

Cooling System Tests, Observations and Overhaul

Of course most of you know that the cooling system is the weak link of the Zetec Engine. But what should be looking for and how do you change the components

Here I will try to list the Cooling system components and how to test each one. Any hints or tips I've picked up along the way will be included

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The Water Pump

This is the most important part of the cooling system but is prone to failing catastrophically usually resulting in a dead engine. Its easy to check if its working and you should do this regularly so you can see if there is a drop off in performance



Caution: Hot fluid and Steam. Release pressure cap slowly and with lots of rag over it!!!! ([See this warning](#))

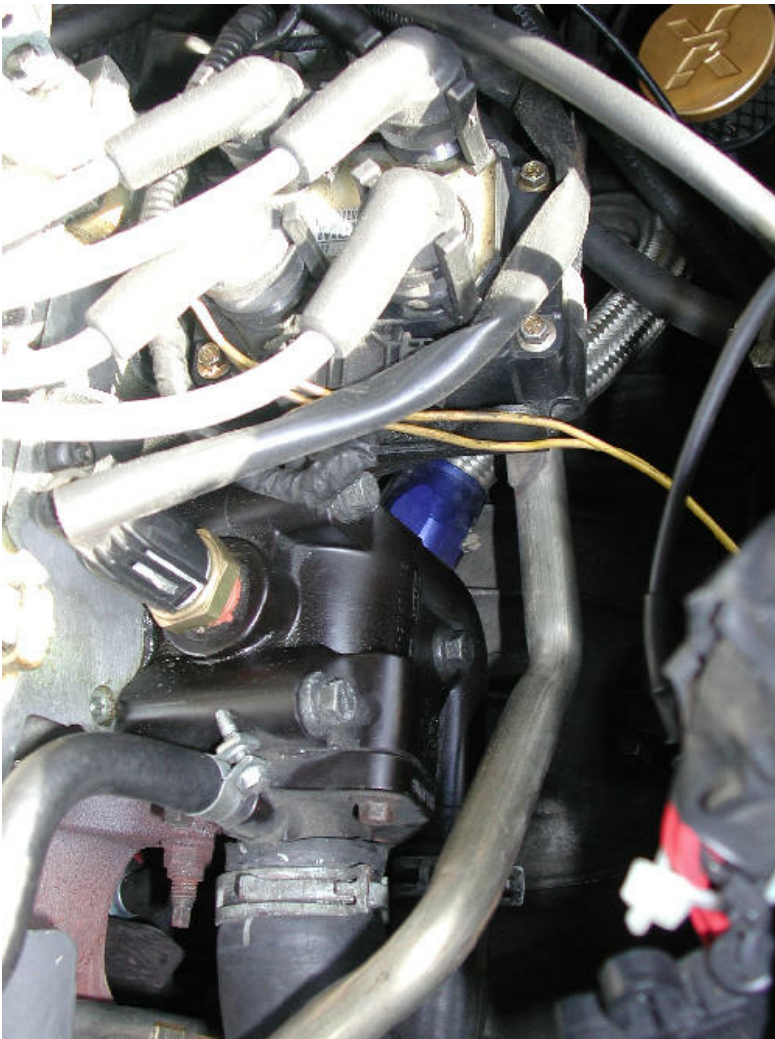
Remove the thinner hose going into the top of the water overflow chamber (Carefully, there will be hot steam), aim it back into top of chamber and start engine. You should see a strong jet of water, no jet = no pump. Remember how strong it was for next time. Only do this when the engine is hot and the thermostat open. There should be no flow when the thermostat is closed.

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Hose's

Not too prone to go but there are some common failure points

1) **Rear heater hoses.** Due to the flex that the engine goes through these are constantly flexing and one of mine burst at 105K miles. In the shot below you can see that I've replaced it with Earl's braided hose. Now Ford obviously know there is a problem as they have changed the design. It is no longer possible to buy just replacement hoses. you have to buy a whole new assembly which includes 2 new hoses and supports at high cost. Its cheaper and stronger to replace the hose with braided Earls hosing. The return hose runs from the bulkhead to the rear of the engine under the alternator



Replaced cabin heater hose (Earl's armoured hose)

2) **Bottom hose combination**, This often goes as well, It splits on two common locations. One is the very top right connection to the metal pipe running across the engine (the jubilee clip in the middle right of the picture below) as this moves all the time. the other is its connection under the engine to a metal tube (engine flow return) which commonly rusts through. Check this pipe is not corroded. A new pipe is about £25



