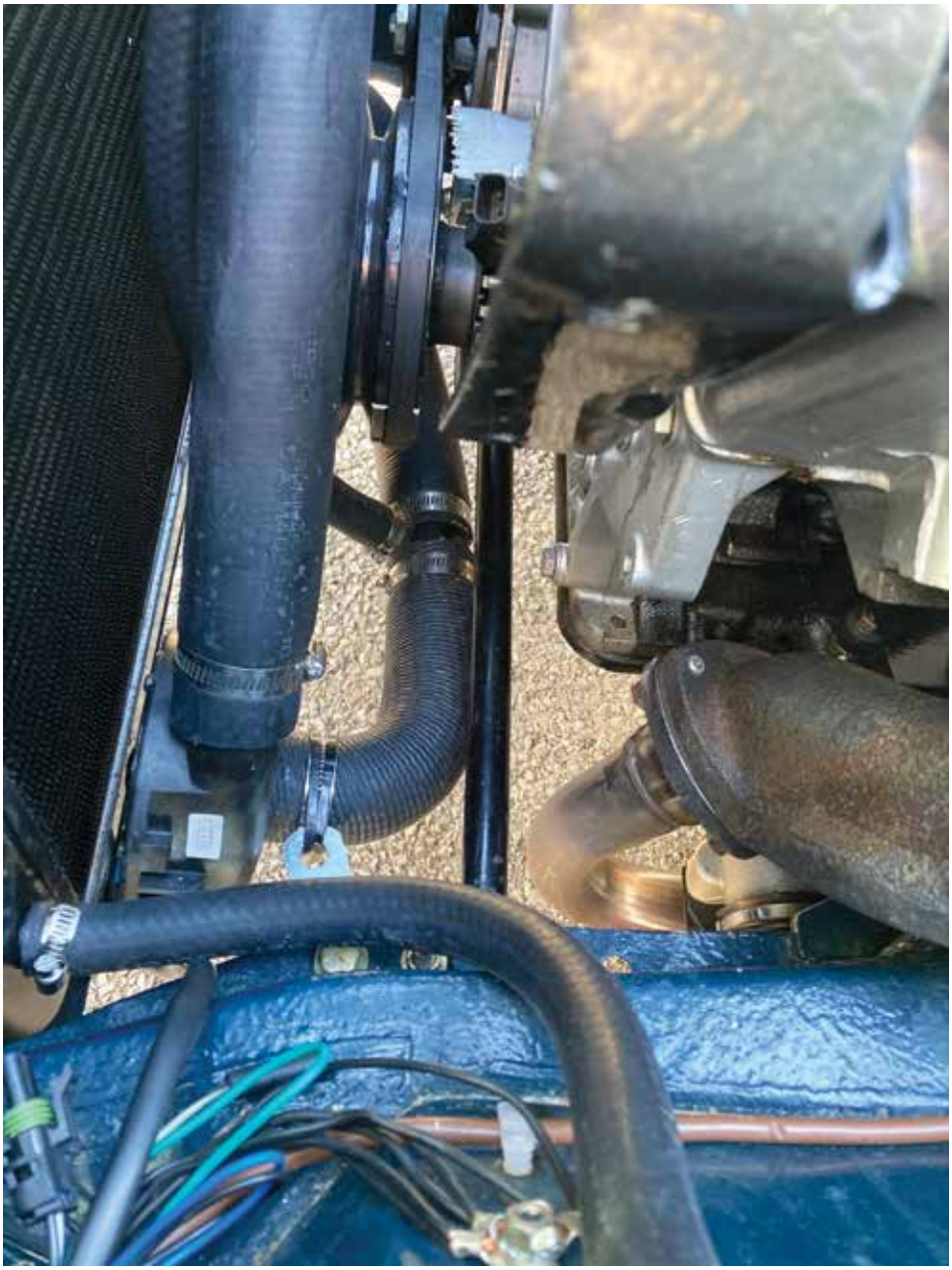
by Terry Hunt

There are many Stags running the original water pumps with no issues, but as I planned my engine build I found that I did not have a suitable mechanical pump to rebuild and so decided to look into an external electric water pump.

The cost can be similar to replacing a mechanical pump or perhaps more, depending on what type of installation you do, and a few different approaches are discussed here. For me, the pros were the ease of service/replacement - you don't need to remove the Inlet manifold to get to it, it can be mounted lower so that a loss of coolant does not affect operation so easily, it can run full-speed regardless of engine speed and the possibility of running the pump after engine switch off to assist in relieving heat soak. The cons were cost, and the extra work needed to install it. I felt that the extra complexity and possible reliability issues were a wash. The mechanical pump can and does have its own problems and many modern cars run electronic pumps with few issues.

