EBB AND FLOW

TECH

The two kits combined include the electric water pump, a Thermatic fan, a digital controller and all the hardware needed for installation.

Computers run virtually every system in a modern vehicle so why not let a computer control the cooling system of your vehicle – new or old?

Maintaining a constant temperature in old school engines has always been the bane of their owners' lives – Clevelands, big block anythings, small block Chevs and most of the pre-aluminium brigade, all have their overheating crosses to bear. At the end of the day, it comes down to sufficient heat exchange area, adequate flow through the coolant system and, most importantly, enough air flow over the heat exchange surface to remove the required level of heat from the engine coolant. Most conventional water pumps use a simple pressed steel impeller that is spun by a pulley driven by the crankshaft, which means that despite the pulley ratio, the water pump turns in proportion to engine speed.

This is all well and good at higher rpm but at lower engine speeds, coolant flow can be less than optimal and these are usually the times when air flow through the radiator is at its lowest rate. Needless to say, when the engine is off, coolant flow ceases altogether and this creates pockets of steam within the cooling system that can lead to burst hoses, overflow pipes that resemble out of control fire hoses and at the very least a huge steaming puddle on the ground. The talented team at Davies Craig (the same company renowned for producing Thermatic® fans for over 40 years) put their collective grey matter together and developed a remotely mounted electric water pump capable of completely replacing a conventional mechanical water pump. This may not be a new idea but the fact that the pump can be fitted to any engine and remotely located if necessary, makes it a unique and effective solution.

The new EWP115 is available with either a nylon/glass or alloy housing and delivers a maximum of 115-litres per minute of coolant flow at a far higher pressure than a conventional pump, which further reduces the occurrence of hot spots in the engine. The benefits of such a pump are enormous – especially for burnout, drifting and race cars because not only is the flow regulated independently of engine speed but the pump operates in an automatic cool down mode when the engine is shut off – bringing it quickly and smoothly back to a pre-determined temperature and eliminating cooling system explosions and potential damage to alloy cylinder heads. This clever little pump is controlled by an even more clever digital controller that allows the desired engine temperature to be set at the press of a button (no more thermostats to jam closed). What's more, this controller operates in a pulse mode while the engine is at normal operating temperature by cycling the pump on and off for a given duration at 6V rather than a full 12V. As the engine temperature approaches the set level, the pump duty cycle and supplied voltage increase until it is operating at full capacity for maximum flow and cooling effect. As the temperature begins to decrease once more, the controller then reduces the pump operation back into pulse mode. The changes in mode are indicated by either a flashing or solid green LED light, located under the EWP label on the face of the controller.

But wait, there's more. This tricky controller is also able to regulate the operation of one or more Thermatic® fans in addition to its electric water pump duties. Once the actual engine temperature climbs to 3° above the set level, the thermo fan (or fans) is switched on – just as the water pump goes into its full flow cycle. This results in a rapid and dramatic cooling effect. Once again, as the engine temperature drops 10° below the set level, the fan is turned off to conserve power.

The 400 Chev was originally cooled by a conventional water pump and a clutch fan.

The fan and shroud are removed to reveal the stock water pump.

The water pump is removed for some minor surgery.

The stock impeller.

The stock impeller with the fan blades removed.

In the Real World.

Now this is all well and good on paper but how effective is all this gadgetry in the good old real world we asked? To put this technology to the real test we enlisted the services of a well-known eight-pot steamer – the faithful 400 Chev. This particular engine is no stranger to bent temperature gauge needles and happily runs 11-second passes in its HQ Monaro host. This is the perfect candidate for a combination that is destined by nature to overheat. In its pre-upgraded form the car was fitted with a five-row, staggered core copper radiator, a full shroud and a large clutch fan. While this system coped with most traffic light delays, it did not keep the car cool at all times and often the big Q became hotter driving along than it did at idle with the clutch fan fitted.

So, we had our test bed – now it was time to fit the new gear to the Coupe. After removing the fan and shroud, the old water pump became the focus of attention. As this would no longer be required to circulate coolant, the old pump was removed and the impeller blades were removed. This eliminated a huge restriction in flow given that the new EWP115 would soon be taking care of this department. To avoid leaks, a new water pump backing plate and gasket were fitted, courtesy of CMP. Alternatively, a bypass pipe could have been used to simply link the two water outlets in the front of the block to a single pipe leading to the new electric pump. At a later date the water pump pulley will be removed and the alternator will be the only accessory run off the crank.

Once the internals were removed it was on to mounting the 16-inch Davies Craig chrome thermo fan behind the radiator. As the fan was designed to run in front of the radiator, we had to remove and reverse the fan blade to run it behind the radiator. In the interests of timeliness, flat bar straps were cut to length and the fan was mounted to the original fan shroud holes – no need to make any more unnecessary holes in the old girl. The new fan covered the entire height of the radiator and left just enough clearance between the fan motor and the front snout of the water pump. If necessary, the fan could have been mounted higher and closer to the top radiator hose for more clearance.