Undoing the thick part of this hose from the radiator is the easiest way to drain the cooling fluid

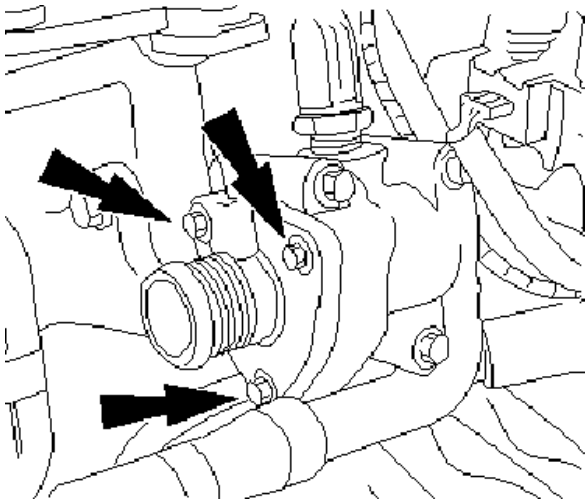
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Thermostat

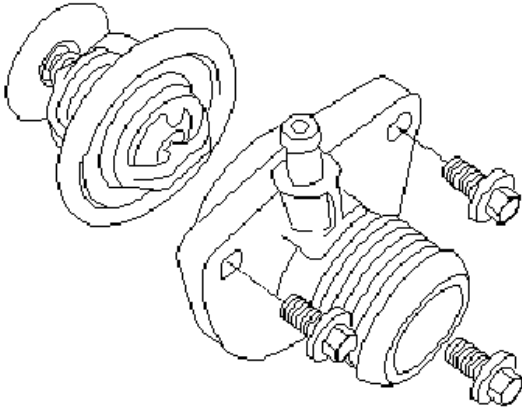
Easy to change and cheap to. Its in the black housing in front of the coil. It should remain shut until about 92C then open to allow flow. this should be about 1-2 mins after starting the engine. You can tell it is working by feeling the top hose on the cold engine as you start up. It should remain cold until the gauge gets near normal (about 2 mins) and then suddenly get hot



I have heard of them jamming open. To remove, take off the top and main heater hoses, (both visible above) and remove the 3 bolts



Make sure you get it the right way round and use a new gasket



See my section on [How to Change the Thermostat](#)

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Temperature Gauge Sender

Hidden from view underneath the thermostat housing and a bit of a pig to replace as there is limited access for a spanner (I used a King Dick adjustable successfully). This sender only controls the temperature gauge on the dash. They are very inconsistent and I have tried 6, all gave a different position on the gauge. So if you don't like where your needle sits or are suspicious of the reading, change this sender

Cost is about £12, and its identifiable by the rectangular connector

See my section on [How to change the Temperature Gauge Sender](#)

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EEC and Fan Sender

This is the top sender, on the thermostat housing, Its the one with the large brass barrel. Unplug the connector and unscre. You will loose some fluid. Screw the new one in (about £14) and viola



Here you can see the thermostat housing. Note the engine block on the Molemobile is red and you can see the crankshaft sensor clearly at the bottom centre

This sender is the most important one. It controls the EEC computer and the cooling fan. It is possible to test its resistance at certain temps, but its so cheap and easy to replace its stupid not to do so if there is any doubt. A good test is that the fan should cut in and out at about 1 min intervals in heavy stationary traffic

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Electric Fan

A very important part of the cooling system. It should cut in and out at about 1 minute intervals if you are stationary in traffic with the engine running. It should not run if you are moving along freely. It is switched on and off by the EEC unit which uses the top sender unit on the thermostat housing. It is set to come on at between 100C and 102C and switch off at about 98C.

If it is not working unplug its connector and put a multimeter or circuit tester lamp across the two pins. Run the engine and you should get a voltage when its hot. If there is no voltage the problem lies with the sender, EEC or wiring. You could also use wire to connect the fan directly to the battery to see if it spins. Power but no movement means the fan is dead (very rare). I've never heard of a fan failing in the UK, but there is a recall in the US where the fan motor overheats and can catch fire!!!!