I went ahead and purchased a Davies Craig EWP115 pump and controller. The cost at time of writing is about $340 and it can also control an electric fan. The next decision was whether to use both mechanical and electric fans or just electric. Keeping the mechanical fan usually requires that the pump be installed in the area where the alternator sits and the alternator needs to be repositioned to the top left of the engine, where the A/C compressor sits.

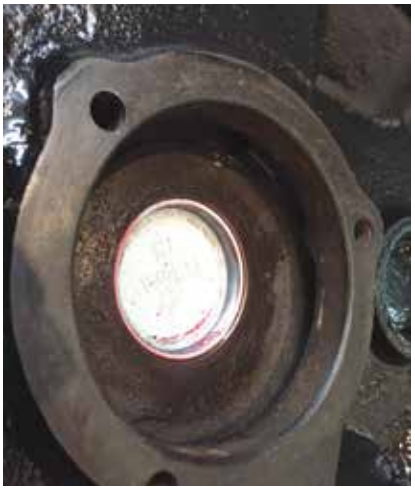
It may be possible to find another way but as I had a view to recommission the A/C one day I decided to remove the mechanical fan and without that I could mount the EWP on the lower left side and make the coolant hose run somewhat easier. A 16-inch pusher fan was obtained, I went with a dedicated pusher as they seemed a bit more efficient than the reversible ones. I had to trim the radiator frame a little to fit it, but it does fit well. I also installed a relay for the fan, in a box along with my headlight relays. Along with that I fitted a TR6 spoiler to help the cooling and T-eed the two head transfer covers together; an easy update that cost little.



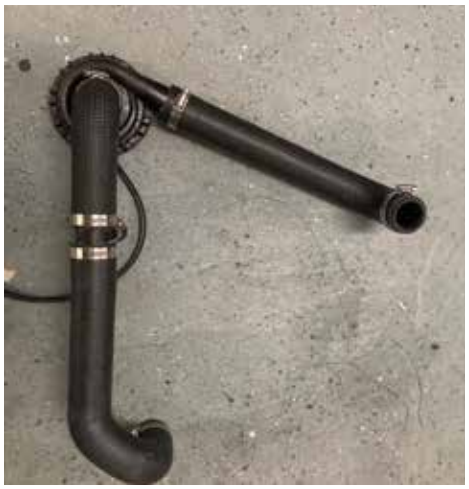
The Davies Craig EWP 115 pump in place

The next step was to remove and plug the old mechanical pump. There are pretty brass plugs available that just drop in to replace the pump, but I found them rather expensive especially when shipped from the UK, so decided to follow the Davies Craig information and just plugged the water pump openings with two core plugs, a 1-41/64" and a 1-45/64" seemed to fit nicely.

The thermostat was removed and the by-pass hose connection from the inlet manifold was plugged, as well as the bypass/heater inlet to the pump cover. The EWP sits between the lower radiator outlet and the inlet to the pump cover, so reconnecting the heater return hose to the cover will no longer work. It needs to be run down to the inlet of the EWP to provide flow through the heater and a Tee is needed there to achieve that. The Davies Craig kit includes an inline splice for the



Original water pump plugged off

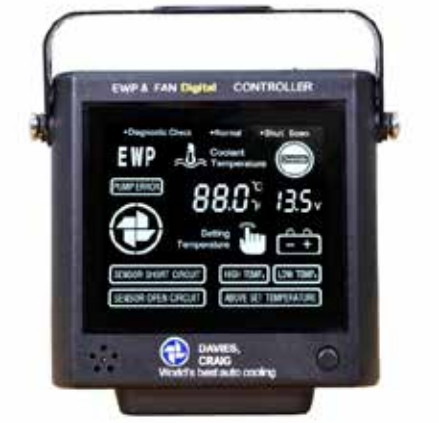


EWP pump and hoses

Header tank

top hose that holds the thermal sensor. It is a 1-1/4" and fits nicely on the standard top hose which needs to be cut to install it. Another possibility is to tap the thermostat cover and install it there.

Next the Controller was installed. As I had the looms all out and was repairing and re-taping them, I decided to include the wires into the looms so needed to lengthen them. After I had done that, I found some information that you should not cut the thermal sensor wires as it could change the resistance, upset the readings, and possibly cause the controller to error. Mine turned out to be fine. I suspect the warnings are regarding bad connections which I don't do! I installed the controller inside the glovebox, a popular option apparently as its not something I really want to see on my dash. In any case when the car is set up and proven itself you hardly need to look at it. There is however a remote warning LED that indicates that the water temperature has exceeded the set point by 10 degrees C. This I upgraded to a nice large 16mm LED and mounted it on my dash where I can easily see it.