The next step was to mount the electric water pump into the bottom radiator hose. This actually worked out very well because the pump sucks water into its centre and pumps it out of the top outlet; allowing us to mount it in perfect alignment with both the bottom radiator outlet and the bottom water pump housing inlet. The pump's diameter was so small that it cleared the sway bar underneath with ease. It is possible to mount the pump almost anywhere as long as it has a sufficient head of pressure from the radiator. EWPs have been mounted under the front guards of some cars for a total stealth installation. It should be noted that the EWP kit comes with rubber adaptor sleeves that allow the small neck diameters of the pump to be matched with larger ID diameter radiator hoses. In this case, we had to call Davies Craig and request their larger rubber adaptors to fit the 45mm ID of the bottom radiator hose – the parts supplied in the kit where too thin for the bottom hose but perfect for the top hose (more on that later). With the adaptors fitted to the pump outlets, installing the EWP was a simple matter of tightening two hose clamps.

The 16-inch Thermatic fan is bolted into place.

A temperature sensor for the digital controller is mounted in the top radiator hose.

The electric water pump has been grafted into the Chev's bottom radiator hose.

The pump sits neatly in the vacant spot under the water pump and clears the sway bar underneath too.

The modified water pump has been re-installed and the system filled up with coolant. The system now needs to be wired.

The digital controller can be mounted in plain sight or hidden out of view.

The last installation to be made was for the temperature sensor. This can either be mounted in the thermostat housing by drilling and tapping a hole or it can be located in the top radiator hose using the supplied adaptor mount. We opted for this method and used the two thin rubber adaptors to match the top hose diameter.

Now that the mechanical installations were done, it was time to tackle the wiring. The control box needs to be mounted inside the car, so that the driver can monitor the various LED lights for fan and pump operation, actual coolant temperature and for any fault code displays. The wiring is not a daunting task and can be handled by anyone with a little auto sparky experience. Essentially, there is a red fused wire which is connected directly to the battery, a pair of wires with a T-connector which plugs into the electric water pump in the engine bay, a green wire which is connected to a switchable ignition source, a wire that plugs into the temperature sensor in the top radiator hose and a black striped green wire that runs to the thermo fan relay. An important note here – the black striped green wire is actually an earth, which is switched by the controller in the cabin – the other end of this wire must be connected to a 12V power source. A 4mm red test light is also supplied to indicate that the system is operational and to assist with displaying fault codes. The Thermatic® fan came with its own relay, which simply required two 12V sources (one to activate the relay via the black striped green wire earth and the other to power the fan) and an earth for the fan motor.

The Acid Test.

Once the wiring was complete it was time to test the system. When the ignition key was turned to accessory, the fan operated for 10-seconds, as did the water pump as the controller ran through its normal diagnostic test procedure. From there it determined that the engine was cold and began operating the water pump in pulse mode. By scrolling through the temperature LEDs (75, 80, 85, 90 and 95 degrees C) we soon set our desired target temperature at 80°C – as that had been the previous thermostat temperature. Soon the big 400 roared into life and we sat and anxiously watched the mechanical temperature gauge for signs of movement. As the thermostat must be removed, the engine did take a little longer to come up to temperature but there was definitely action happening

The lights on the controller show that the engine is at 80°C, the unit has power, the electric water pump is on and the Thermatic fan is on.

with the lights on the controller. As the engine temperature began to approach our set limit the EWP light stopped flashing and stayed on constantly, indicating that the pump was now operating fully and no longer in pulse mode. When the engine reached 83° (3° above our set point) the thermo fan was activated and the temperature rapidly decreased to 75°, at which point the fan was switched off and the pump returned to pulse mode. All good so far.

So, the combination of the new electric water pump and the 16-inch Thermatic® fan had tamed the wild 400 as it sat and idled indefinitely without overheating but what if we upped the ante – just to prove a point? With the engine rpm brought up to 3000 and the car still stationary, the temperature soon began to climb – reaching 95°C and bringing on a full set of red LED warnings on the face of the controller but after four minutes of this torture the car was maintaining 95° and did not overheat. As soon as the engine was returned to idle the temperature began to drop and in no time it was idling happily again between 75° and 80°. Mission accomplished.

Granted, this test was done in winter and the engine may require a more efficient radiator of some additional air flow when the Mercury hits 40° but it proves the point that the new pairing of electric water pump and electric fan is more than capable of regulating the temperature of one of V8-dom's most notorious hot heads – the 400 Chev. Better still – after the engine is switched off, the controller automatically switches into over-run mode. This operates the fan and pump for two minutes or until the coolant temperature is 5°C below the set temperature (whichever occurs first).

As the engine was warming up for the first time and we were purging air from the system and topping up the coolant with the radiator cap off, it was possible to see the huge flow of coolant across the top of the radiator – no belt driven water pump is capable of supplying this level of flow at idle and that is normally where an engine prone to overheating needs coolant flow the most. This system works well and will bring a little peace of mind to those who suffer from the overheating blues.

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Source:
Davies Craig Pty Ltd.
(03) 9369-1234
www.daviescraig.com.au


Wiring the relay for the Thermatic fan was the final job.