

Replacing a timing belt (cam belt) on an Ford Escort 1.4 PTE SEFi engine

If like me, you forgot to change the timing belt at the last service and it went "ping" while driving to the shops, you may wish to invest in new engine, or at the very least a few new valves, rockers and possibly the cylinder head... If you are sensible and know that it needs changing, then this little guide is for you. Applies to the 1.4 and 1.6 CVH or PTE engine, but can be applied generally to other models too. Pictures and references to Haynes are made in square brackets where appropriate!

Tools:

Haynes Manual – "Ford Escort & Orion Sept 1990 – 2000 (H to X registration) Petrol"

Socket wrench

Torque wrench(es – "small" and "large")

Breaker bar (up to a foot and a half)

Socket extensions

8mm socket

10mm socket

13mm socket

19mm socket

15mm ring spanner

17mm open end spanner

Adjustable spanner

No.30 Torx bit

4/5mm flat blade screwdriver

3.5mm Allen key

Rubber mallet

Stanley knife and/or blades

Parts:

Timing belt to fit your car (may come as a kit which includes the tensioner pulley below)

Tensioner pulley

Drive belt to fit your car

Rocker cover gasket (if rocker cover is removed)

Power steering fluid (if applicable)

Clean workshop!

Time required:

Basic swap – lucky: 1 hour (Doesn't include inspecting cylinder head or components)

Basic swap – unlucky: 2 hours (Why longer? You have some nasty gasket to clean up...)

Basic swap – amateur: 4 hours (You've never done it before, so you're taking your time)

Taking it apart

1) Get a copy of the Haynes manual – the instructions for this task are pretty clear. This guide just serves as a summary and points out a couple of extra things.

2) [Ref.3] Jack up the front of the car, and preferably sit it on axle stands. These are better than ramps, because you are free to remove the front right wheel for better access. If you don't have set, get some – they're pretty cheap.

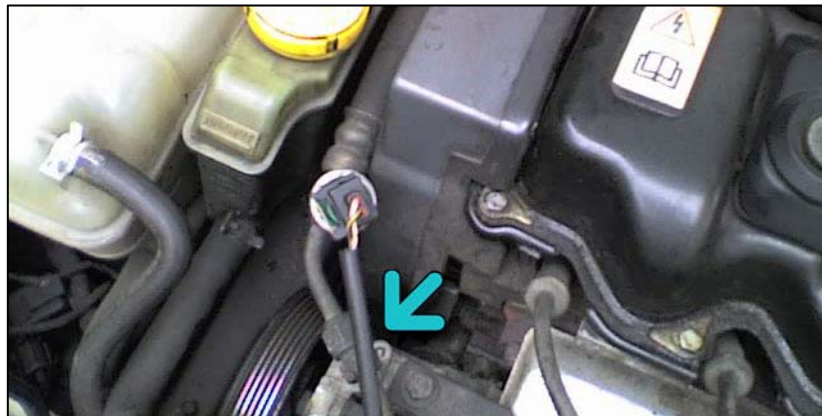
3) [5A.3 – 4.1] Disconnect the negative terminal on the battery (10mm socket) and tuck the connector safely away from the battery. This helps prevent shocks, accidentally turning the starter motor(!) or causing a short circuit when working on the engine.

4) Remove the drive belt covers – on this model a small top cover [10.14 – 25.2] which bolts on (10mm socket) to the power steering pump (if you have one) and working under the car, a lower cover [1.10 – 3.3] which is held on by three screws (13mm socket) just behind the front right wheel.

5) Remove the drive belt by taking up the tension in the pulley with a spanner (15mm) with one hand [1.11 – 3.23] and carefully unwrapping the belt with the other. You should replace this belt at

the same time as the timing belt, unless you have done so very recently (less than 1000miles ago). Otherwise, mark its direction of rotation and keep it safe to one side.

