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HOME TD5 - Crankshaft Pulley / Torsional Vibration Damper - Incorporating V-belt Replacement
04/08/2010

UPDATE *Crank Oil seal replaced - Details at the bottom of the article*

As the mileage and "use" of the vehicle increases, more and more stuff begins to wear out!!! (landys don't we just love em!) and the crankshaft pulley to my surprise is another one of those items. On most cars I'm used to a pulley bolted to the end of the crankshaft, made entirely of metal and expected to last the life of the vehicle.Well the TD5 crankshaft pulley is a little more "complex" than that. The pulley itself is made from several parts which are bonded together with a strong rubber, and to the front of that, a TV damper is also bolted to it. Rubber I hear you say ? well I was surprised as well.....and it seems mine had come to the end of its useful life.

Whilst reading through this, ask yourself a question.....Does your TD5 "squeak" "just" as the engine stops when you turn it off ? if it does read on!!

I have had this "squeak" for about 9 months, and although I could not really find the issue, it did concern me a little as it really should not do that, but ignoring that fact after a recent weekend away playing off road, my car developed a rattle that was very intermittent and was only apparent at idle, as the noise of the engine probably overcome the rattle at any higher RPM, it was not "load" affected, ie aircon etc on / off, it was just there!!.....the best way to describe it as I have subsequently read is a "marble rattle".....sounds almost like a marble is bouncing around in the sump or front pulleys somewhere.

To try and find this "Noise" was a bit of a headache, and it was clearly apparent that it was not directly engine related as the noise disappeared with the V belt removed and the engine run, so it had to be one of the V-belt driven components. During trying to find it as it really was not obvious where it came from, I fitted a new PAS pump, diff aircon pump, new water pump, new tensioner, and new V-belt in an effort to track it down, each time the engine was run with the noise was still there, and by this time I was getting really annoyed with it lol !!.....all I had left to swap was the ACE pump and the Alternator / Vac pump.....obviously each item cost a considerable amount of money and to fork out for the last 2 would have been a significant investment and as it turned out a waist of money.

It was by chance that during one of the many times refitting the V belt I noticed the Crank pulley flex considerably when the tensioner was released, had not noticed up to this point (doh) but anyway, it does not take an expert to know that cannot be right.....can it ? I could grab hold of the damper bolted to the pulley and move it by hand with not a lot of force, and the fact the 2 are bolted together with a minimal gap between them I assumed they "may" be contacting each other when the engine was running, thus producing the noise intermittently.....To test this I refitted the belt again, then unbolted the

TV damper from the crank pulley and run the engine again with the damper off, and hey presto!!!.....at last !!.....no noise!!.....

Right, so had found the problem, and went off to search online how much a new one was....."assuming" £150 max would be expensive, I then fell off the chair when I did find out how much a new one is,.....£400 + ...WTF!!.....for a pulley, surely not.....!!.....well yes that's the cost of a Genuine item, an OEM one will set you back around £320. I did originally space the TV damper from the crank pulley using washers between the 2, this stopped the noise as a "temp fix", but after seeing how much play was in mine once it was off, I would strongly advise that if its worn, REPLACE it sooner rather than later.

This article details the crank pulley replacement.

To start the job, as with most TD5 related tasks, remove the engine acoustic cover (3 bolts) and the viscous fan / radiator cover.

This will give you access to the viscous fan. To remove this you have to undo the large 36 mm nut on the back of the fan, now these fans on their own can be a real headache to get off, other times it will simply come undone with a swift tap of a hammer on the fan spanner. Now you can by specific fan holding tools, and fan hub spanners, but mine had not lasted very well with all its use, and was beginning to "spread" so was starting to chew the nut up. So I had a cheap adjustable spanner that I decided to grind down to fit into the gap between the fan and the fan pulley.

