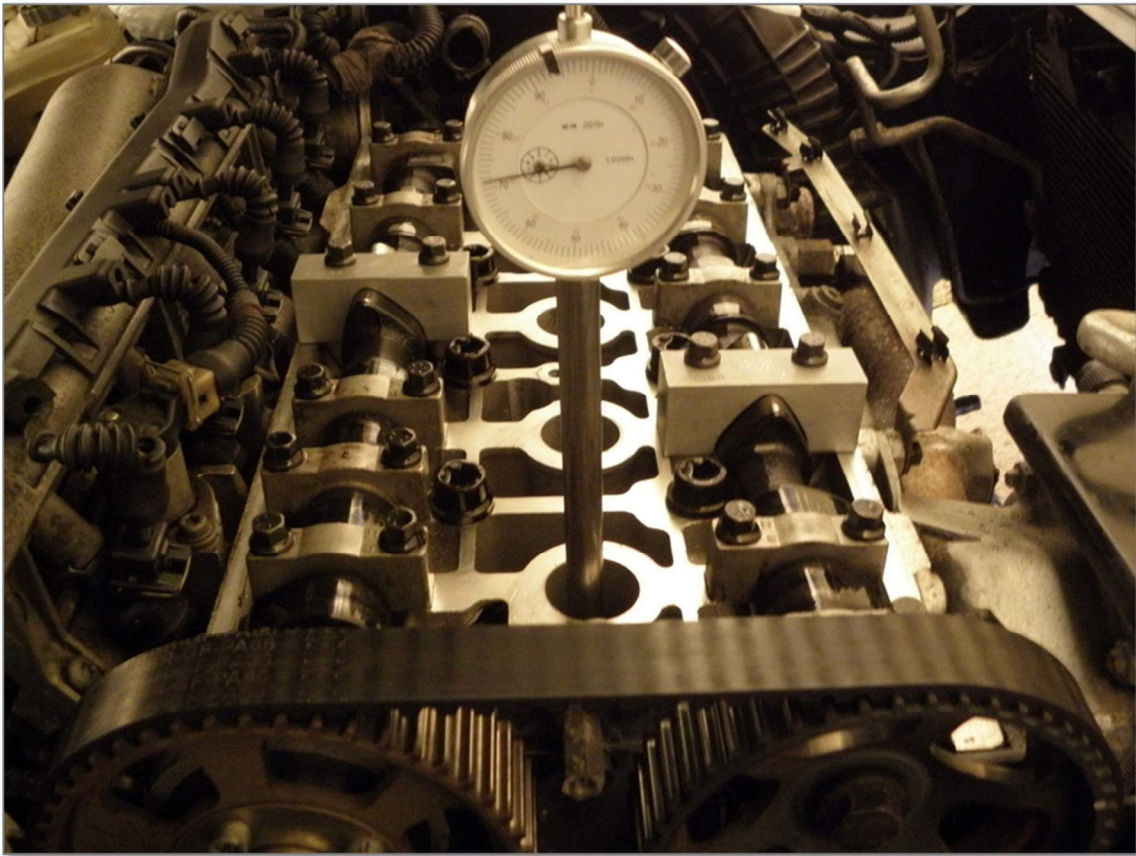


CAMBELT CHANGE

Fiat Coupe 20V & 20V Turbo

2nd Edition



April 2012

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Introduction

The first edition of this guide provides a technique for changing a cam belt using common tools, and in a minimum time.

The original guide used a “Tippex marks” technique to place a replacement belt in the same place as an original. This was good enough for Autodata, as their guides didn’t include a procedure to set the exact valve timing using blocks and a dial gauge.

This guide uses the Correct FIAT technique involving cam blocks and a dial gauge to achieve perfect valve timing on the tensioned belt.

The following list gives an overview of the key tasks involved in the cambelt/ water pump change.

Core Steps

1. Jack Car
2. Remove under tray
3. Remove induction pipework
4. Remove radiator, fans and expansion tank.
5. Release exhaust.
6. Undo PS Belt and bottom pulley
7. Undo mounts and move engine
8. Remove Cam cover
9. Remove Aux belt
10. Remove Cam belt
11. Replace Water Pump
12. Fit new belt
13. Replace Aux belt
14. Replace Cam cover
15. Replace engine mounts
16. Replace PS belt
17. Reconnect exhaust
18. Replace radiator, expansion tank, and fans
19. Replace induction pipework
20. Replace coolant and bleed
21. Replace under tray

In order to get at the belts and remove the tensioners, the engine needs to move. FIAT originally recommended engine removal, however the engine can be swung across the bay instead.

Parts and Tools

1. Cam belt Kit & Tensioners (Continental CT880K2, 167 teeth, or Dayco)
2. Water Pump (QH QCP3219)
3. Rocker cover Gasket
4. Aux Belt (Continental 6DPK 1225)
5. Power Steering Belt (Continental 6PK 1138)
6. Thread Lock

Tools

7. Torx T40 (or Ribe if you are a perfectionist) for the top cam cover bolts.
8. Torx T50 for the bottom pulley bolts.
9. Cam Blocks (Laser 3636 or similar)
10. Dial Gauge
11. Axle Stands
12. Jacks
13. Penetrating Oil
14. Socket Set
15. Torque Wrench



Jacking up the Car.

Avoid jacking the floor or the sills.

Get the jack cup around one of the sub frame bolts, then use Axle stands.



Supported by axle stands



Removing the Undertray.

Screws (S) that attach the leading edge of the bumper only need to be loosened a few turns, then the under tray can slide back.

The bolts in front of the front wheels (BH) attach to hangers which might be rusty. If you feel a lot of resistance, don't blindly force it or you'll damage the hanger, freeing the captive nut. Get some penetrating oil in from above and let it soak. When you remove the bolt twist back 2 turns, forward 1 turn, wash the thread, back 2 turns, forward one turn, wash the thread etc.

There are some plastic plugs (P) around the edges of the bumper that need to be pulled out.

The other bolts (B) have 10mm heads if original.

Bag up all the bolts you free up from this. There will be hundreds in the end, so you won't know which one went where if you don't.



Removing the MAF and hose assembly.

This isn't essential, but it is a quick job and makes it easier to get at the cooling system.

Undo the 10mm bolt that secures the plastic elbow to the front of the car.

Undo the 10mm bolt that secures the plastic tube to the side of the cam cover.

Undo the jubilee clip that secures the hose to the inlet plenum.

Undo the jubilee clip that secures the hose to the intercooler.

Undo the small clip and detach the small hose from the plastic tube.

Undo the hose to the dump valve.

Undo the connector to the MAF by pushing the metal bar in.

Withdraw the hose and bag up any clips and bolts that came out with it.



Removing the radiator.

Because the water pump is being changed it makes sense and is quick to drain the cooling system and get the radiator and pipework out of the way. This also enables access to the exhaust.

Undo the wiring loom to the radiator fans and get it out of the way.

Undo the 8mm bolts that secure the fan tray to the radiator.

Withdraw the fan tray from above.

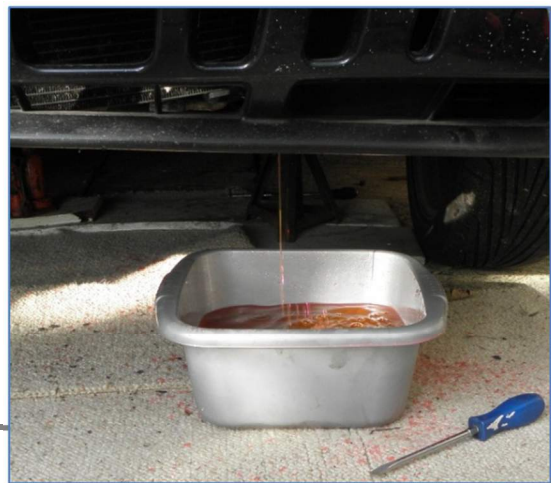
From under the car undo the 4 bolts that secure the radiator support rail to the body, and pull the rail down to release it from the radiator.

