

Timing Belt Replacement – Volvo D3 – 110i

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- Serpentine alternator belt – 30731809 Optional
- Timing belt kit – 31359568 includes belt plus idler & tensioner pulley
- Crankshaft nut – 3531111 Optional, recommended
- Vibration damper bolts (flange screw, M10x30) – 4 – 975101 Optional, recommended
- Crankshaft holding tool – 9995433 This is a Volvo part number available in Europe that is not available in the US; the US part number is 885819 with a slightly different configuration, approximately \$280. However, Google 9995433 Volvo and several vendors will pop up that sell an equivalent tool. I purchased mine at FreedomRacing.com for \$50 plus freight.
- 30 mm socket, ½” drive
- Torx T60 socket or wrench
- 6mm allen wrench
- Breaker bar – 24 inches
- Torque wrench – 25 to 65 foot pound range
- Torque wrench – 250 foot pound capability, ½” drive
- Torque multiplier – not an absolute requirement but highly recommended
- assorted hand tools
- Advil – for the headache you will get leaning over the front of the engine

Torque Values

idler pulley – 18 ft lb

tensioner pulley – 20 ft lb

harmonic balancer (vibration dampner) – Stage 1 - 35 ft lb

Stage 2 - +50° *The general torque specs for an M10 bolt call for 37 ft lb.*

crankshaft nut – 220 ft lb

This project has a higher than normal degree of difficulty based on the number of steps, the high torque value of the crankshaft nut, the ability to align the timing marks due to the limited space, & if you screw up you could permanently damage the engine. Go into this with your eyes open.

Much information states that the timing belts themselves are virtually indestructible. In most instances it is a mechanical failure of one of the pulleys that causes a timing cam failure resulting in potential engine damage. In my case after 1400 engine hours the timing belt and belt tensioner pulley looked new. The idler pulley however was showing signs of bearing seal failure.

1. Remove the center shoulder bolt in the primary plastic guard at the front of the engine and disengage the tabs around the perimeter of the guard. Note: the belt cannot be changed by removing the small lower guard attached with two bolts, the harmonic balancer must be removed.
2. Use the T60 Torx to remove tension from the alternator serpentine belt tensioner. The tensioner has a hole that will allow a 4 mm pin (drill bit, punch, etc.) to be inserted to keep the tensioner retracted. Move the belt out of the way.

3. Use the 30 mm socket on the crankshaft nut to turn the shaft and align the lower timing mark on the crankshaft and camshaft timing mark to the upper notch on the housing. While you are rotating the crankshaft loosen the four bolts on the harmonic balancer. The lower timing mark probably will not be visible, however the harmonic balancer has a locator pin that roughly aligns with the timing mark on the crankshaft. This locator pin must be in the 12 o'clock position. When I had the upper & lower timing mark aligned I used a straight edge across the lower bolts on the timing gear and put a mark on the raw water pump mounting bracket to provide an additional reference point. I then wiped off the top of the timing gear on the crankshaft and with a magic marker marked one of the teeth and made a corresponding reference mark on the engine. Using these two primary marks after belt replacement I would know that the alignment of the crankshaft and camshaft was correct. I also marked several different reference points used to verify position during assembly.
4. With the 30 mil socket and breaker bar holding the crankshaft steady remove the 4 bolts on the harmonic balancer. Bolt the crankshaft holding tool onto the harmonic balancer with the handle pointing to the port side of the boat at 90°. Lay three 2 x 4 wood blocks or equal on the frame rail of the engine for the handle of the crankshaft holding tool to bear against. Using the breaker bar loosen the crankshaft nut. Removing the nut was a difficult task due to the torque value, if you have a torque multiplier available USE IT HERE. You may be able to do this step without using the wood blocks allowing the handle of the crankshaft holding tool to bear against the frame rail.
5. Reset the timing marks; remove the belt tensioner and idler pulley.
6. Remove the 4 bolts retaining the crankshaft holding tool. Use the 30 mil socket to hold the crank if the bolts are reluctant to come out freely. Remove the crankshaft nut.
7. If the harmonic balancer does not come off use a plastic mallet and lightly tap around circumference repeatedly until you can work it off. Remove the timing belt.
8. Inspect the fresh water pump while it is accessible.
9. Replace the idler and belt tensioner pulleys. Finger tighten the belt tensioner pulley.
10. Verify the timing marks are correct, fit the timing belt around the starboard side of engine across the idler pulley and over the camshaft pulley then around the water pump and belt tensioner. The timing marks should be aligned.
11. Using a 6mm allen wrench turn the belt tensioner counterclockwise until the indicator bar is at the 12 to 1pm position and tighten the pulley. Press on the timing belt, verify the tension indicator moves.
12. Bolt the harmonic balancer on with the 4 bolts and tighten the crankshaft nut just past finger tight. Rotate the crankshaft 4 revolutions to verify that there is no internal engine interferences, verify the timing marks are still aligned. Remove the 4 bolts on the harmonic balancer, install the crankshaft holding tool at a downward angle hooking the handle under the angle welded on the frame, rotate the crankshaft slightly if necessary. See photo.
13. Use a torque wrench and torque multiplier if available to tighten the crankshaft nut to the correct torque.
14. Remove the crankshaft holding tool, reinstall the 4 harmonic balancer bolts to the correct torque.
15. Reinstall or replace the alternator belt.
16. Test the engine, replace the outer timing cover.

There are some things on the Amel that provide an owner the opportunity to ponder WHY. In this case it seems someone at Amel recognized the difficulty in removing and particularly tightening crankshaft nut. To aid in this process a short piece of angle was welded onto the angle iron engine mounting frame allowing this specific crankshaft holding tool to be utilized, I do not believe this piece of angle has any other purpose. Without this seemingly minor addition this project would have been considerably more difficult.

Mark Mueller
A54 Brass Ring