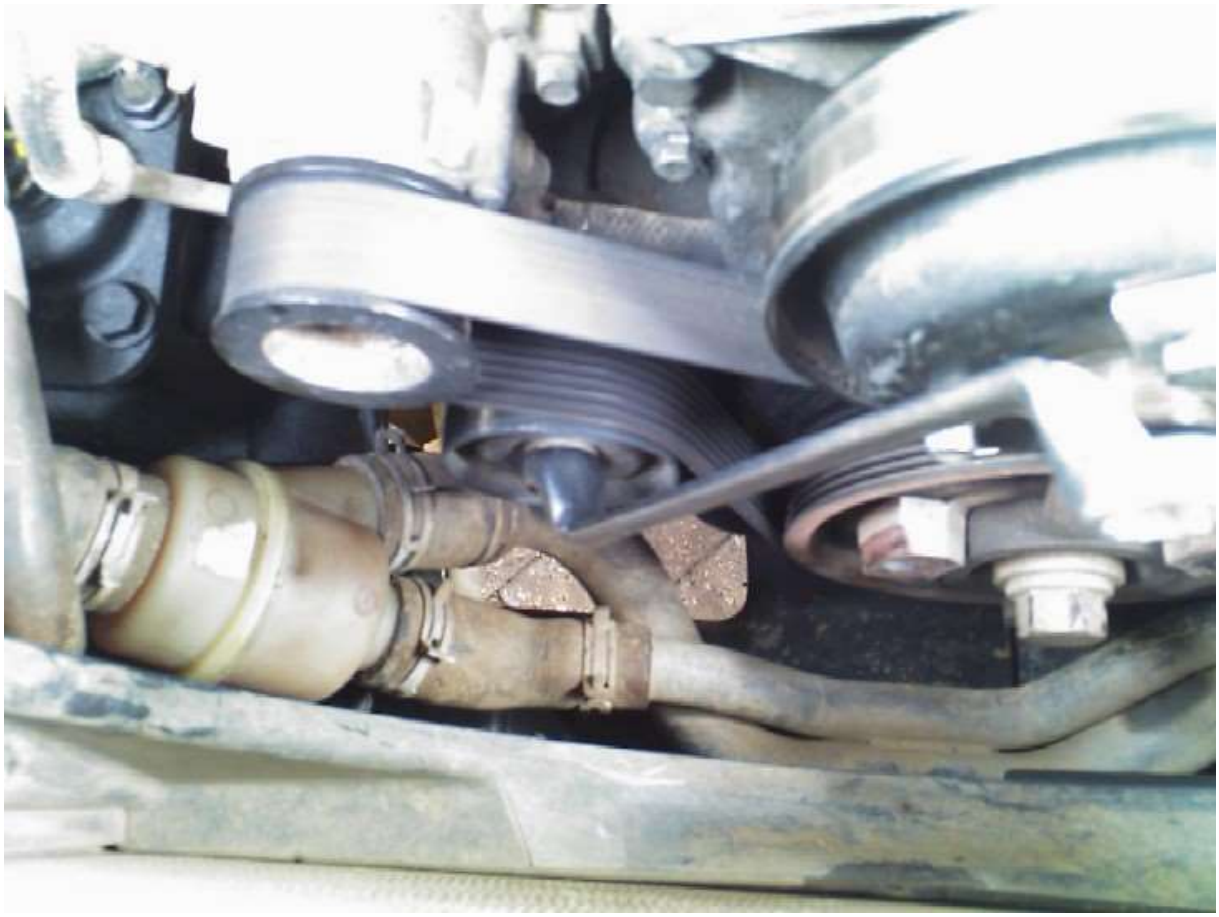
To also give more access (you will need it) also remove the drivers side intercooler hose. To hold the fan pulley from spinning, you can buy a tool, or you can make one up if you need one. The pulley is held on by 3x10mm bolts, remove 2 of them to start with.

My tool to hold the pulley is simply 3 bits of ali flat bar, which pivot on 2 bolts and have holes drilled in the end to fit the pulley bolts. Once my tool is bolted in, I then remove the 3rd pulley bolt so it allows room for the spanner to fit onto the hub nut.

Below is the simple tool, shown with 2 different bolts I used so the original ones don't get damaged.

The tool is simply about 18" long, enough to provide leverage to hold the pulley, or if you want you can "wedge" it under the aircon pump to assist in holding it whilst undoing the fan hub nut.

Once the fan is off, then remove the V-belt by using a15mm spanner to move the tensioner to the drivers side to release the belt of all the pulleys / pumps etc. A cranked ring spanner is useful here to move your knuckles away from the other engine components.



It's good practice to note the belt position so when refit comes, you refit it so it runs in the same direction, if you intend to replace the belt, then no problem. Mine was already new due to the epic in finding the original noise.