Undo the 8mm bolts that secure the radiator at the top and let the radiator drop down.

Remove the cap from the coolant header tank (if you don't want a face full of pressurised anti-freeze).

Undo the jubilee clip that secures the thin hose that links the turbo to the bottom of the radiator, and drain the coolant.

Release the radiator bleed screw to let the radiator properly drain.



Remove the radiator top and bottom hoses by disconnecting them from the engine, and withdraw the radiator.

Make a cooling bits bag and collect the screws, jubilee clips etc. in it.



The pile of cooling bits and hoses is something like this.



Removing the Header Tank

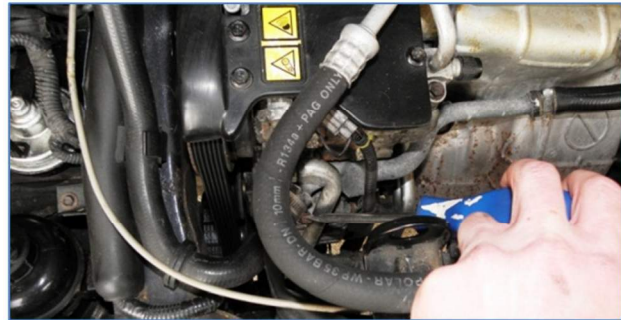
With the cooling system drained, removing the header tank allows excellent access to the cambelt area.

Make sure the tank is fully drained.

Undo the thin clip that secures the thin pipe that runs across the back of the engine. Into the throttle body.



Undo the hose connection to the water pipe at the front of the engine.



Undo the bolts around the header tank and withdraw it.



Removing the wheel and OSF liner.

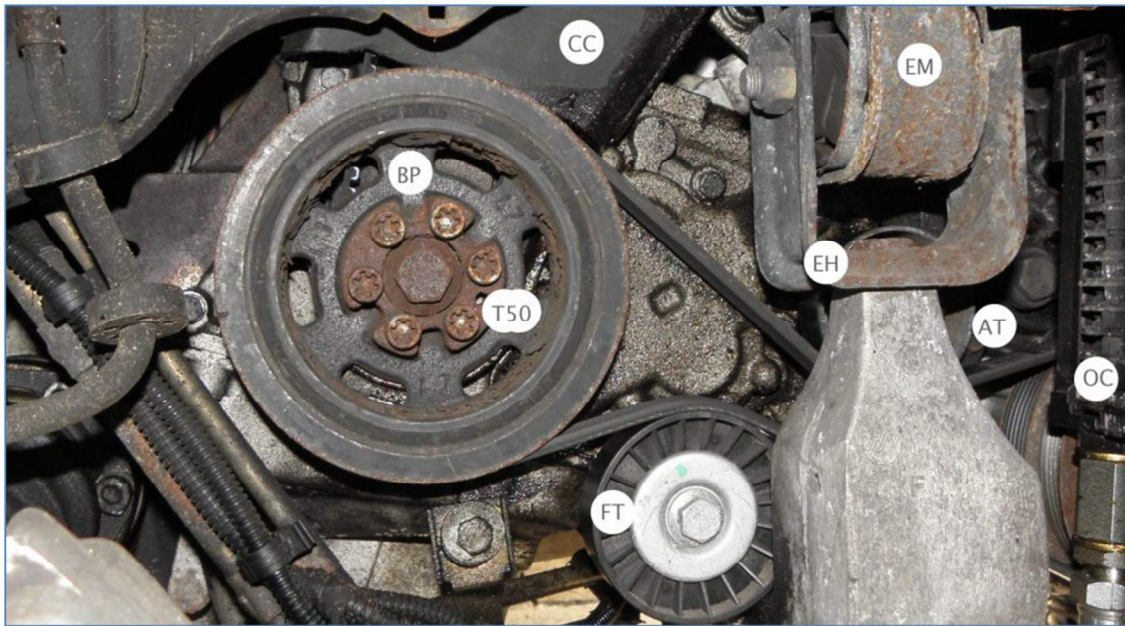
The whole liner needs to come out to enable access to the power steering belt adjustment.

Remove the wheel. As the car's lifted, get a brick under there if you need to stop the wheel from turning.

There's a small panel built into the liner that can be taken out. It has some bolts / screws holding it in.

The liner can tear the paint off the wheel arch, so I tend to get the rubber seal on the edge out first to make a bit more room for the liner to come out.

Make a liner screws/ bits bag and collect them in it.



- | | | | |
|----|---|----|----------------------------|
| BP | Bottom Pulley - held on by T50 bolts | EH | Other part of engine mount |
| CC | Cam Cover | FT | Fixed Tensioner |
| EM | Engine Mount | AT | Adjustable Tensioner |
| | | OC | Oil Cooler |

The belt in the picture is the power steering belt.

Removing the Cam cover.

Release the breather tube from the top RH of the cam cover.



Use a Ribe M4 or Torx T40 or similar to release the inner panel screws, then withdraw the inner panel.



Keep these screws separate.

Use the Ribe M4 or Torx T40 to release the coil packs (you could leave them on, but there's usually a buildup of oil on cyl.1 from clumsy filling that you should try to clear up.



Wiring to the coil packs can be released by pushing down on the wire bar that you see.



Release the earth strap on the right using a 4mm allen key.

Remove the wiring loom from above the cam cover, and release the clip that secures it from the bracket on the right of the cam cover.



Move it off out of the way.

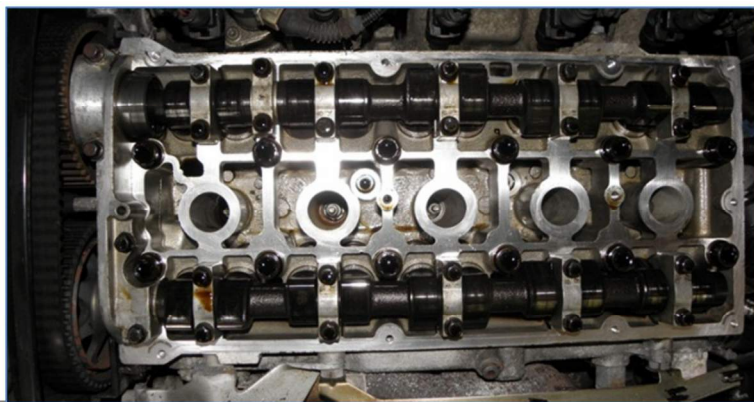


Now start removing the other cam cover bolts. Keep them separate. They are all the same length except for the far LH bolt that goes in the centre above the cambelt.



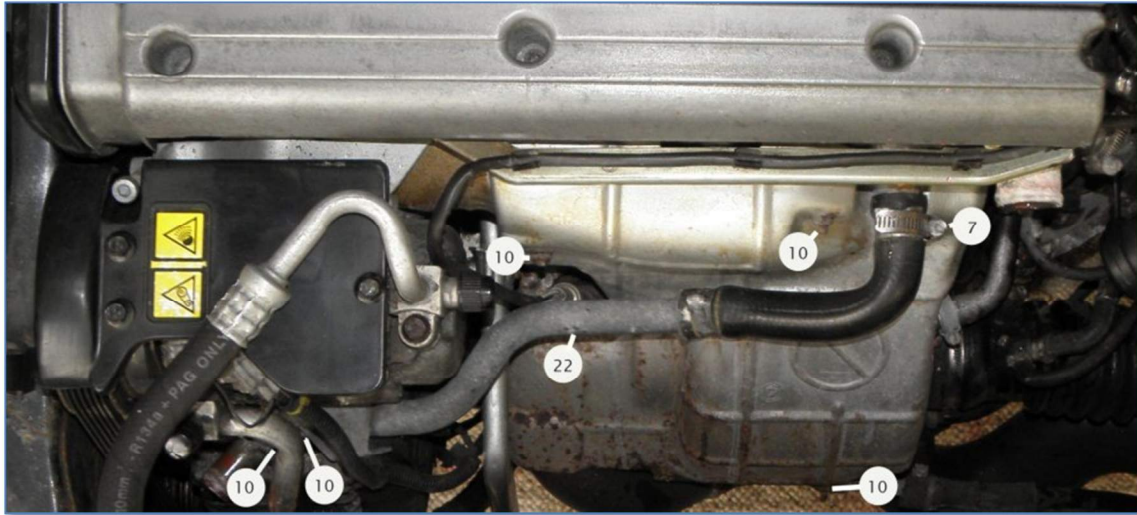
The cam cover should come off easily as there is only usually sealant on the LH side.