6) Power steering. "Remove the timing belt top cover" says Haynes. If you've got power steering or a 16v Zetec or both, this is easier written than performed! I find it's easiest to totally disconnect the power steering pipes and move them out the way. Undo the retaining clips for the piping (8mm socket), one on top of the power steering pump and one behind the engine. There is a junction in the piping just above the drive belt [pic 6] which can be undone (17mm open end and an adjustable spanner) and the two sections separated - be careful to have "something" underneath to catch the fluid which will leak out until you either bung the ends or finish working! Bear in mind you can temporarily reconnect the ends after you have removed the timing belt cover. The power steering fluid reservoir can be slid up from its mount on the coolant tank and twisted up and out of the way for even better access too...



[picture 6]

7) The timing belt top cover [2B.5] is held in place by two craftily inaccessible bolts (10mm socket) on the side of the engine block. Get a small child to help undo them and slide the cover through the gap you liberated by removing the power steering hose.

8) Getting this bit right saves time later on - set the crankshaft so that number 1 piston is at Top Dead Centre (TDC) on the compression stroke. If you don't know what that means, you probably shouldn't be attempting this job, instead, read up on how four stroke engines work! You can use a socket on the crankshaft pulley bolt to rotate the crankshaft (clockwise, looking at the timing belt end of the engine) to align the notch on the rim of the crankshaft pulley with the ridge marked "0" on the timing belt cover [2B.3 - 3.5]. Make sure that the arrow on the camshaft pulley aligns with the "dot" on the side of the cylinder head [2B.3 - 3.6]. If it doesn't, rotate the crankshaft one more revolution and it should line up now. If it doesn't line up, it's because aliens are messing with you, your belt has slipped and you're noticing funny sounds coming from your engine, or you have no belt... Be careful not to move the crankshaft or camshaft at all after removing the belt - even a couple of degrees could be enough to risk the pistons and valves coming into contact, damaging their surfaces or worse, bending a valve head.

9) Now we have to remove the crankshaft pulley. Again easier said than done. Avoid at all costs "wedging" a socket on a long bar between the crankshaft pulley bolt and the ground, then trying to turn the starter motor - it'll only end it tears. Another option touted by some is to leave the car in gear with the wheel on the ground (or get a buddy to stomp on the brake pedal) to offer resistance while undoing the bolt. Unless you have both luck and an impact gun, it won't budge. Haynes recommends however, unbolting the starter motor and wedging a "suitable bar" in the teeth of the flywheel ring gear to lock the crankshaft in place. Although they show a picture of a screwdriver in place [2B.4 - 6.6], in practice, this will probably not hold the flywheel in place - I find a 3.5mm Allen key works well. The three starter motor bolts should unbolt easily (13mm socket, universal joint) [5A.7] and you can swing it out of the way of the flywheel without undoing its electrical connections. You'll now have a gaping hole exposing a few teeth of the flywheel [pic 9]. You may need three arms for the next bit. Prise a "suitable bar" in between the teeth of the flywheel - and hold it in place, bearing in mind you are about to turn the crankshaft anticlockwise

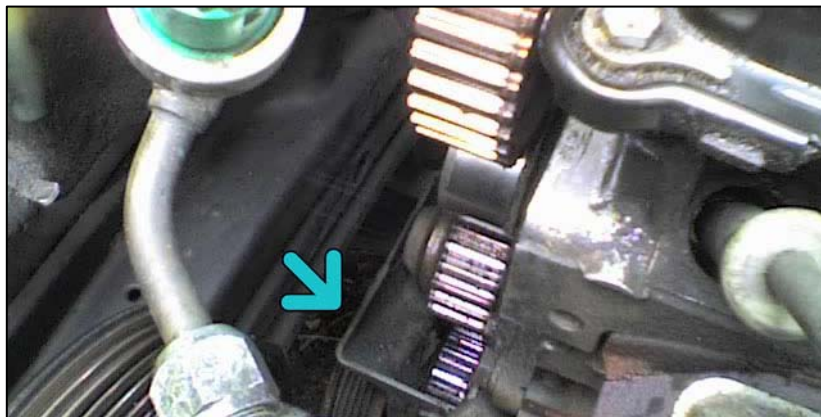
which will pull the "suitable bar" upwards. Now place your long breaker bar (a good foot and a half works well) with socket (19mm) on the crankshaft pulley bolt and making sure the "suitable bar" doesn't slip, rotate the crankshaft anticlockwise until the flywheel body pinches the "suitable bar". Holding the "suitable bar" in place, you should now be able to undo the crankshaft pulley bolt fairly easily. If it doesn't budge however, it probably won't ever budge again... this is where the guide ends! Once the bolt is off, remove the "suitable bar" if it hasn't already fallen out.