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Radiator

Pretty robust in a Mondeo, I've not heard of one going, except in a crash. Just have a good look to make sure there is no rust areas or dents. The little fins can get bent, but if a lot of there are then air flow will suffer. Give it a good rinse with a hose to get out all the flies and junk from between the fins

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Expansion Tank and Pressure Cap

Again, no known problems here. Have a look to make sure its not split or corroded. There is a metal insert where the cap goes and this can corrode. If it does the cap will not seal. The caps are £5 from Halfords and set the pressure of the whole cooling system. its worth replacing the cap every few years to make sure its OK.

Never open the cap when the engine is hot. The sudden drop in pressure could take the water above its boiling point

resulting in steam and boiling water rushing out. When I worked on the Ambulance I saw several cases of this happening and its not fun. If you must open a hot cap. Cover it with a heavy cloth and very slowly vent the cap (pretend its a shaken up coke bottle) bit by bit.

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Antifreeze Mix

This is the official Ford recommendation

Antifreeze	Ford Specification
Motorcraft Super Plus 4	BSD-M97B49-A

Antifreeze

Specific Gravity (providing no other additive is in coolant)	Approximate Percentage of antifreeze (by volume)	Remains fluid to	Solidifies at
1,061 at + 15°C	40	-25°C (-13°F)	-30°C (-22°F)

Capacities

Cooling System (including heater circuit and expansion tank)	Litres
DOHC 16V	7

Personally I used BlueCol at a 50/50 mix. Whatever brand and strength you use. Be consistent. Don't mix brands as the additives may not mix. I always pre mix mine and carry a spare 5 litre container with a 50/50 mix at all times (just in case)

Also a good hint is to always use Distilled or Reverse osmosis water in the engine. This way there is no minerals in the water to deposit in the engine (Pet Fish shops sell RO water)

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Cooling System Overhaul (I recommended at 80,000 mile intervals)

To make sure the cooling is in ace condition I'd do the following, which will cost you some time and about 40 quid

- 1) Take off the return hose to the overflow tank and start engine. You should have a small fire hose now. If not the water pump is dying (normally around 60K miles of use)
- 2) Take off the bottom radiator hose and dump all the fluid
- 3) Replace the thermostat with a new one and gasket (£12 Halfords)
- 4) Replace the temp sender that is under the thermostat block (do it while the thermostat is off being changed as its fiddly) that will change your gauge readings (I've swapped 6 of them over, all read in different places, so its pot luck until you find one that's where you want) these are about £14 and have a rectangular plastic connector
- 5) Change the temp Sender on the top of the thermostat. Its about £14, These have a circular connector with a bump
- 6) Flush systems in both directions with hose (While thermostat is off)
- 7) reconnect all hoses
- 8) Re-fill with new 50/50 water and antifreeze mix
- 9) Replace pressure cap (Halfords £8)

That should make sure its running A1. Fitting an accurate oil and or water temp gauge is also a wise move as then you can then be doubly sure

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Molemobile Observations and Comments

Often people ask me what temperatures should I be at. well the first observation is that every Mondeo runs at a different part of the N-O-R-M-A-L on the gauge. As long as you're out of the white and red ends when running you're probably fine. There seems to be a lot of variation between sender units. I've tried 6 now and all have read differently. I believe that the nominal range of the gauge is about 70C at the N, 80C at O, 90C at R and 100C at M and then it speeds up so that A is about 105C, L at 110C and red at 120C

On the Molemobile. When starting from cold I see the gauge move out of the white within 1 minute and its at O in about 2.5mins.

However my oil temp gauge doesn't register above 60 for about 5 mins, so the water gets hotter faster than the oil

There is very good air flow in the Mondeo engine bay. On the Molemobile on fast roads at constant high speed my engine sits exactly at 80C (don't forget I have an Oil cooler fitted too). As soon as I start slowing down in traffic I go up to about 90 (<30mph) and if its stop start I rise to 100C, this is the same no mater if I'm driving volvo style or completely rally stage style. The hottest I have ever seen was in mid summer, in central London when I hit 105C. On track days and on the Dyno temp stays at 80C as there is air flow

My fan comes on exactly at 100C (mid M), and drops the temp by 5C in about 1 minute. Its normally back off in about 1 min in traffic. It never comes on if I'm moving.

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*Mad Moles Mondeo Madness, © Mad Mole 2001. You may see the Molemobile fly past in the Sutton area (Surrey). [Return to Home page](#)
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