Cover the engine up ASAP. Any dirt or grit dropping in will get into the oil.



Releasing the Exhaust (Optional)

Releasing the exhaust can make the engine easier to move around in the engine bay.



Remove the rubber and metal hose that runs in front of the alternator. It is held on by 2 slightly inaccessible 10mm nuts.

Soak the base of the Lambda sensor in penetrating oil,

Release and disconnect the cable that connects it to the wiring loom.

Use a 22mm open ended spanner to release the Lambda Sensor and place it in a bag or container.

Soak the 10mm nuts and lower bolt that secure the turbo heat shield in penetrating oil. Undo them and withdraw the heat shield.

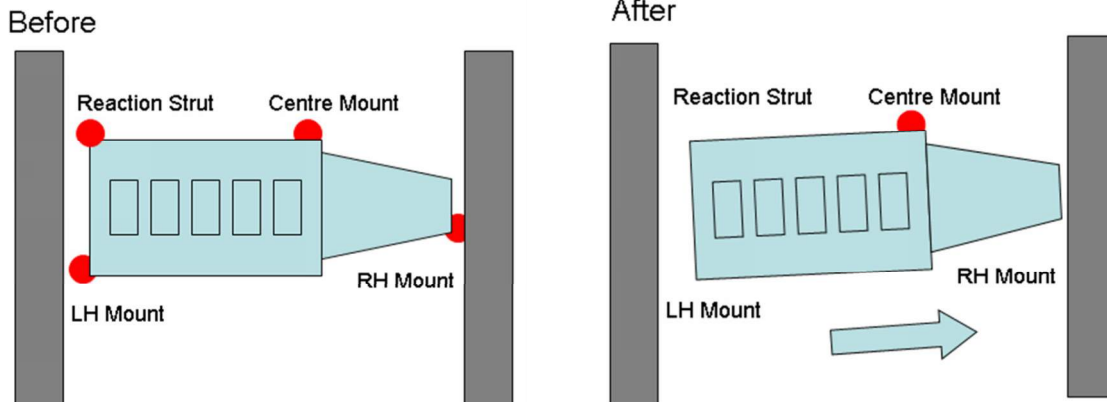
From under the car use a 13mm deep socket to release the two nuts that hold the exhaust clamp.

Withdraw the clamp and release the exhaust.

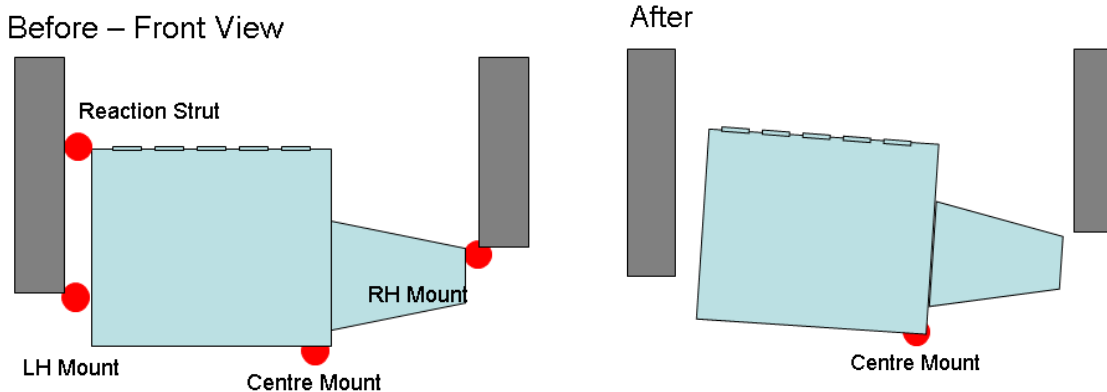


Releasing the Engine Mounts

In this procedure you will support the engine on jacks, and release all but the rear central mount as shown below:



Position a pair of trolley jacks under the engine. Use planks under them to ensure that they are free to move. Apply enough pressure so you are certain the engine is supported.



Engine Mount

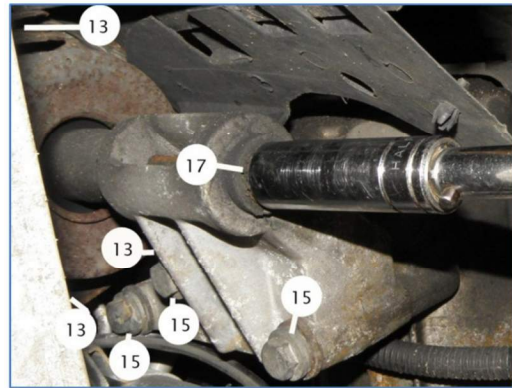
Undo the bolt that runs through the reaction strut bracket at the top / back of the engine. (15mm)

Undo the three bolts that secure the OSF engine mount to the chassis. (13mm) Note that these should be threadlocked when reattached.



Gearbox Mount

If the 17mm bolt doesn't come out, stop before damaging the mount, and release the three 13mm bolts that secure the mount to the chassis. Also undo the 3 15mm bolts that secure the mount to the gearbox. This is easier if you drop the gearbox a little on the jacks. Because the intercooler plate has a hook on it, you may not be able to release the gearbox mount fully, but it will allow plenty of movement.



The engine is now free to move. It should move quite easily, but clearance is still quite close once released.

You will move the engine up and down and across to get at various bolts. There's no need to try and pin the engine in a particular position.



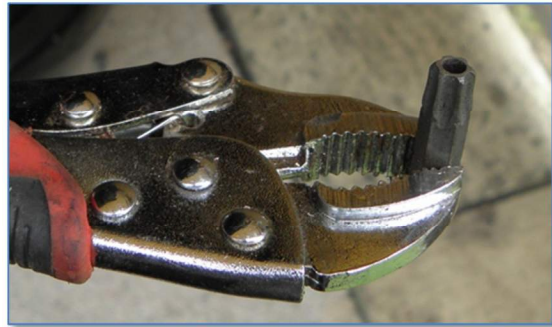
Releasing the Cambelt Cover

This is held on by 4 ribe bolts. A Torx T40 bit works on these.

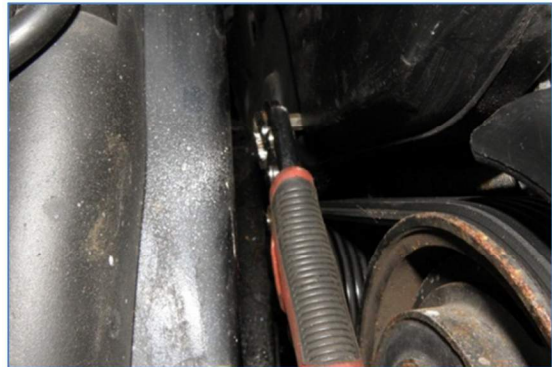
This is the lower T40, and the engine can be lowered a little to enable straight access to it.

The top bolt can also be accessed direct as above.