The Davies Craig Controller was placed in the glove box

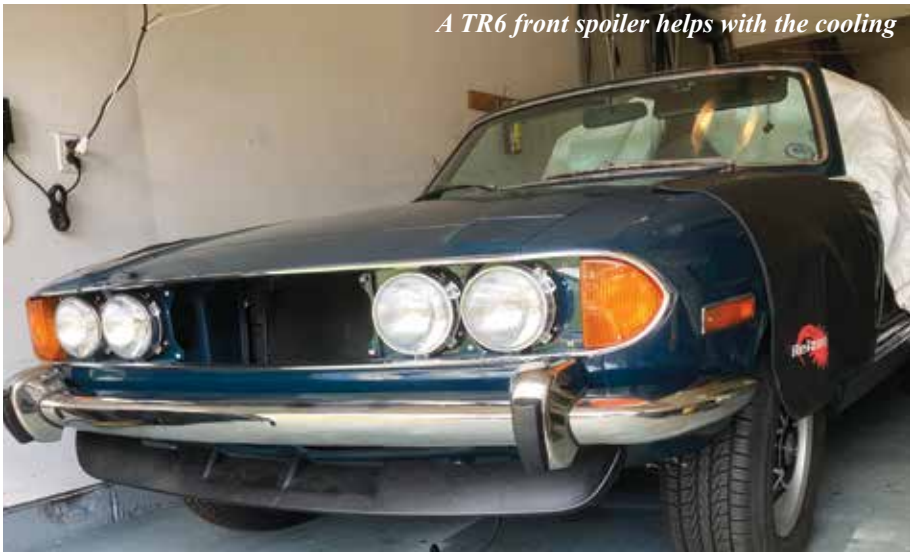
Finally, I needed to install the actual pump itself. It has 1-1/2" hose fittings, but the radiator and pump cover are both 1-1/4" so I obtained some hose reducers 1-1/2" to 1-1/4" for those and went 1-1/2" between the two including the Tee I needed for the heater hose. I found that NAPA online has thousands of hoses with pictures and descriptions, so spent many hours filtering through until I came up with three that looked likely. The first one had a nice sharp 90 bend then dropped down to below the front pulley, (this is where retaining the mechanical fan would cause a problem getting around it). Then two longish runs with 90 degree turns each end which were cut to run from the tee to the inlet and the outlet to the pump cover. I ended up with NAPA part# NBH7389, 2 off and NPH7275. The pump should not be solid-mounted, so I just installed a bracket and tie wrapped it to that to prevent excessive movement.

I had also installed a VW header tank with take offs soldiered to the radiator tank. It could be argued that a header tank is not required now that the pump was mounted nice and low but it's a convenient way to keep the system bled and easy to see the level, so I went with it.

Initial filling went well, the pump runs as soon as ignition is on, so it helps to bleed the system, along with the header tank of course. You can even get the controller to run pump and fan full speed if you need to. Normal operation for the Davies Craig is that when the coolant is cold the pump runs for 10 seconds then stops for 30 seconds, as the temperature rises it runs for 10 seconds on, 10 seconds off.

Header tank take off

Finally, when approaching the set-point it starts running continuously under full control, only rising to full speed when needed. This is how the controller eliminates the thermostat. Some are alarmed when they hear that the pump runs intermittently but I see no signs of stress, or wild variances. It is only happening when cold and I have not seen any problems. The set-point is adjustable with quite a large range. I set mine at 90 deg. C which equates to the Mk 2's 88 deg. C stat. The fan is turned on when it exceeds the set-point by three degrees and stays on until set-point is reached again. I have never needed to but there are ways to turn the fan on or both fan and pump on by setting an override. It also has fail-safes where the fan/pump will run full speed if the water does not raise temperature sufficiently in a set time and there is a remote warning LED if the temperature should go 10 deg. C above set-point. On engine shutdown the pump and fan will operate for three minutes or until the coolant drops by 10 degrees, whichever comes first. I was seeing a minute or two at most last summer. After a few weeks I was confident



