Appendix B
A Step-by-Step Guide to Changing the Front Oil Seals on the Volvo B-230 Engine

When replacing the timing belt, check to see that there are no oil leaks around any of the pulleys. If no leaks, you may skip oil seal replacement. The standard recommendation is to replace the oil seals every other time the timing belt is changed. Some people replace everything as a matter of course, every time. It's up to you.

Keep old timing belt for use per **Figure B2** and **B3**.

This guide is for those of you who have chosen to replace the front oil seals.

> Oil seals from a Volvo dealer are expensive. IPD (www.ipdusa.com) sells oil seals that are reasonably priced. And, so far, they have worked for me.

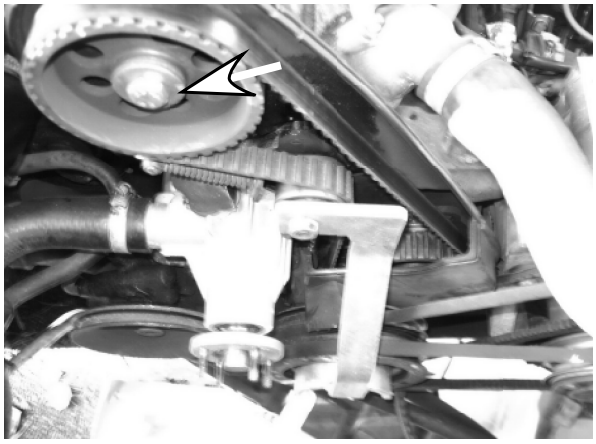


Figure B1. At the same time that you're loosening the crankshaft bolt (using the Volvo 5284 crankshaft holder tool), loosen the 17 mm bolt (arrow) on the overhead camshaft.

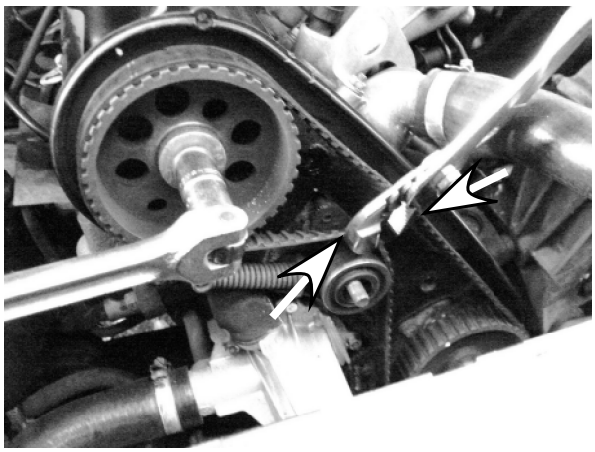


Figure B2. Or, if you forgot, you can grip both sides (arrows) of the *old* belt near the tensioner with large pliers. Simultaneously, use a long-handled wrench to break free the 17 mm bolt.

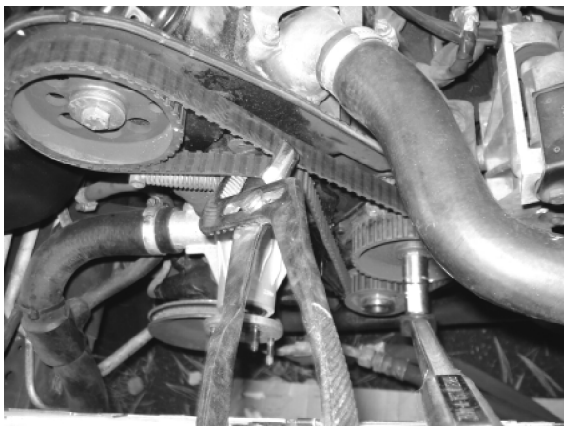


Figure B3. Similarly for the intermediate shaft bolt. Hold the *old* belt tight with large pliers while breaking the 17 mm bolt free.

Figure B4. Both the overhead camshaft and intermediate shaft gears are keyed and can only go on one way. You may wish to mark each with an “o” and “i,” respectively, to distinguish them.