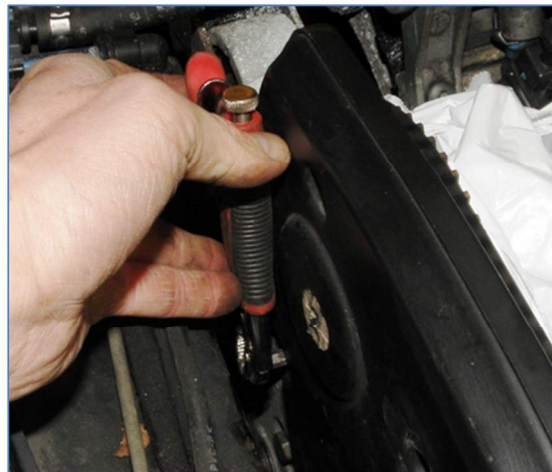
There are 2 bolts that are a bit harder to access. Something like this Torx T40 in a pair of mole grips does the job.



Front one.

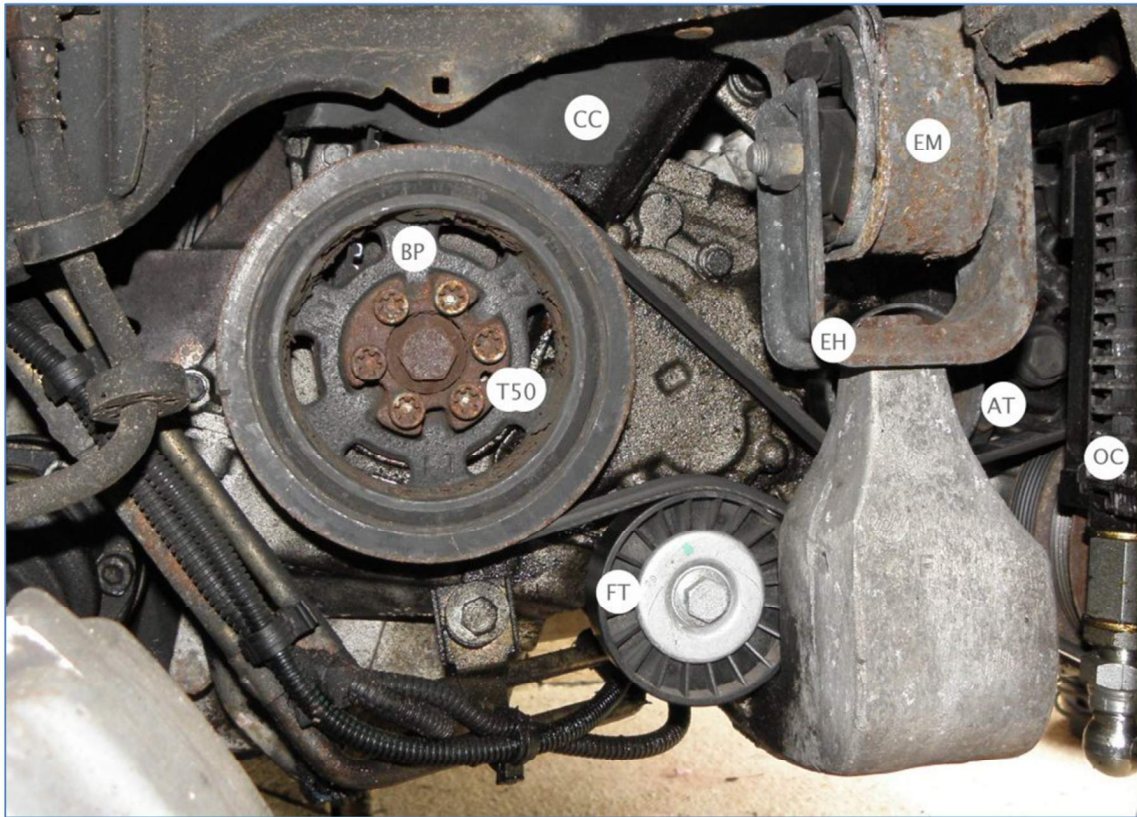


Rear one.



Now withdraw the cam belt cover.

Removing the Power Steering Belt



The bottom pulley should be removed to enable removal of the cambelt.

Soak the bottom pulley T50 (ribe M5) bolts in penetrating oil, and leave the belt on for now.

Loosen the bottom pulley bolts.

Loosen the 2 13mm bolts that secure the adjustable tensioner to the engine. The power steering belt should go loose.

Withdraw the power steering belt.

Remove the six T50 bolts and withdraw the bottom pulley.

Aux Belt Replacement

With the engine moved, access to all the tensioners is possible.

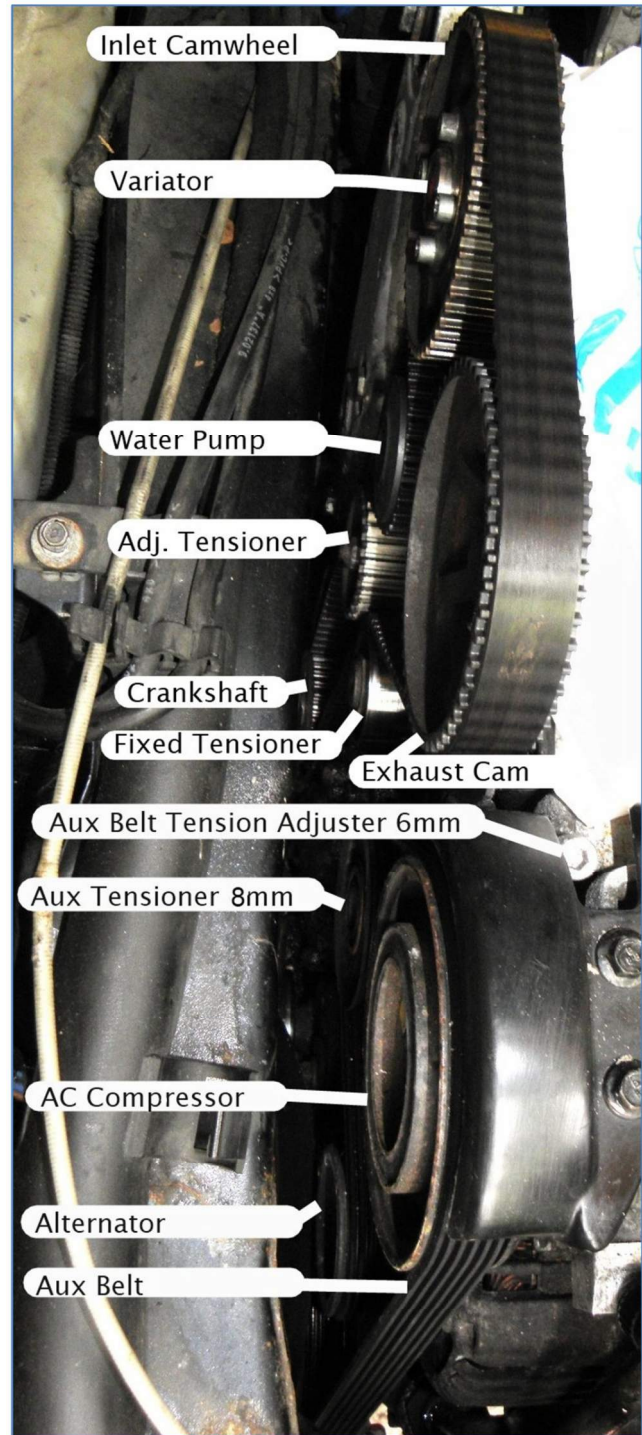
The Aux belt centre bolt is held in by a 6mm allen key so this is a good time to replace it.

Loosen the centre bolt, then turn the tension adjuster to release the tension.

Feed the new belt on, retension it using the Aux Belt Tension Adjuster.

Tension should be set so that the belt can move 1cm each way on the run down from the AC Compressor to the power steering pump.

Now tighten the 8mm central allen key on the Aux Tensioner pulley.