**********If your just doing the V-belt, then this is as far as you need to go.********

Next task is to remove the TV damper from the pulley, its held by 3x13mm bolts. If the crank spins whilst undoing them, use a breaker bar and 24mm socket on the central bolt to hold the crank pulley still for you.

Once the damper is off, then you will have to tackle the pulley itself.

If you wish to check your damper for wear, then to get to this stage is pretty straight forward, below is a video showing how much movement was on my pulley when installed on the engine, if your pulley moves anything like below, then its time for a new one!!!

You "should" be able to hear the pulley "knock" as it flexes as well.

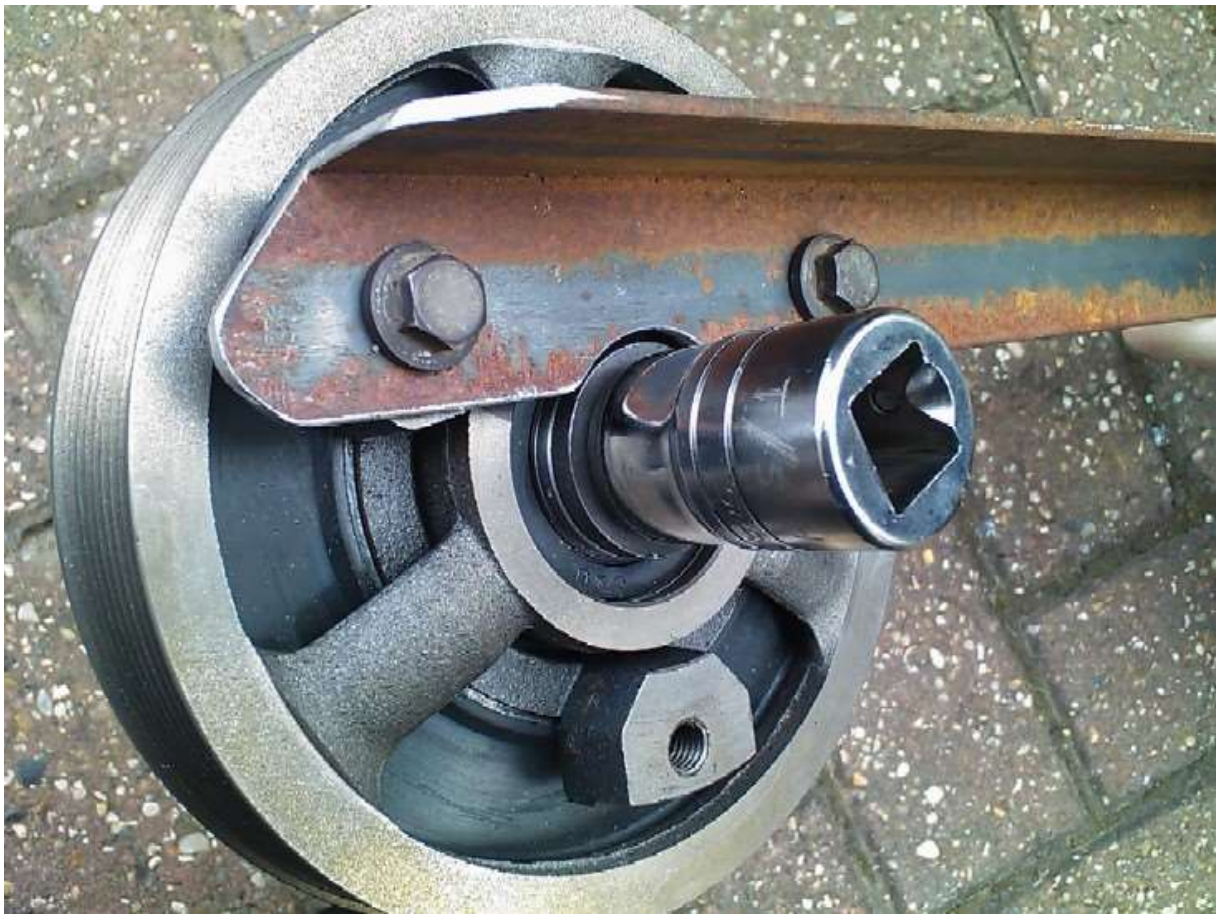
TD5 Engine Crankshaft Pulley - WORN

Right, so if your pulley is fubar'd like mine, you now have to remove the central bolt, this is VERY tight at 340lbs ft. There is no way you can stop the crank from rotating while trying to undo this bolt, so you will have to make a tool to do it. I chose to use a piece of 5mm thick angle iron at about 30 inches long, simply found in the works scrap bin!!.....

