Replace cambelt (timing belt) and water pump, 2.0tdi PD engine *
(Volkswagen Passat 2005-2010)

*Caution! This instructions are created by random users and must be used as a reference only! Please, take all safety precautions, and if you're not sure - don't act! Administration will not accept any responsibility for damage to you or your vehicle after following these instructions bellow.

Tools we need:
Trolley jack + stands (get some padding - plywood, rubber); set of ratchets, sockets, torx bits, spline bits and spanners; good to have torque wrench(es); 19mm spline socket; hose clamp pliers and normal pliers; cambelt tools - crankshaft locker (please mind that there are 2 types), camshaft lockers and pin for auxiliary belt tensioner; get some magnetic tool to pick up awkward little bolts or nuts.

Posted by: waway

This is how we do it:
Change cambelt and water pump.

1. Get access to cambelt:
- jack up front of the car (apply hand brake, chock rear wheels, make sure you do it on flat hard surface), DO NOT use jack on its own - use suitable stands (See Image 1 below), make sure that stands stand correctly, straight and car doesn't slip off. Don't put stands just under cars floor otherwise they will just punch through. Must be either special designated places or something that can hold cars weight. We found that suspension bushings are suitable for that (Image 1). Just make sure that it sits properly - stay safe!

- remove engine undercover (Image 2) and front part of wheel liner (Image 3) held by T25 torx screws

- remove fuel filter housing held by 2x10mm bolts and 10mm nut (Image 4), unclip plastic catch that holds coolant hose to filter housing, release hose clamps and disconnect fuel lines (Image 4), put fuel filter housing in a bucket with hoses up, so no fuel comes out.

*NOTE: use some tissues to prevent diesel fuel leaks, try not to have any diesel on coolant pipes and if you get some clean it up.

- disconnect coolant tank sensor (Image 5), remove 2xT25 screws that hold the tank and move tank aside (there is no need to disconnect pipes, you can move it freely like that)

- using 16mm spanner turn auxiliary belt tensioner clockwise to de-tension it and secure it with the pin (Image 6)

- remove auxiliary belt, if the belt is going to be re-fitted mark or remember its direction to fit it same way

- apply 16mm spanner to auxiliary belt tensioner to take pin out and bring it to its original position
- using open end 13mm spanner remove auxiliary belt tensioner, undo 2x13mm bolts (Image 6)

- remove vibration damper - 4x10mm spline bolts (Image 7), use 19mm spline socket in the middle if you need to counter-hold

- support the engine from the bottom with trolley jack, use padding (important!), so you don't break oil pan (Image 8)

- loosen 2x18mm bolts (Image 9) to make sure that engine is supported by jack and there is no pressure on the mount

- remove 2x16mm bolts and 13mm bolt from engine mount (Image 9), remove 2x18mm bolts and take the mount out

- remove engine bracket (Image 10), get access to 3x16mm bolts by lowering and lifting the engine using jack

*NOTE: while lifting and lowering keep checking top and bottom so you don't jam or break anything

*NOTE: for easier removal of the bracket you can remove air pipe that's in the way, but we did it without removing air pipe, just wiggle it and find happy way out

- remove timing belt covers (Image 11) - 3 clips for the top cover and 5x10mm bolts for the bottom

2. Remove timing belt and components:
- using 19mm spline socket turn crankshaft clockwise and lock it in service position (Image 12). Please mind, that for every turn of crankshaft, camshaft makes only half a turn, so you need to make sure that with the locked crankshaft - camshaft is in correct position, too. There are two types of camshaft pulleys (see Image 12a below). Also (!) crankshaft must go clockwise before being locked - apply locker just before locking point and then turn it clockwise to lock it.

- both camshafts have to be locked, too (Image 13). However, if you can't fit the pin in either of them, it is OK to lock it after timing belt removal. If you could fit pin in the pulley - loosen 3 bolts in elongated holes, so outer part can have some play - that will make removal of timing belt easier

- loosen 15mm nut in the middle of tensioner pulley (Image 14), it should spring back, you can help it with 6mm hex-allen key by turning it anti-clockwise

- remove guide roller (Image 15) - 13mm nut

- remove timing belt - start with the idler roller (Image 15) or water pump (Image 16)

- lock the camshafts if they are not locked yet (Image 13) and loosen the bolts in their elongated holes (if you have new bolts in new timing belt kit - replace them, but keep them loose).

- remove idler roller (image 15)

- undo 15mm nut on the tensioner (Image 14) and take it off the stud

- replace tensioner wheel and guide roller studs following procedure:
  * put 2x13mm M8 nuts on a stud and lock them against each other
  * undo the stud from engine block by turning bottom nut (the one that's closer to the engine block)
  * put the new stud in hand tight
* lock 2 nuts on it
* tighten stud into engine block with the tightening torque of 15 Nm (both studs)
* unlock nuts by turning bottom nut clockwise and remove them

3. Replace water pump (recommended) (Image 16):

- put the tray under to catch escaping coolant
- remove 3x10mm bolts
- forcefully wiggle the pump out
- apply some grease on a O-ring of the new pump, put the O-ring on, also for extra water proof, you can apply some gasket sealant (Image 17), just a little bit - don't go ridiculous ;)
- insert new pump into its place and tighten 3x10mm bolts up to 15 Nm
- top up coolant, check for leaks

4. Install new timing belt and components:

- install idler roller - 90Nm + 90° further (Image 15)

*NOTE: In the middle of idler roller bolt, which has a 12mm thread - there's a hole for engine bracket bolt. In case if you have different engine and idler roller bolt has only 10mm thread, tightening torque for that is 40Nm + 90° further