[picture 9]

10) With the bolt off, the pulley should slide off the crankshaft fairly easily. If not, you can use a crank puller, a couple of longish bars, or failing that, a claw hammer clad in rubber or wood does the job.

11) The timing belt lower cover [pic 11] is held on with two almost as inaccessible bolts (10mm socket) as the top cover, but again the small child can help remove those.



[picture 11]

12) Supposing you still have a timing belt and it hasn't disintegrated, you'll now need to remove the tension from the belt and pop it off. There is a bolt (13mm socket) either side of the tensioner pulley [2B.5 – 8.4] which should undo easily allowing the unit to slide out of the way.

13) The belt should be framed and hung on the wall if it's still in perfect condition – otherwise chuck it away. Don't reuse it! The same goes for the tensioner pulley – it's a non-serviceable unit, so if the bearings sound like there's some loose change in there, it's time to go. Fitting a new belt on an old pulley with no grease left in the bearing, will wear the bearing out very quickly, meaning heat-induced seizure or disintegration, both of which will snap your shiny new belt and destroy your engine. Some folks say change the water pump at this opportunity too for similar reasons.

14) Now's a good time to remove the crankshaft timing belt sprocket and give it a good clean, checking it for undue wear [pic 14]. It should slide off easily. Check the other sprockets too, although you should be able to get in and clean them without removing them from the engine.



[picture 14]

Removing the rocker cover.

The following should only be carried out if your belt went "ping" and if you want to check the damage to the cylinder head and gubbins...

15 i) Rotate the crankshaft a couple of degrees AWAY from TDC. This will allow you to rotate the camshaft(s) without the valve heads hitting the pistons.

15 ii) Disconnect the spark plug leads. Detach the throttle cable by carefully unwrapping the cable end and sliding the cable out from its support bracket [4D.4 - 5.5]. Disconnect the ventilation hose attached to the air inlet duct by unscrewing the jubilee clip [4D.4 - 4.8a]. Unclip the throttle position sensor plug. Remove the crankcase ventilation hoses from either side of the rocker cover by carefully opening the circlips with sliding jaw pliers and moving them further down the hose. Unbolt the air inlet duct [4D.4 - 4.8a] from the rocker cover (10mm socket). Unscrew the jubilee clip on the end of the inlet hose and carefully remove the inlet duct from the engine. Unbolt (no.30 Torx) the throttle support bracket [4D.4 - 5.5] as it will get in the way when you remove the rocker cover. You may need an incredibly short Torx bit to access the lower bolt...

15 iii) Loosen off the rocker cover bolts (10mm socket) in an opposing pattern, starting from the middle of the cover. This helps prevent distortion of the cover. Remove the bolts and washers.

15 iv) Remove the rocker cover - it may need some persuasion from a light tap of the fist or a soft rubber mallet on each side depending on the state of the gasket. If you're lucky, the cover will separate from the cylinder head with the gasket stuck to the cover. If you're unlucky, you'll have gasket on the cylinder head face. Make sure no bits of gasket fall into the cylinder head...



[picture 15 v]

15 v) As long as the pistons are away from TDC, the camshaft can be rotated to visually inspect the rocker arms, tappets, springs and valve heads [pic 15 v]. If anything seems amiss, it's best to remove the cylinder head and have the camshaft, valves, tappets and rockers checked and/or

renewed. While the cylinder head is removed, now's time to visually inspect the pistons, cylinder walls and top rings. That's outside the scope of this guide, so let a mechanic do the job or get involved!

15 vi) Assuming all's well, you'll have to remove the old gasket material [pic 15 vi] from the rocker cover by liberal use of a scraper, Stanley blade, scalpel and/or solvents! For gasket on the cylinder head, be extra careful not to gouge the aluminium or drop bits of gunk into the well. If you do, you'd better hope that your oil filter works...