My original intention was to make the tool "over long", and then cut it to required length and when undoing the crank bolt, wedge it under each chassis rail, but once I had got it all apart, with the amount of pipes etc running across the front of the engine, its pretty difficult to get a good point to wedge it without the possibility of damaging something, so its fortunate I left it as long as I did.

This means it gives a good leverage against the big bar (3/4 drive) you'll need to remove the crank pulley bolt. The tool has 2 holes drilled to line up with the pulley where the damper bolts on, and the "cut out" on the bar you see is to allow the socket and washer on the bolt to clear. Fits like below

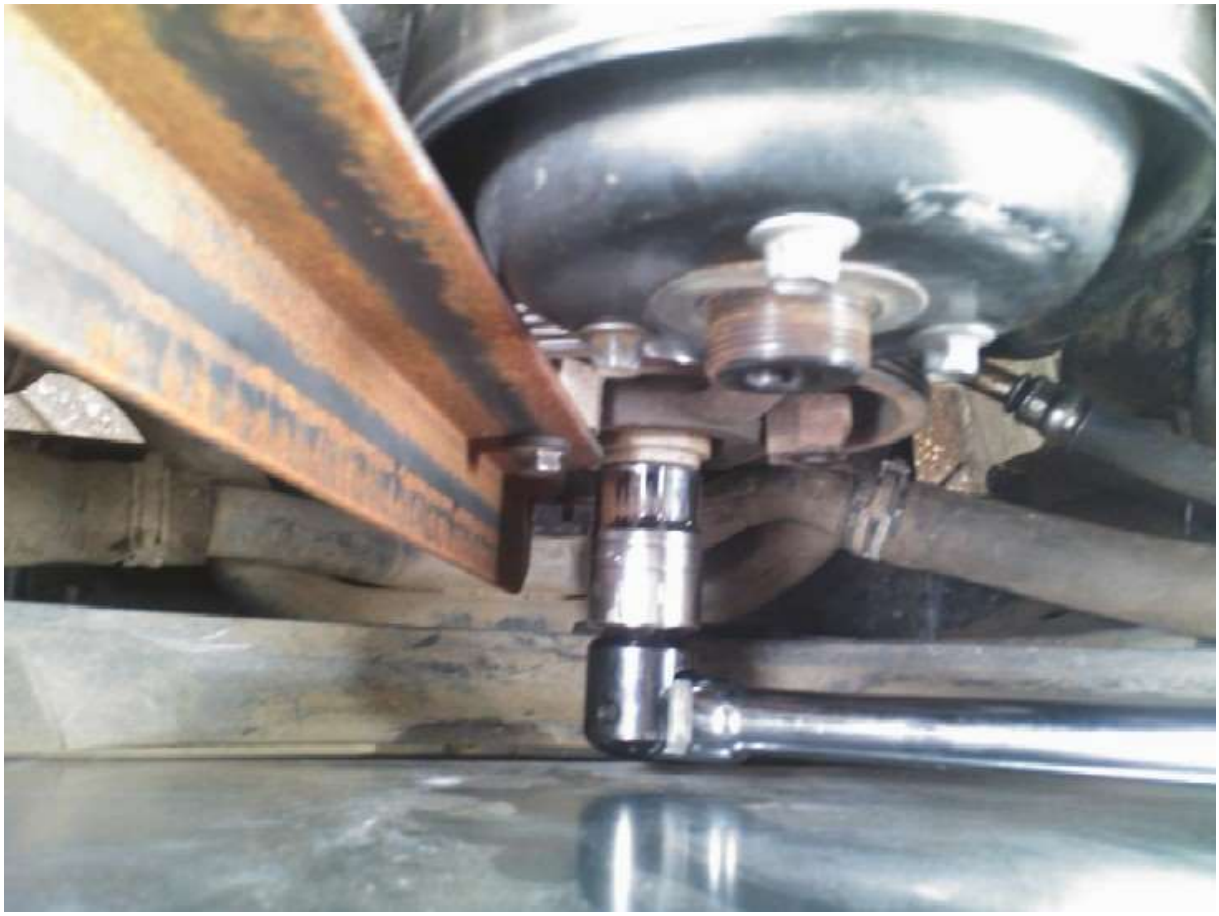
Using the old damper bolts.....you can see the "cutout" to allow the socket and washer on the bolt to pass.