Removing the cam belt.

Remove spark plug no. 1 and insert the dial gauge.

Move the engine to TDC by turning the 19mm bolt on the crankshaft clockwise.

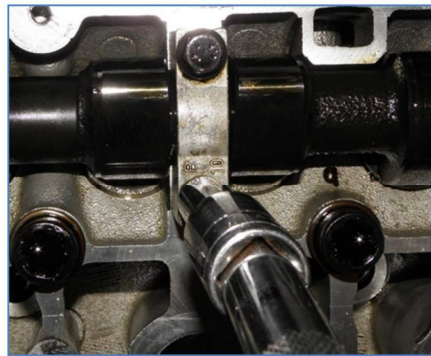
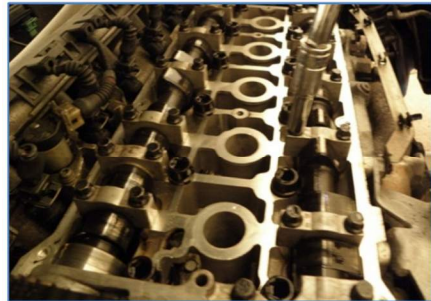
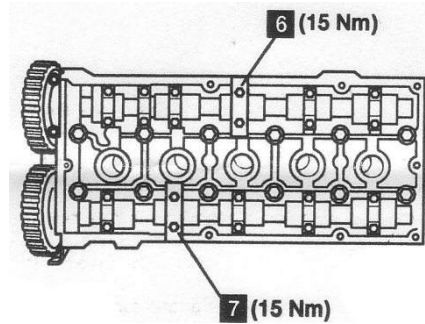
Loosen the 18mm nut in the centre of the exhaust pulley. It is recommended that you don't use the blocks to hold the cams, so use the 19mm crank bolt and the cam belt to hold it.

Remove the caps from the inlet and exhaust cams noting which block went on inlet and exhaust cams.

As an example the inlet has the letters B10 on.

And the exhaust has the letters B13.

Retain the 10mm bolts that hold the caps on, they will be needed to hold the cam locks in.



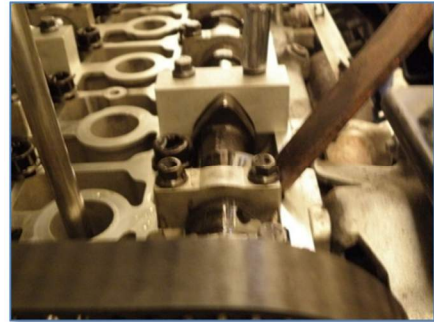
Place the blocks over the cams.

Turn the crank to get the inlet cam lined up perfectly with the block.

NOTE: Do not tighten the blocks any more than hand tight. The blocks are taller than the cam caps and there is very little thread contact. It is easy to strip the top threads out of the alloy head.

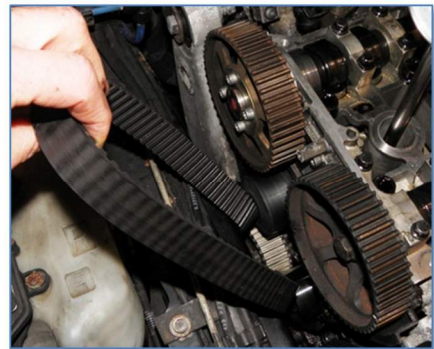


If you need to, use a lever against the exhaust cam to get it into position. The slackness in the pulley nut will prevent you from using the crank to position it.

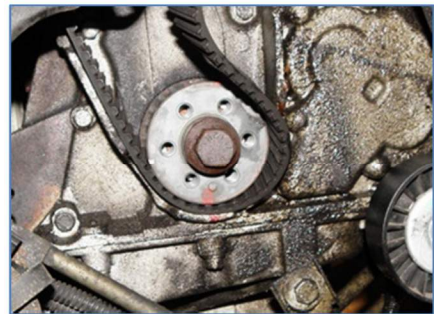


Loosen the 13mm nut on the adjustable tensioner. This will make the cam belt go loose.

Withdraw the cambelt.



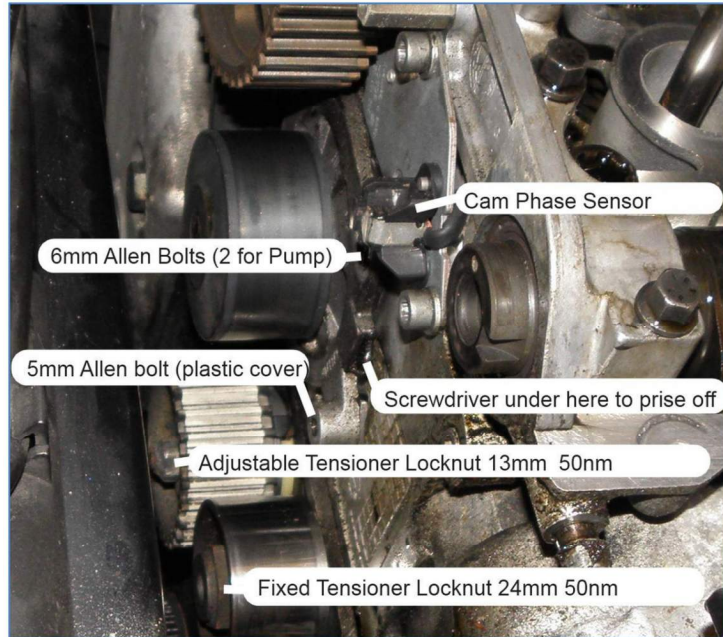
Try to keep the notch on the bottom pulley in the 9 O'Clock position shown, with the dot facing down.



Water Pump Removal

As the exhaust pulley wheel is loose, it can be unscrewed and removed.

A small black plastic cover can be removed by removing a 5mm allen bolt from the water pump housing, but remember to replace it before replacing the exhaust camwheel.



Remove the two 6mm allen bolts that secure the water pump.



Prise the water pump off gently using the screwdriver slot.

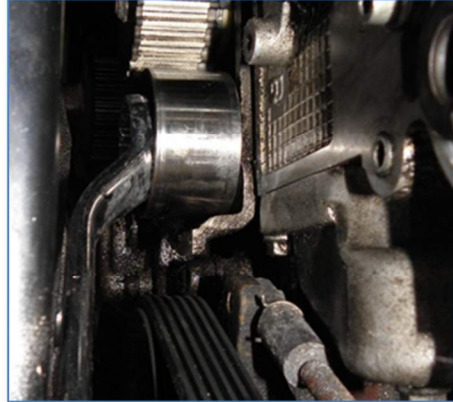


Fixed Tensioner Removal

The fixed tensioner is held in by a single long threadlocked bolt with a 24mm head.

Remove by turning anticlockwise (normal).

The fixed tensioner needs less room to move than the adjustable tensioner, however if room is needed, lift the cambelt end of the engine until the lower mount is almost touching the chassis leg, and lower the gearbox end so that it just clears the wishbone. Use a piece of wood to help the engine to move, but if it needs force, you need to move the jack or do something different.

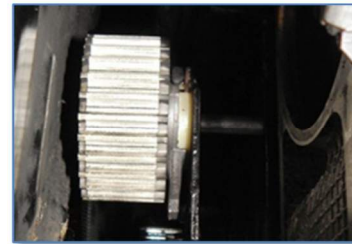


Adjustable Tensioner Removal

Remove the 13mm locknut from the adjustable tensioner, and withdraw it. If there isn't enough room gently use a piece of wood in the pictured position to get some additional leverage.

Here are some photos showing exactly where everything was when the miracle of the adjustable tensioner escape happened.

The inner wing has various depressions in it and you also need to use them to get the last few mm.



Installing the New Adjustable Tensioner

Whip the new tensioner in as soon as you can while the clearance is there.