[picture 15 vi]

15 vii) Remember to fit a new gasket and refit the rocker cover and other components you detached earlier. The rocker cover bolts should be tightened in an opposing pattern to 7Nm as Haynes says – but you may find different gasket materials do a different job of sealing and that figure may need tweaking... If in doubt start off at a lower setting, run the engine, check for leaks, allow to cool and tighten gradually.

Putting it back together

16) Clean all the parts and lay them out ready to refit [pic 16].



[picture 16]

17) Make sure that the camshafts are at their TDC mark [2B.3 – 3.6] as mentioned earlier, then make sure that the crankshaft is also at TDC [2B.5 - 8.7]. Verifying in this order prevents damage to the valves.

18) Refit the crankshaft timing belt sprocket, making sure the flange sits towards the outside.

19) Loop the new timing belt over the crankshaft sprocket and pull up over the camshaft sprocket making sure neither the crankshaft nor camshaft move from their TDC positions [pic 19]. Making sure the front of the belt runs straight from crankshaft sprocket to the camshaft sprocket with no slack, wrap the back of the belt around the (new) tensioner pulley and water pump sprocket. There is not much give in one of these belts, so making sure the front of the belt is taught; verify the

TDC marks on the crankshaft and camshaft. If they have moved (which the crankshaft probably will...) slip the belt off and try again. You can slip the crankshaft pulley on and off to verify the TDC of the crankshaft if it moves, and use the arrow cast into the camshaft sprocket to align its TDC.



[picture 19]

20) Refit the timing belt lower cover, doing the bolts up to 10Nm.

21) "Refit the crankshaft pulley, and tighten its retaining bolt to the specified torque setting" says Haynes. This is where the "suitable bar" comes in handy again, this time holding it in place in the flywheel teeth bearing in mind that you are about to turn the crankshaft clockwise which will pull the "suitable bar" down. Once you have rotated the crankshaft, the "suitable bar" should stay in place, allowing you to do the crankshaft bolt up to 108Nm – that's tight, so you'll need a good "click" type torque wrench possibly on a breaker bar. When you're happy, remove the "suitable bar".

22) Take up the tension in the new timing belt by sliding the tensioner pulley towards the front – tighten one bolt to keep it there. Haynes says the correct tension is achieved when the front of the belt can be rotated through 90° by finger and thumb, but no more [2B.6 – 8.13]. You can use a socket on the crankshaft pulley bolt to rotate the crankshaft through two complete revolutions to even out the belt tension. The two revolutions will bring the camshaft back to TDC. Now check the both the crankshaft and camshafts point to their TDC marks. If you have any doubt, you'll have to refit the belt as in step 19... Rotating the crankshaft two revolutions at a time, test the belt tension, move the tensioner pulley if necessary then tighten the two tensioner pulley bolts to 18Nm.

23) Refit the starter motor doing its bolts to 35Nm and refit the drive belt remembering to take up the pulley tension with a spanner to ease refitting. Reconnect the battery negative terminal.

24) Double check everything. Have you got a spare bolt? Is there a bolt missing? Scan the area underneath the car just in case anything has become dislodged or there are tell tale signs of oil leaking.



[picture 25]

25) Test the refit – start the car [pic 25]. If all's well, it will sound exactly as it used to. Inspect the timing belt installation – look for wobble or mis-seating of the belt on the pulleys. If all's not well, your engine may not fire at all – you've more than likely got the crankshaft and camshaft out of alignment – double check the TDC marks. If you have replaced a belt after one snapping on the road, your engine may be damaged. If your engine starts at all, it will more than likely vibrate excessively, make loud tapping noises and possibly spit petrol out of the exhaust. In this case, it's time for a rebuild or a replacement!

26) You've finished your job; refit the timing belt upper cover, doing its bolts to 10Nm, bearing in mind the hassle with the power steering assembly. Refit the drive belt cover(s), refill the power steering fluid [0.13] if you have lost too much during its reassembly and check your oil.

27) Go for a spin!