*******NOTE..... the genuine damper has an "offset" hole, the OEM ones don't, so when you come to make your tool and drill the holes in it, use your NEW damper as a template, even then it "may" not line up in one position on the original damper, not a real problem as you can rotate the crank to get it to line up with the other 2 holes.*******

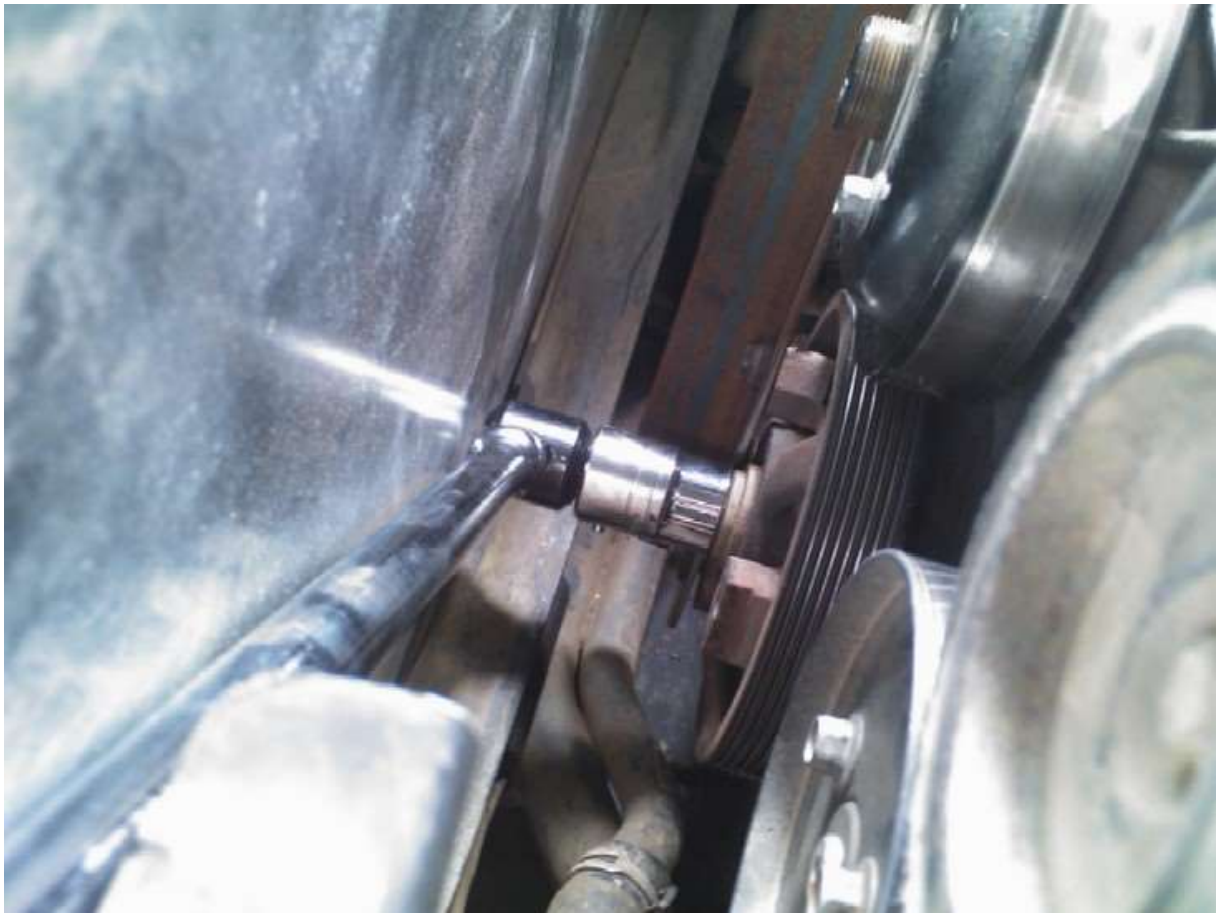
So, now its time to fit the tool to the engine, and position it so you can hold it whilst undoing the pulley bolt, this bit really is a 2 person job and you will have to heave against each other to crack the torque. You WILL need either a 24mm 3/4 drive socket, or a 15/16 3/4" drive socket to undo this bolt. You cannot use a 1/2" drive and step it up as it will make the length of the bar to long to fit between the radiator and the engine. The workshop manual states to remove the radiator, well it can be done with out disturbing the cooling system as in this article, but you must use the tools I specify to complete it.