This one is a Continental tensioner. The arrow needs to line up with the hole when the tension is correct.

There's a stud in the block that will line up with the slot on the right.

See the tab below that can be used to push the tensioner into a tensioned position.

Put the 13mm nut on but leave it loose for now. It is a locking nut so doesn't need thread lock.



Installing the Water Pump

Clean off any silicone or sealant from the block area, and make sure it is clean and dry.

Lubricate the seal with LM grease before fitting in the groove around the water pump. Also lubricate the inside edge of the block with LM grease. The seal is prone to getting trapped and cut without grease so make sure it can slide in.



Spread sealant on the face of the block and the water pump, but keep it away from any surface that the seal needs to slide across.



Push the water pump on by hand. If it won't go don't force it. Try twisting and wriggling it in.



If you need more room, you can remove the inlet cam wheel, but mark the positions to ensure roughly correct alignment.

Apply thread lock to the 6mm bolts before inserting them. **Do not use the bolts to force the pump into position.**



Tighten the 6mm allen bolts to a torque of around 20 nm. If in any doubt about the way it has gone together, remove the pump and check.



Installing the New Fixed Tensioner



Apply thread lock to the bolt that secures the fixed tensioner



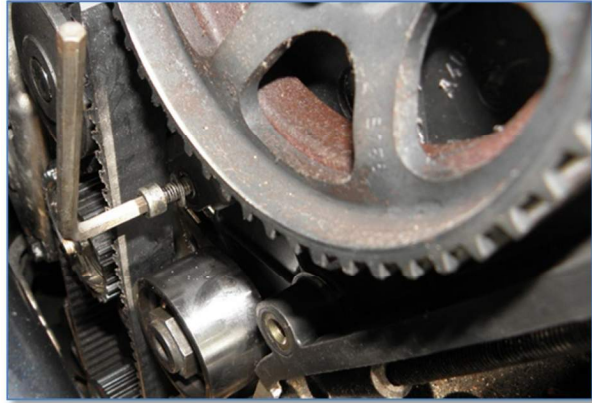
Torque it up to 25 nm.



Installing the new cambelt.

Refit the small black plastic inner cam cover.

This needs to go on before the belt or exhaust cam wheel are fitted. It is attached to a lug on the water pump and to a bolt on the front of the engine.

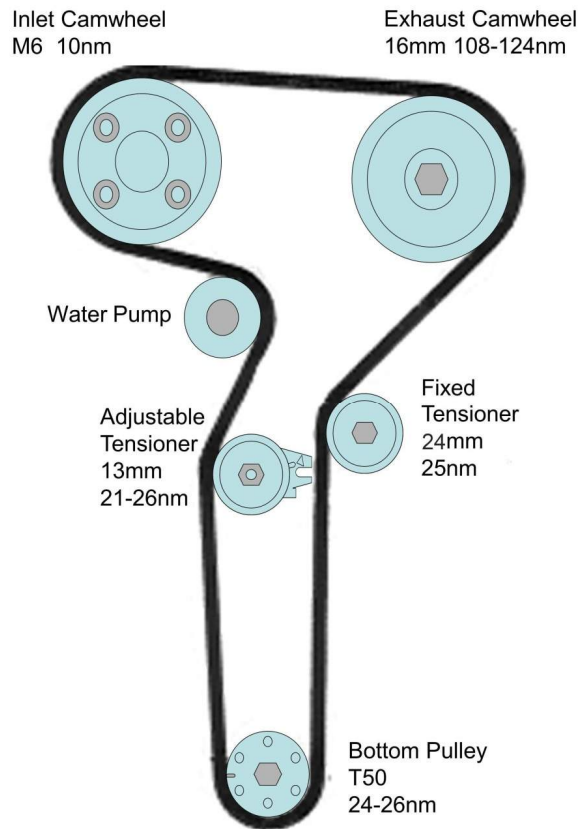


Fit the belt

Feed the cambelt onto the pulleys, noting the marked direction of travel. The cambelt turns clockwise looking at the engine from the angle shown (right).

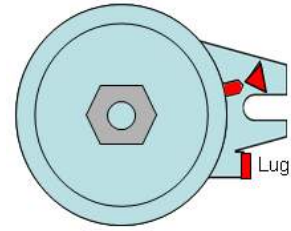
Start making fine adjustments so you know there is enough play in the top pulleys. They should be able to move against the cams, but they shouldn't be any more loose than that.

Keep the bottom pulley at TDC. It seems easiest to start at the bottom pulley and work anti-clockwise around the belt keeping everything in position.



Tensioning the belt

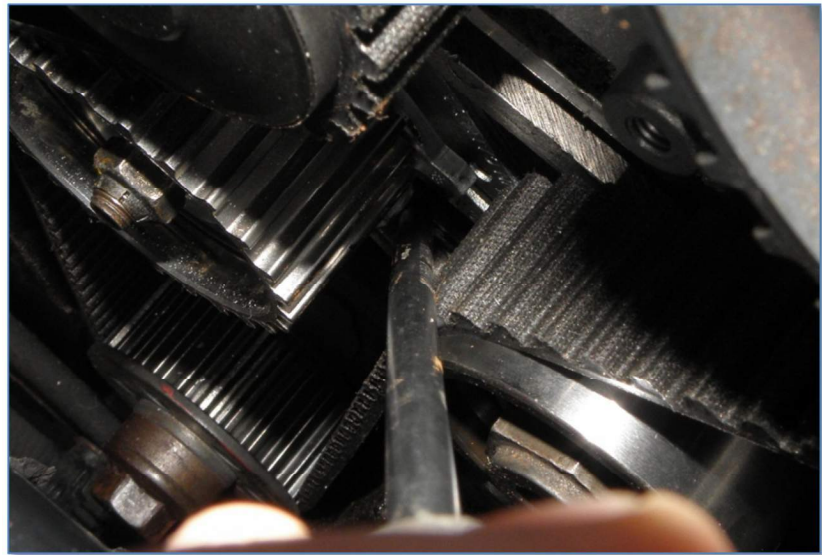
Once you have the belt on with the teeth slotted into the correct cam pulley grooves, get a long screwdriver and push against the lug shown on the tensioner until the pointer lifts and lines up with the hole or arrow. Use the fixed tensioner as a fulcrum.



Now tighten the 13mm nut in the centre of the adjustable tensioner.

The pointer looks like it might be in position, but using a mirror will provide confirmation.

The Colourtune mirror below provides one way to view the pointer from the correct angle.



Getting Perfect Cam Alignment.

Using your dial gauge, adjust the bottom pulley position until you have perfect TDC.

Go forward slowly to find maximum height.

Then start tightening the ribe bolts on the inlet pulley and nut on the exhaust pulleys taking care not to stress the blocks or move the cams / pulleys



Retorquing the Inlet Cam Pulley Bolts.

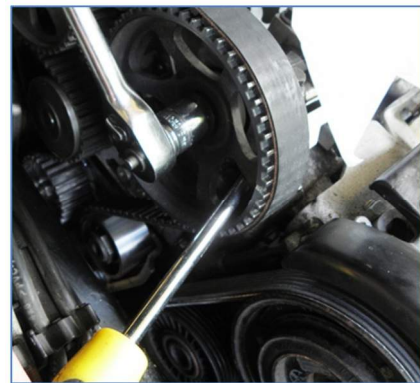
The ribe bolts have a suggested torque of just 10nm. I tend to take one out, apply thread lock, put it back in and so on working round without releasing the wheel's hold on the cam.

10nm seems much too low, so I tend to use a 3/8" socket handle and do what I think is OK for a bolt of this type (around 15nm). It is going into steel on the variator, so it is unlikely that the thread will strip.



