

**This note is intended as a supplement to the Factory/Bentley/Haynes repair manual notes on replacing the water pump housing for the 6 cylinder engines fitted to the TR5/250/6/GT6/Vitesse/2000/2500 series cars.**

**Intro:**

About a year ago, I had a water pump fail and damage the inner machined surface of the waterpump housing. A month or so ago, my temp gauge indicated that my repair (a masterpiece of 2-ton epoxy, a craft-knife blade, a boy-scout ingenuity and some air-grinder art) wasn't holding up.

I undertook the replacement a couple of days ago (with many thanks to Dave Wingett for the housing), and the help of number one son (thanks Robin). A number of points that are not covered in Factory/Haynes manual arose, so I thought I'd share them and get them on the list (yea, I'd searched the archives beforehand but no luck).

I should stress: this message only applies to those unfortunate folks who are replacing the waterpump HOUSING, not the waterpump (the housing is the bit that bolts to the cylinder head, contains the thermostat, feeds the upper and lower radiator hose, and has the water pump bolted to it). It also contains the heater feed pipe compression joint coupling as well.

If you are undertaking this task, this is a good opportunity to replace all the old hoses, and the fan belt, since you will have some much torn down,

**1. Draining fluids**

You will be removing various parts of the cooling system, and so will be liberating some coolant. Depending on your local ordinance, and your feelings, you might like to collect the green stuff. Get a couple of large deep trays and position them under the front and right-hand side of the engine. Start with the removal of the upper hose clip on the lower radiator hose. Once this hose is removed, you will release a fair quantity of fluid. The hose can be pushed downwards (below the level of the water pump) to allow most of the fluid to exit the block/radiator. Incidentally, you will have another shower when you remove the housing from the cylinder head, so don't remove the trays just yet.

**2. Removal**

All the front-of-engine items can be removed as per the manual and are pretty straightforward. Once you release the fan belt, the top and bottom hoses, and (on carb cars) the inlet manifold hose, then the housing will release easily, except for the heater feed pipe union ....

Note: you may have to undo one of the thermostat cover bolts to release the carb fuel feed.

**3. Heater feed pipe and its union**

The person who designed this piece of equipment must have been a repressed child, and enjoyed visiting revenge on the rest of us. The steel pipe is NOT easily removable at the compression fitting – firstly, you can't get at it easily, and even if you release the compression fitting, the pipe is never going to leave the compression nut. After all these years, and with the help of corrosion, this is really FIXED!

The easiest option is to remove the housing with the pipe still attached. This necessitates removal of the 2 water hoses from the pipe at the rear of the engine. The heater feed is the vertical one, and is tricky to get to: if someone has replaced the original wire clamp with a jubilee pattern pipe clip, you will be able to use a ¼"AF wrench to release it; if not good luck! The horizontal hose that links to the rear of the inlet manifold is pretty straightforward to remove. I'd

recommend removing the hose from the rear of the inlet manifold as well to give a better view of the working space.

My pipe was very rusted, and the wrong type for my purpose (I needed a PI type anyway to carry out a PI conversion), so I was replacing this pipe anyway. It isn't necessary to do so, but if the old one is very corroded (mine was) then I'd recommend a replacement. I obtained mine from Rimmers (cheap and stainless steel). The Big Three in the US carry the pipe as well, so getting a replacement should be straightforward.

Removal of the pipe: The pipe is held to the bell-housing by a bracket that drops down and back. The 5/16" UNF bolt head (1/2" AF spanner/socket size) can be accessed with a socket if you have 24" of extensions. The bigger problem is getting a spanner on the nut on the gearbox side. You can just about get a combination spanner in there if you remove the battery and battery box (if fitted).

Once the bolt is removed, the housing and the pipe can be maneuvered out. To do so, you need to fold the rear bracket on the heater pipe upwards towards the pipe. I did not fold the attaching bracket up prior to trying this operation. DO NOT MAKE THAT MISTAKE! If you do not fold the fixing bracket out of the way, the pipe will jamb in the space between the double down-pipes and the engine mounting. I ended up cutting the pipe from the housing and then bending and forcing it out. If I had bent the bracket out of the way, it would not have jammed at all!

## **Servicing the Housing**

The housing holds a number of key parts: the thermostat, the temp sender unit, the carb water heater feed, the water pump, and the heater feed pipe union. All the items can be removed from the housing easily once it is removed.

### **1. Water Pump Removal**

The water pump is held by 3 nuts and washers, fixed to studs. Once loosened, the nuts and washers can be easily released. But be warned, the studs often release from the housing, leaving you with a stud and nut trapped between the pump body and the pulley.