To avoid any possible damage to the radiator, get a piece if thin metal sheet to put in front of it so you don't damage the fins with your bar and socket as the space is VERY limited. I would suggest a sheet no more than 2-3mm thick as it really does make that much difference!!



It's a tight squeeze to fit the bar and socket onto the bolt head, but it will go, a small tug forwards on the radiator will provide a little more room.

******NOTE the sheet of metal protecting the radiator******



Now I used a 3/4" drive bar to crack the bolt off then immediately switched to a 1/2" drive bar to do the rest because if you undo the bolt to much, the bar will be hard up against your sheet of metal and you simply wont get it off again. You "could" use a 1/2" bar to crack it, but you would have to extend the bar with a tube to give you enough length to crack the bolt, up to you really but I'm a firm believer in struggling as least as possible, it will all depend on your selection of tools available.

Once the bolt is undone, you can remove the damper, you wont get the bolt right out due to the lack of space, so you have to remove the damper with the bolt in it, its quite heavy so leave the sheet in place and use your tool to assist you in lifting it out. You may need a slight "lever" with a pry bay under the edge of the pulley to wiggle it free off the crank shaft.

Now the workshop manual states to clean the crankshaft oil seal when replacing the damper, so if yours is not leaking, that's all good, if you have a leaking front crank oil seal, now is the perfect time to replace it.

Old pulley below

Old V new

Here you can see the way its constructed and the rubber that mounts the 2 bits together. The rubber on the old one is all soft, and if you drop the pulley it "rattles".....below another short video showing where its worn out....simply by resting it on the floor and a small amount of pressure it can be easily seen....

TD5 Engine Crankshaft Pulley - WORN 2

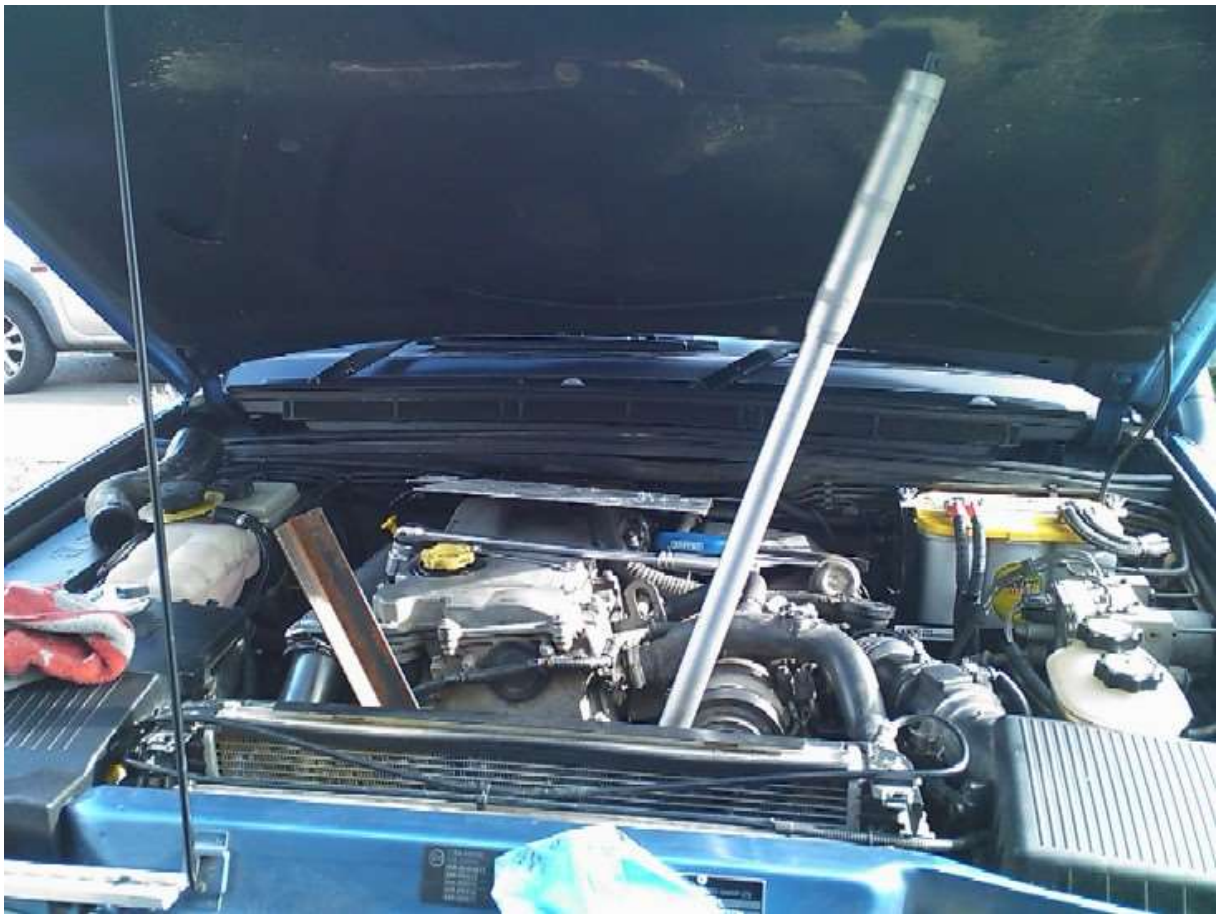
*Now its time for the refit, you **MUST** fit a new bolt when refitting your new pulley, picture of the bolt below for ref.....it costs about £9*