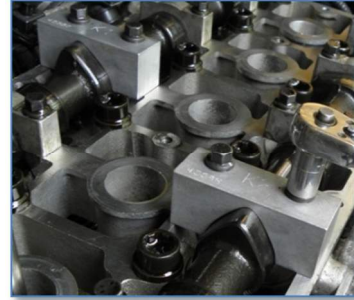
Tightening the Exhaust Cam Pulley Bolt.

To tighten the exhaust pulley find a way to hold it. The photo shows a big screwdriver resting on the top face of the head. Torque for this bolt is 120nm but the purpose at this stage is to stop it from slipping. A second stage is necessary when the cam block is removed.



Checking Tension and Alignment.

Now remove the cam blocks, and rotate the crankshaft through 2 revolutions. Pay attention to the pointer on the tensioner, and when the 2 revolutions are nearly complete, check the dial gauge to get perfect TDC.



Now place the blocks back over the cam lobes.

Hopefully they fit perfectly, and will go down to touch the face of the head.

Use a mirror to check the belt tensioner again. The needle should be pointing to the centre of the hole.

The following actions are necessary if either of these is out.

| Cam Blocks Aligned? | Tension Correct? | Action |
|---------------------|------------------|--|
| Yes | Yes | Continue |
| No | Yes | Release cam wheel bolts, and try aligning the belt again.(Page 29) |
| Yes | No | Retension the belt (Page 28). No need to realign the cam wheels yet. |
| No | No | Go back to Tensioning the Belt, Page 28 |

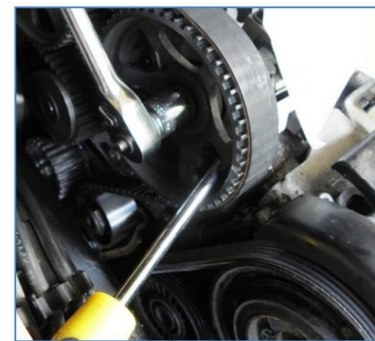
Removing Cam Blocks/ Replacing Caps.

Remove the cam locking blocks and replace the cam caps, first smearing fresh oil on the inner faces. On mine, B10 was inlet, B13 was exhaust. Torque to 15nm.



Torquing the Exhaust Camwheel

Now that the blocks are released torque the centre bolt for the exhaust camwheel. Torque for this bolt is 120nm. Use the technique shown, or 2 ring spanners bolted together can work. Avoid disturbing the cam phase sensor.



Replacing the Spark Plugs

Smear the plug threads with LM grease, and insert them, then torque down to 15nm.



Replacing the Cam Cover.

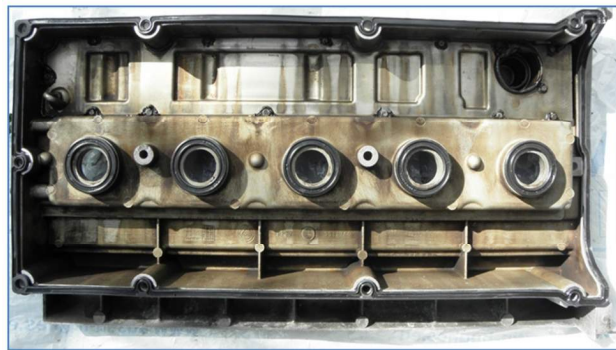
Place a fresh gasket into the slot on the cam cover.

Smear some silicone sealant into the crevices at the cambelt end of the cylinder head.



Replacing Plug Inserts

Insert or check that all the rubber inserts that seal the plug holes are in place.

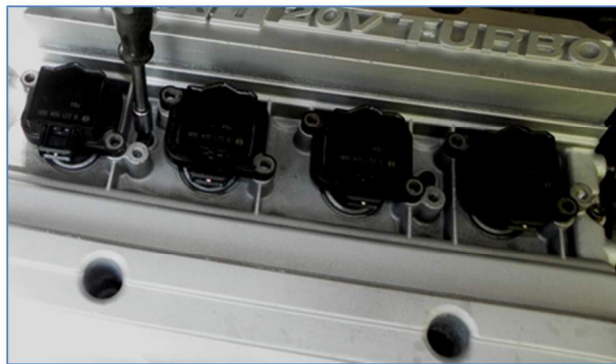


Tightening Cam Cover Bolts.

Insert the cam cover nuts. The longest goes in the OSF middle, next to the cam belt. The others are all the same length.

Tighten in sequence using light pressure. Make sure the tightness is equalised across all of the bolts.

Ensure that the cover is seated correctly before increasing the torque to 10nm taking special care with the bolts in the corners.



Replacing the Coil Packs and Rewiring.

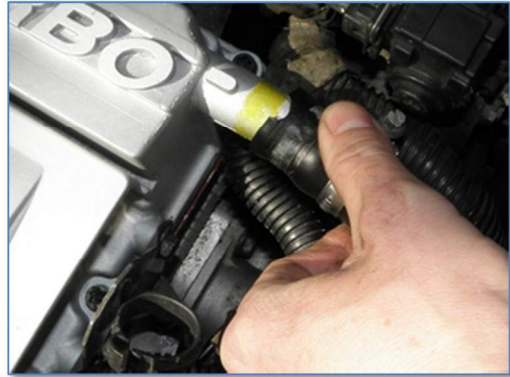
Place the coil packs and tighten down using the 10 short T40/ RibeM4 bolts. Replace the earth strap, and route / clip in the wiring to the back of the coil packs.

Replace the spark plug cover.



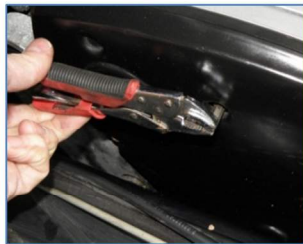
Replacing the Cam Cover Breather Hose.

Smear on some sealant and replace/ clip in the oil breather.



Replace the Cambelt Cover

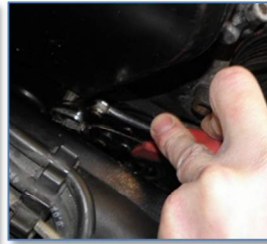
Using the T40 / Ribe M4 bit and a pair of mole grips.



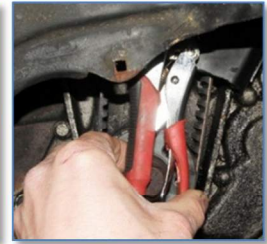
Top



Rear



Front



Bottom

Replacing the Bottom Pulley

Apply threadlock to the bottom pulley bolts, and then replace them. Torque the bolts to 25nm.



Refitting the Power Steering Belt

Feed the power steering belt through the gap between the fixed and adjustable tensioners and wrap it around the power steering pump pulley.

Then wrap the other end around the crank pulley.



To tension the belt, use a 17mm open ended spanner, then tighten down the 13mm retaining bolts to hold the tension.

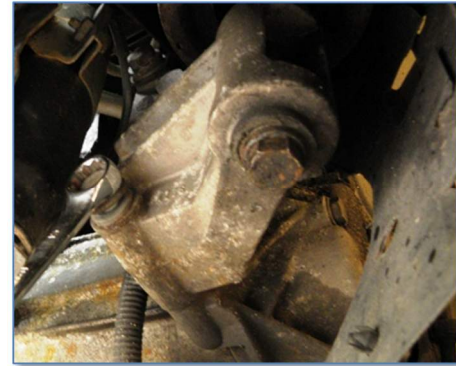


Replacing the NS Engine Mount

Jack the gearbox side of the engine up so that the bolt can reach its mount.

It is likely that you will need to pull the engine around a little to get everything to line up.

If the bolt shown wouldn't come undone and you've undone the bolts that hold the mount onto the gearbox, replace them.



Replacing the OS Engine Mount

If you took the oil cooler bracket off remember to replace it between the engine mount and the body before bolting in the engine mount.