All is not lost. The studs fitted into the housing are 5/16" UNF thread - If you get two nuts of that size, you can easily release the "trapped" nut. Spin one nut onto the back of the stud; follow this with the second nut. When both nuts are on the threaded portion of the stud, get 2 1/2" AF spanners and tighten the nuts together (you are trying to jamb them against each other). Once done, put the one spanner on the original nut (the one between the pulley and the pump body) and on the innermost of the 2 locknuts. If the locknuts did jamb, then you should be able to undo the original nut. Once the stud is free, then release the 2 locknuts and spin them off.

Once the nuts are removed, remove the pump body and check it for movement in any direction. If the rotor moves in or out, or side to side, it is probably a candidate for replacement. It is not possible to service this item in the field.

### **2. Thermostat removal**

The thermostat cover is held by 2 5/16" bolts. Once removed, the cover can be eased off, and the thermostat revealed. If the thermostat was functioning prior to removal, it is probably OK to reuse. The gasket is a standard size, and you can find them at most autoparts stores – just take in the housing to help them size the gasket.

### **3. Temperature Sender (on PI cars) plug, (and on carb cars) Inlet Manifold Hose Connector**

Both these items easily undo with the correct spanner.

### **4. Heater Feed Pipe**

If you going to reuse the old pipe, then you will need to carefully undo the compression fitting by putting correct sized spanners on the inner and outer nuts. If the housing is securely held in a vice, it makes it easier too.

You will find that the pipe complete with the compression fitting will back out of the piece still fixed to the housing. It is almost impossible to release the compression fitting nut or it associated olive from the pipe, so my advice is don't bother. Just put the pipe with its fittings to one side.

If you decide that you want to use a new pipe, then you will face the challenge of getting the outer compression fitting nut off the pipe. I tried heating to red heat, and every other technique and it would not budge. In the end, I cut the pipe about an 1" from the nut and inserted a junior hacksaw blade through the fitting, clipped it to the hacksaw frame, held the assembly in a vise and made to cuts very carefully on opposite sides of the pipe (sound's complicated but it wasn't: just image you were cutting from the inside out). I was then able to drift the old pipe out of the fitting with a large punch.

The compression olive will end up as scrap in this process, but it is a standard ¼" (I think) compression fitting olive (take the old one with you to Builders Square or your favorite plumbers supply store).

### **5. Housing**

If you are reusing your old housing (or have a replacement), make sure that the old gaskets are all removed and the mating surfaces are clean and dry.

The 3 housing bolts should be cleaned and wire brushed so the threaded portion is clean and bright. Then spray with brake cleaner or denatured alcohol.

### **6. Cylinder Head**

There will be some gasket residue on the front of the head that will need to be cleaned off using a scraper and wire brush. Make sure that all coolant in the now-exposed area is removed prior to fitting. If necessary, you can undo the engine block drain plug (located at the rear of the engine block near exhaust manifold downpipes).

## **Refitting Sequence**

This assumes that you are intending to fit the parts to the housing whilst off the engine (it's a lot easier that way!).

### **1. Pump Refit**

Assuming that the pump is in good condition, the only preparatory item is clean the mating surface with a wire brush or a gasket scraper to ensure that they are clean and ready for gasket cement.

The three studs that hold the pump to the housing will need cleaning (or if you prefer, replacing). If you are to clean them, then a wire brush in a power drill will do a good job (don't forget to wear goggles/safety glasses – those wires can fly!).

## **2. Pump Studs**

Once the studs are clean, use the locknut technique, but this time on the outer threads (my TR6 has UNC outer threads – but that might be a DPO legacy! – either way, find the correct nuts and lock them against the outer threaded section. Clean the threads with brake cleaner/denatured alcohol, and let them dry. Then apply Loctite thread locking fluid to the threaded portion that is to be fitted to the housing (or you can do what I do: use the my wife's least favorite nail varnish) and screw the studs into the housing. Use a spanner to tighten them until you feel resistance – **UNDER NO CIRCUMSTANCES TIGHTEN THEM FURTHER!** If you tighten the studs in the housing with too much force, the studs will shear off, or break out of the back of the housing. Release the locknuts and repeat for all 3 studs.

## **3. Pump**

Leave the studs for an hour to allow the Loctite/varnish to set. The pump can now be fitted to the studs. Apply a very THIN film of silicone sealant to the faces of the housing and to the pump. Fit the gasket over the studs on the housing. Fit the water pump over the studs, and fit lock-washers, and nuts to the studs, and tighten securely (but not too much force – only needs 14ft/lbs – not that you get a torque wrench in there!).

Don't fall into the trap of putting too much silicone sealant on the surfaces: it will exude outwards (and you'll see it, and when dry, probably remove it), but a similar quantity can go inwards and circulate round till it finds a small enough passage to block.