Clean up the crank oil seal carefully making sure you push no dirt into the engine.....fit your tool to the new pulley and lower it into position with the new bolt already in it. There is no keyway etc on the crankshaft so the pulley can be fitted in any position. Start the bolt by hand, then tighten it up as much as possible using a standard 1/2" drive bar / socket.

*Now you will need a BIIIIG torque wrench to torque the bolt up, the figures are **340lbs ft or 460NM**. To get a torque wrench that size, it is most likely going to be a 3/4" drive one, this was one of the reasons for choosing to have a 3/4" drive socket to crack the torque when removing. These big wrenches are a LOT of money, so if you have one great, if not you will need to borrow one if possible to do this job.*

Because of the size of the torque wrench, it is a really TIGHT fit in the space when getting it on the bolt, so make sure the sheet of metal is in there to protect the radiator, again it will be a good wiggle / heave to get the wrench on, and depending on what position you get it onto the bolt, and how tight you did it with the breaker bar, you "may" have to remove and refit the tool holding the pulley once or twice until you get the required torque,

removing the tool will allow you to swing the torque wrench back over again to have another go.....below is the rough position I got it onto the bolt.



Next fit the new damper part back onto the new pulley, and torque the bolts to 59lbs ft.....again you will need to hold the crank from spinning whilst torquing them up....you can refit the V-belt either before or after the damper assy is fitted, up to you.

New damper installed, and no more "marble rattle" ;o)

The rest of the refit is a reverse of the removal.....job jobbed!!! ;o)

PS, at the start of the article I asked the question, "does your TD5 squeak when you turn it off ?" Well as I said mine did, and now it does not do it anymore, so I'm pretty sure the "squeak" just as the engine stops is an early warning sign that the pulley rubber is becoming weak and worn, whether the noise is actually made by the pulley itself, or because it flexes and allows the V-belt to slip on the viscous fan pulley, who knows, but its def not a good sign "imo".

**********UPDATE*********

Ok as mentioned in the write up I never actually replaced the crankshaft / front housing oil seal, and as stated the workshop manual strangely enough it does not mention it either, However as we all know (and so should I have done) once you disturb an oil seal there is a VERY good chance it will leak not long after.

Well mine decided to start doing just that which really annoyed me as the strip down would have to happen again to replace it, and another new bolt would have to be purchased for the refit.

The new oil Seal Part No is ***ERR5992***

The strip down procedure is obviously the same as before, once you get to that point, the old seal needs to be levered out "carefully", taking care to NOT damage the housing, clean the recess making sure you don't push any dirt into the oil housing.

Take note of how far in the old seal is positioned.....

*The new seal **MUST BE FITTED DRY***

Fit the new seal into position "squarely" and use something NON metallic and blunt to tap it into place, the rest of the refit is as mentioned in the write up already.

(*NOTE** seal not fully seated above*)