A TR6 front spoiler helps with the cooling

A 16" electric pusher fan is controlled through the Davies Craig controller box

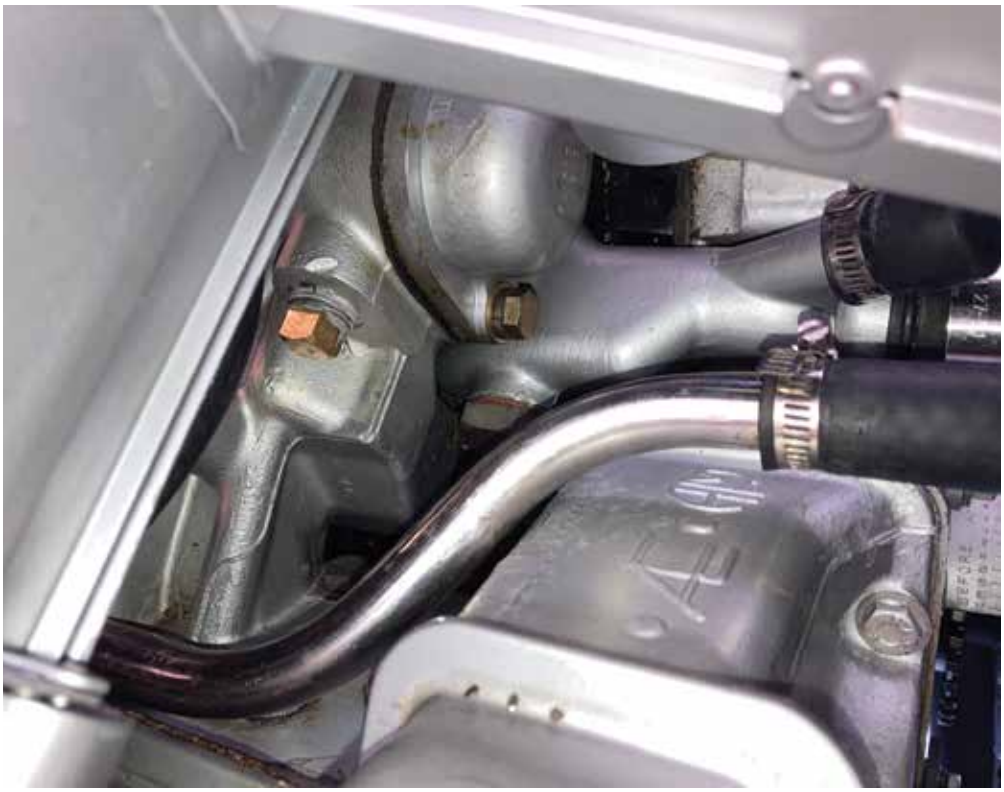
that it was working well, and the glovebox lid was left closed. It takes a while to get used to how it works. I was concerned that after a fast run on the Interstate when one slowed or stopped the fan came on, but it was pointed out that sort of run puts a lot of heat into the engine that can no longer be removed by airflow, so the fan needs to do its job. After sitting at idle for a while the fan cycles on and off, but not excessively, and I did run it hard on some high 90 degree days.

So, things were fine in the heat of summer, but I did have some issues when the cold weather came. Here in the Northeast, we get hot summers and cold winters. It was taking ages to get up to temperature and was often dropping well below the set-point when driving. My cooling was too efficient!

Davies Craig have a note on this, they suggest reinstalling a thermostat, thus restricting the flow until the thermostat opens. I selected a high flow 82 degree thermostat which will be fully open in the summer when running at 90 degrees. It needs to have 2x3mm holes in it to provide some flow which the temperature sensor can see and it's working fine, although I did drop the set-point to 85 degrees to match the thermostat. Its working out fine. It heats up quickly and the heater now blows warm air fairly soon after start-up.

This experience opened up discussions on other possibilities for installing an EWP. Neil (Flying Farmer at SOC) is running a couple of fuel injected mid-200 hp engines on an EWP without a controller. He has the system set up as normal with thermostat and bypass (rerouted to a Tee before the pump) and runs the pump at ½-speed using a drop down resistor, actually a Mk 1 ignition ballast. He reports it runs fine and although he has a switch to run it full speed, has never needed it. In theory an arrangement of relays could provide full-speed when the fan is running and even a short heat soak run after switch-off. A member (SOC) from Norway has the controller installed but its otherwise standard, retaining the thermostat and bypass but he has placed the temperature sensor in the right head transfer housing so does not need to provide holes in the thermostat. I had considered this but as I have a Mk 1 inlet manifold without the foot that closes the bypass off when hot, so I decided to leave the bypass out. The heater actually serves as a bypass - as long as it's turned on.

All in all, I'm pleased with the results. Would I modify a perfectly running car? Probably not. The standard cooling can absolutely deal with it if kept well serviced but given my situation with engine out, in pieces and no pump, it seemed to make sense and I do like the extra cooling functions this change has provided.



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