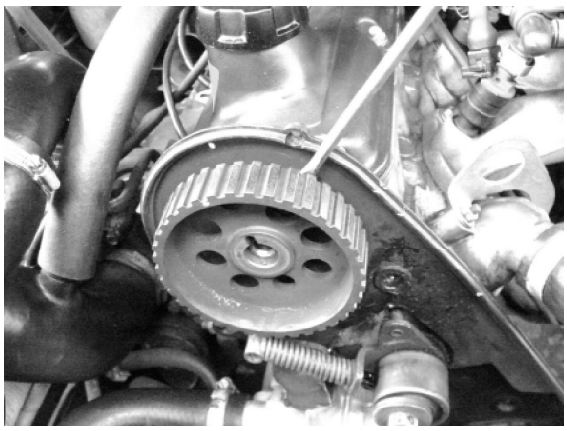
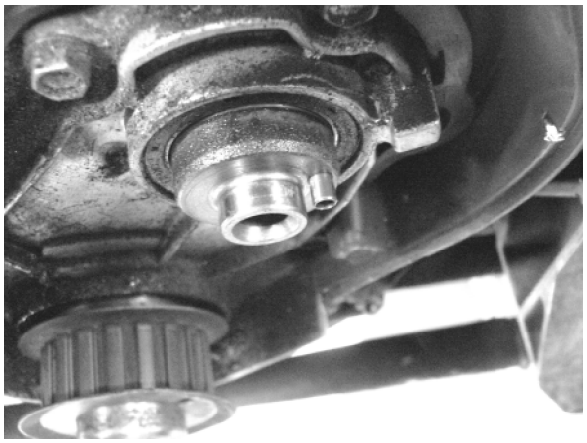


Figure B5. Gently pry around perimeter of both the overhead camshaft and intermediate shaft gears using a flat-bladed screwdriver. Pull pulleys off.

(a)



(b)

Figure B6. Pulleys off. **(a)** Overhead camshaft, with 2 mm thick spacer. **(b)** Intermediate shaft, no spacer. Pay attention if your engine has spacers behind the overhead camshaft and intermediate shaft pulleys. Some cars don't.

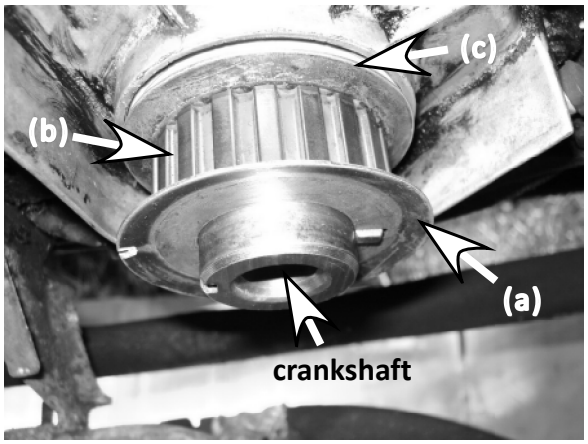


Figure B7. The crankshaft pulley should already have been removed. Now, slide off the front crankshaft shim [arrow **(a)**, which has two notches, one on the outer circumference for marking Top Dead Center (TDC) and one on the inner circumference for locking onto the knob of the crankshaft pulley boss **(b)**]. The rear crankshaft shim **(c)** does not lock onto anything. Note that for both shims, the concave sides face away from the timing belt. All three pieces should slide off the crankshaft easily. (Well, you might have to pry the pulley boss off gently with small flat-bladed screwdriver.)

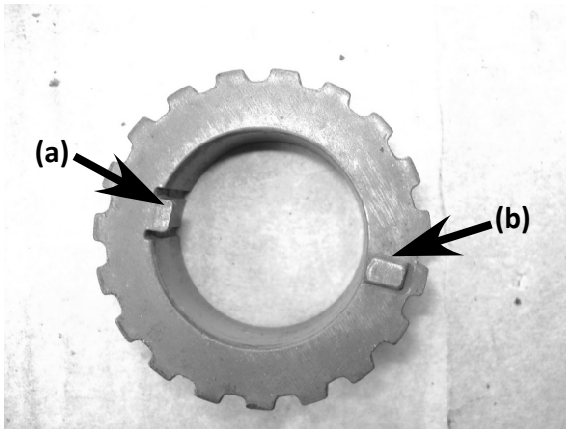


Figure B8. Front of crankshaft pulley boss. Arrow **(a)** points to ridge that locks onto groove in crankshaft. Arrow **(b)** is the knob where front crankshaft shim and crankshaft pulley locks onto.