- install tensioner wheel onto its stud, make sure "sticking out bit" at the back goes into rectangular hole in the engine (Image 18) and secure it with 15mm nut, just to
hold it - don't tighten it yet

- using 6mm hex-allen key turn top of the tensioner wheel anti-clockwise till it reveals hole for a pin. Put the pin in then turn top bit of the tensioner clockwise as far as it goes and secure it with 15mm nut. In this position tensioner is in maximum "AWAY" position (image 14)

*NOTE:
There are few types of pins - 5mm allen bit, VW tool T10265, also some tensioner wheels can come with the pin already.
Double check that rear of the tensioner seats correctly in the rectangular hole in the engine block

- fit new toothed belt, starting from crankshaft pulley, then tensioner, then camshafts, then idler roller and water pump. After fitting camshaft pulleys bolts must stay in the middle of their elongated holes, so there is room for adjustments. And because when you will put tensioner into tensioning position (also fit guide roller) it will pull belt back - you can safely turn camshaft pulleys all the way clockwise before fitting new belt.

- install bottom guide roller - 20Nm (Image 15)

- loosen 15mm nut on the tensioner (it will spring back), take the pin out, insert 6mm hex-allen key and turn it clockwise till metal arrow at the back goes slightly pass the middle of the gap (Image 14), not more than 5mm, it should go back during adjustment. Secure with the nut and tighten it up to 20Nm and then turn it 45 degrees further. Normally, I apply little drop of thread lock inside that nut.

!Important! - Ensure the engine is cold when setting a tensioner, because there's different setting when engine is hot.

- check again that rear of the tensioner seats correctly in the rectangular hole in the engine block
- Use counter-hold (pulley holder - Image 19) to push pulleys against direction of engine rotation, so tension of the belt stays natural and tighten camshafts bolts in their elongated holes up to 25Nm

- take crankshaft locker out, take camshafts pins out. If you get pin stuck - turn crankshaft either way, also can use pulley holder.

*NOTE: if camshafts pins are stuck badly, I use nail puller, and if it is too bad :) and plastic handle of the pin breaks - put metal nut on that thread to get good grip for nail puller

5. Check timing belt settings, and if necessary make adjustments:

- turn crankshaft 2 full rotations, so camshaft makes full round, lock the crankshaft properly (crankshaft must go clockwise before being locked - apply locker just before locking point and then turn it clockwise to lock it)

- try to fit pins to lock camshafts

If any of the pins doesn't fit, follow this procedure:

* loosen 3x13mm bolts on camshaft pulley
* using a mirror or mobile phone camera and turning camshaft by middle 18mm bolt, adjust camshaft, so hole in the engine block is right in the middle of camshaft "fingers" (Image 20)

!Important! - While adjusting camshaft by turning middle bolt - make sure that 3x13mm bolts are loose and there is space for adjustments either way!
* fit camshaft pin in
* tighten 3x13mm bolts on camshaft pulley up to 25Nm (use counter-hold - push pulley against engine rotation)
* make another 2 full turns of the crankshaft, lock it properly (crankshaft must go
clockwise before being locked - apply locker just before locking point and then turn it clockwise to lock it)
* check if you can fit the pins in - if not - repeat the procedure

- check if metal arrow at the back is in the middle or up to 5mm to the right the middle of the gap (Image 14)

6. Put covers back on and install everything back in reverse sequence:

- fit auxiliary belt, so it spins same direction

Tightening torques:

- vibration damper - 10Nm + 90 degrees

- engine bracket - 40Nm + 180 degrees

- mount bolts:
  * 13mm - 20Nm + 90 degrees
  * 16mm - 40Nm + 90 degrees
  * 18mm - 60Nm + 90 degrees

- wheel bolts - 140Nm

7. When assembled, start the engine, put heating on full (all zones), let coolant to get everywhere it needs to go, run the engine for 3 minutes at 2000rpm, then check coolant level and top up if necessary. Also check it after driving for a while.

Easy!
Here's YouTube video link:

https://www.youtube.com/watch?v=OffyDbc3jgA
Image 4 - Fuel filter housing, fuel lines and plastic catch

- Disconnect fuel hoses
- Fuel filter
- Plastic clip
- 2x10mm bolts and 10mm nut
Image 5 - Coolant expansion tank

2xT25 screws

Connector
Image 7 - Vibration damper

- 4x 10mm spline bolts
- Pin in the 5th hole
Image 8 - Engine supported by trolley jack from the bottom - use padding!
Image 9 - Engine mount and bracket

- 2x16mm bolts: mount to body
- 2x18mm bolts: mount to bracket
- 13mm bolt
Image 11 - Timing belt covers

Top cover...
...held by 3 clips like this

Bottom covers...
...held by 5x10mm bolts

Cambelt covers
Image 12 - Locked crankshaft, 2 types of crankshaft lockers

2 types of crankshaft lockers

Mark matches mark
Image 12a - 2 types of camshaft pulleys

Type 1: arrow must be up

Type 2: hole with teeth must be up

2 types of camshaft pulleys
Image 13 - Locked camshafts
Image 14 - Cambelt tensioner pulley, maximum "away" position and final set up

Maximum "away" position

Final set-up
Image 16 - Water pump
Image 18 - Sticking out bit of tensioner needs to go into rectangular hole in engine block
Image 19 - Pulley holder
Image 20 - Adjusting camshaft

Turn camshaft by middle bolt...

...till you get this hole in the middle

Make sure there is room for adjustments on either side here