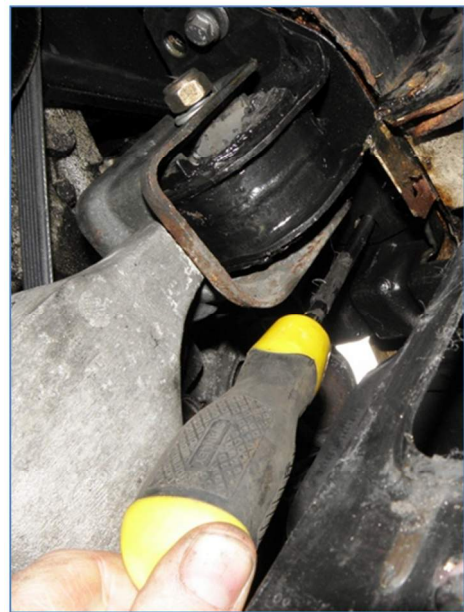
There is a tab that locates it onto the engine mount.

Apply thread locking compound to the engine mounting bolts.

Put the engine mount into the lower retainer, slide the bolt through, and raise the engine so that the engine mount and oil cooler bracket are against the body.

There are 2 large holes to allow you to use a large screwdriver or similar to line the mounting up before inserting the bolts.

NOTE: Use your fingers to insert the bolts to avoid cross-threading the retainer plate in the body.



Reattaching the exhaust (if you detached it)

Put some oil or grease onto the clamp threads.

Push the exhaust back on to the turbo. No sealant is required.

Place the clamp over and tighten the 13mm nuts while moving the exhaust to get it properly located again, the tighten down fully.



Replacing the exhaust heat shield

This is held on by 2 10mm nuts (top) and a 10mm bolt (bottom)

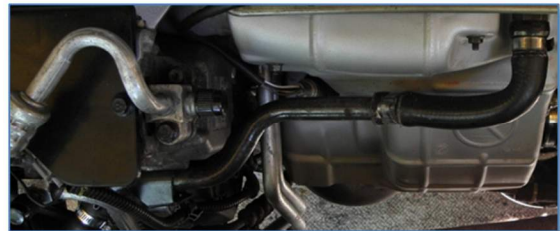


Replacing the Lambda Sensor

This requires a 22mm spanner. The cable clips into the rail above the exhaust heat shield, and then back into the loom to the right of the cam cover.

Replacing the Expansion Tank to Header Rail Hose

This is held in down the front of the AC compressor by 2 x 10mm nuts. Depending on what you have removed, there may be a hole that exposes one of them through the front of the car.



It is worth smearing a bit of gasket sealant around the water rail tube that the hose connects to.

Replacing the Header Tank

Reattach the header tank, and reconnect the hoses as follows:

Thin hose goes to the back of the throttle body through a section of cable management that runs along the injector rail.



The thin clips can be reused by using a pair of pliers and a thin item like a nail or jewellers screwdriver to create a gap for the top hook to fall into.

At the rear, the header tank mount goes under the black metal bracket that secures the blue fuel hoses.

Reconnect the hose that goes to the water rail, again using sealant on the joint to the expansion tank and the metal tube below the air compressor.

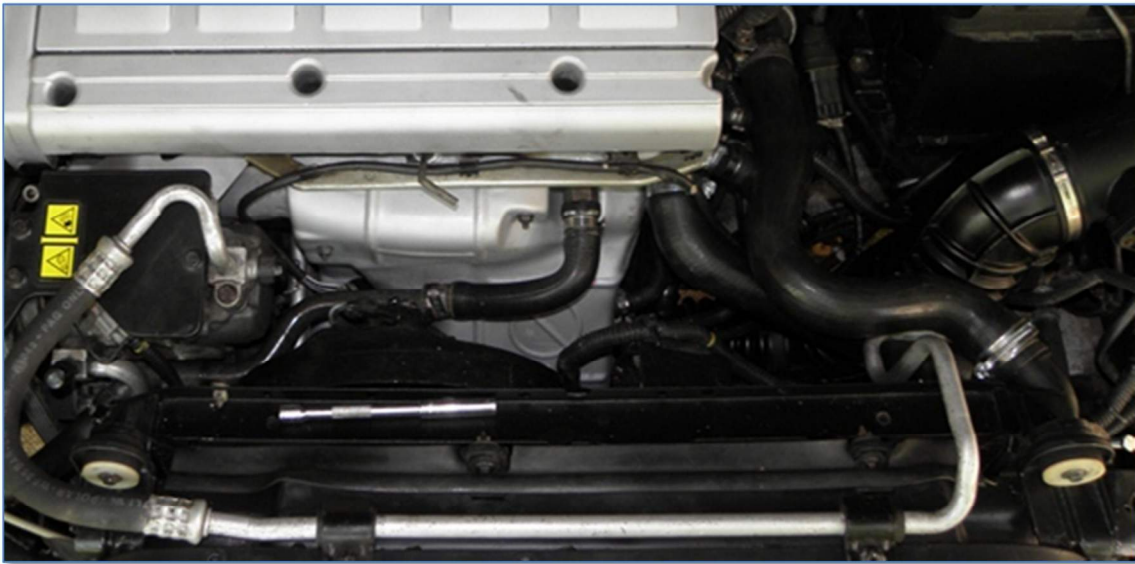


Replacing the the reaction strut bolt.

Threading this bolt back through should be easy.
Nut size is 17mm.



Replacing the Radiator



Get the radiator loosely in position, and if there is an AC radiator, attach that to the main radiator first.

Then hang the radiator using the long 8mm head bolts that go through the white washers in the bottom corners of the photo above.

Now attach the radiator fan assembly to the back of the radiator. There are 4 bolts.

Now reconnect the thin hose that goes to the turbo at the bottom of the radiator.



Replace the radiator support rail. There should be a rubber grommet for each lower radiator mount.

Reconnect the wiring to the fan assembly. There are connections to both fans and also spade connections to a large resistor coil. A cable tie should be used to tie the loom to the radiator fan frame.

Reconnect the large hoses that connect the radiator to the engine/ thermostat.

Refilling and Bleeding the Cooling System

Check that all hoses are secure and now in place.

Pour coolant into the expansion tank until it fills.

Bleed Point 1

Find the bleed point on the side of the radiator, just behind the Valeo sticker. It is a thumb screw.

Bleed the radiator by undoing the screw until coolant starts running down the side of the radiator.



Bleed Point 2

This is just behind the thermostat, near the battery. There are 2 hoses that are joined by a plastic assembly, and a thumbscrew on the top.

You can get in from behind the engine, or by getting your hand down between the throttle body and the thermostat as the white arrow shows.



Bleed Point 3

On top of the water rail there's an allen key. It is usually quite tight.



Running

As you run the car it will let more bubbles out through the expansion tank. Short heating / cooling cycles are good for this.

Replace the MAF Hose Assembly

This is held on by:

- A Jubilee clip on the throttle body.
- A jubilee clip on the intercooler.
- 2 x 10mm bolts on the end of the cam cover.
- A 10mm bolt to the right of the radiator.
- A thin tube that goes to the back of the engine.
- A hose to the dump valve.

Reconnect the MAF to the wiring loom.

See page 6 for further information.



First Start

Check the coolant is up to the Max level, and leave the cap off to let any air escape.

Start the car, and let it idle.

Let it warm up a bit, and check for leaks.

Replacing the Undertray

Slot the undertray in behind the bumper, and push the edges of the bumper in front of the wheels to get it in place.

Get some of the 10mm (B) bolts (see below) loosely done up before doing what you can to improve alignment.

Screws (S) that attach the leading edge of the bumper need to be tightened.

Then the BH bolts are next.

There are some plastic plugs (P) around the edges of the bumper that need to be put back.



Replacing the wheelarch side cover.

Do up the screws and fixings for the side cover.

There are 2 captive screw bushes on the inner arch, and one on the rear of the bumper hanger. Also a plastic plug.

Replace the OSF Wheel and you're done (apart from getting the jacks / axle stands out.)