## **4. Thermostat**

Place the thermostat (spring side down into the housing) in the housing. Apply a very THIN film of silicone sealant to the faces of the housing and to the cover. Fit the gasket, and then fit both bolts (remember the longer one will clip the fuel pipe later on). Tighten securely. Don't forget to fit the housing so the outlet points towards the front of the car.

## **5. Temp Sender and Plug/Inlet Feed**

These 2 items can be fitted with a little plumbers jointing compound, or PTFE tape.

## **6. Heater Feed Pipe**

### **New Pipe scenario**

Fit the first part of the compression fitting into the housing with a little plumbers jointing compound, or PTFE tape. This should not be fully tightened just yet.

Slip the compression nut and olive onto the pipe, and with a little plumbers jointing compound, or PTFE tape, insert the pipe into the compression fitting. Push the pipe home to ensure that it is fully seated before tightening the compression nut —do not fully tighten just yet. It should be possible to move the pipe.

### **Old Pipe scenario**

In this scenario, you are trying to get everything aligned and tight prior to feeding the pipe back through the manifold space. This means that the compression fitting should be very snug (although leaving a little bit of wriggle room does no harm) prior to refitting to the car.

Fit the compression fitting into the housing with a little plumbers jointing compound, or PTFE tape. This should be firmly secured.

Insert the pipe and compression nut into the compression fitting on the housing with a little plumbers jointing compound, or PTFE tape. Tighten the compression joint so that the rear part of the pipe will be approximately vertical once the housing is fitted. This has to be pretty secure, and if the pipe cannot be made to align vertically when secure, then you will need to release or tighten the compression fitting on the housing to allow the pipe to be maneuvered so it will line up vertically once fitted.

As you will have worked out, the principle difference between the pipe fitting is that in one case (new) you can easily move the pipe to get it aligned, in the other case, you cannot!

## **Refitting To Engine**

### **1. Heater Feed Pipe**

If the heater feed pipe bracket is still bent towards the pipe (if it isn't, do it now), then the pipe can be fed carefully between the exhaust downpipes and the engine mounting. It is a bit of fiddle, but it can be done.

Once inserted, and while everything is mobile, get a pair of pliers and bend the rear pipe bracket down to the original angle.

### **2. Housing**

Apply a thin film of silicone sealant to the front of the cylinder head, and to mating face of the housing. Apply silicone sealant to the threads of the 3 bolts (particularly the long bolt that is fitted at the bottom of the housing). Feed the 2 upper bolts through the housing, and fit the gasket over the bolts. Offer the assembly up to the cylinder head and get the bolts started into the head. Then fit the lower bolt and ensure that all 3 are engaged before commencing tightening the three bolts (20ft/lbs).

The reason that the bolts need sealant is that they pass through the front of the head into the water jacket, and water can creep through the threaded portion (well, it certainly did on mine!). My leak occurred after everything was fitted, hence I cannot be sure that the upper bolts enter a water jacket – the lower one definitely does, but I siliconed all of them just in case.

### **3. Heater Feed Pipe -- Rear Bracket Mounting**

This task is one of those that you don't want to do often. The pipe can be moved a little, and the bolt fed through the bracket and bell housing, but getting the nut located on the gearbox side is a nightmare (well, without dropping the gearbox mounting, and I wasn't going to do that). We tried hot gluing a nut to screwdriver – failed! Epoxy to a ½" wrench – failed!

In the end, one person is needed to maneuver the bolt while the other person feeds a nut with a pair of fine needle nose pliers (almost snipe nosed) in the space, and then tilts the nut with a screwdriver held in the other hand. If the bolt is clean and bright, and the nut new, you can spin them on successfully enough to get a socket and wrench into play. The pipe should be tightened so it is vertical.

### **4. Compression Joint**

Now you can get to tightening the compression joint. If you used a new pipe, then tighten the part fitted into the housing, and then securely hold the part fitted into the housing, and tighten the compression joint nut down onto the housing.

If you used the old pipe, everything should be pretty tight already.

## 5. Finish Off

Now refit the hoses to all pipes, tighten hose clips, refit the fan belt, and tighten, and refit the temp sender wire.

Remove the long bolt from the thermostat housing and fit the fuel pipe clip, prior to tightening.

Refill with antifreeze (if you plan on reusing old, don't forget to filter it through an old towel or similar). I forgot to use the old aspirin trick (carefully open the thermostat and insert an aspirin into the gap – it ensures that the air in the system bleeds out as you refill) so I had to let the car warm up, and then cool down, before I could get the water level correct.

Good luck with your project,

Tony Gordon  
Midland, MI

If you can see how this process can be improved, or if I've let errors creep in, drop me an email on: [tgordon@saginaw-city.k12.mi.us](mailto:tgordon@saginaw-city.k12.mi.us)