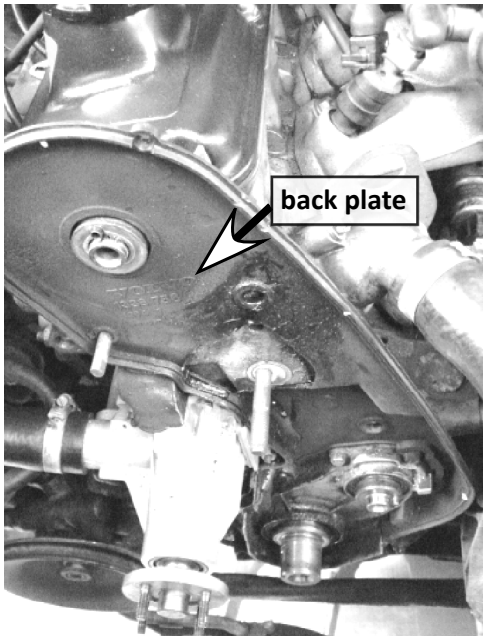
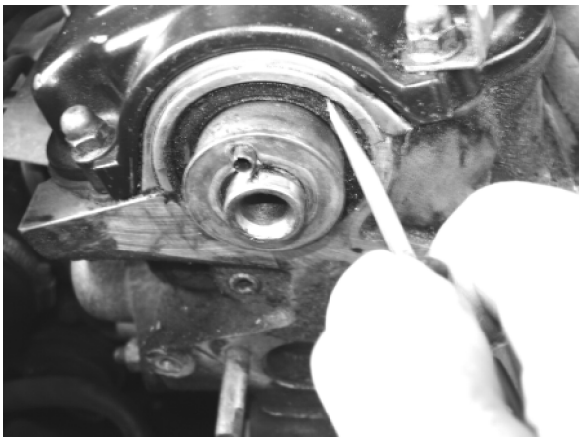


Figure B9. This photo shows all three shafts with the pulleys off. Pull off the back plate to expose the overhead camshaft seal.



(a)

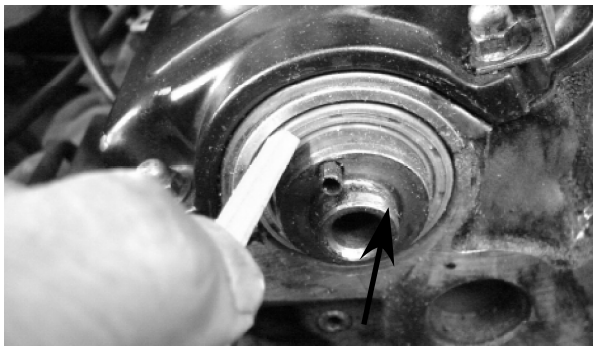
(b)

Figure B10. (a) Pry out the overhead camshaft seal with a small flat-bladed screwdriver, working diametrically opposite each pry point. Do the same for the intermediate shaft seal and crankshaft seal.

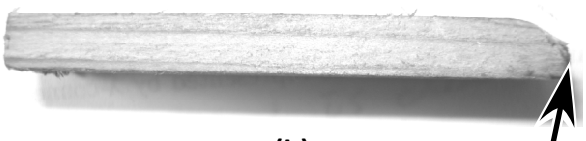
(b) The blade of the small screwdriver should be 3-4 mm in width. You may have to use a pick if you find yourself pushing the seal in. Worst case, as one reader discovered, resort to a seal puller.

Figure B11. Clean all shaft and related surfaces, including recesses where the seals sit, with solvent. Clean front of engine. Clean back plate. Deburr any rough shaft and recess surfaces with very fine sandpaper. Wipe clean.

Figure B12. The front surface of the seal is solid while the back is grooved. Rub Vaseline petroleum jelly on the inner circumference of each seal. For the outer circumference, put a spot of oil on a dry cloth. Then, use that cloth to lightly coat the outer circumference. The petroleum jelly will ensure that the shaft-to-seal surface is lubricated on engine start-up until normal engine oil gets there. The lightly oiled outer circumference will help in pressing the seal into the recess.



(a)

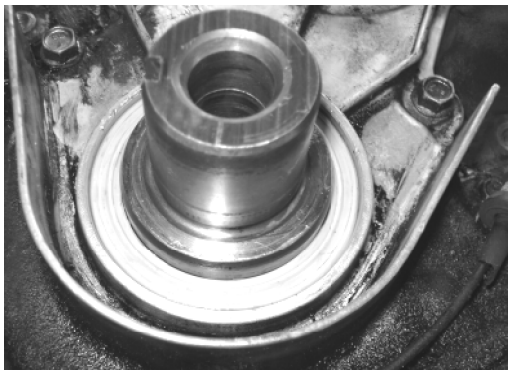


(b)

Figure B13. (a) Press each seal in by hand as far as possible. The seal should not seat by hand pressure alone. If it does, you've got too much oil on the outer circumference. Next, I fashioned a small piece of wood **(b)**, whose contact end was carved down to fit the seal. I used a regular hammer to pound on the opposite end of the wood. Be sure to tap diagonally across from the previous spot. If the seal doesn't move in when tapping, then you haven't put enough oil on the outer circumference. Set the seal in about 1.5 mm from the front edge of lip. Use your finger to feel around the recess for high points.

(a)

(b)



(c)

Figure B14. Photos of new seals installed on **(a)** overhead camshaft, **(b)** intermediate shaft, and **(c)** crankshaft.

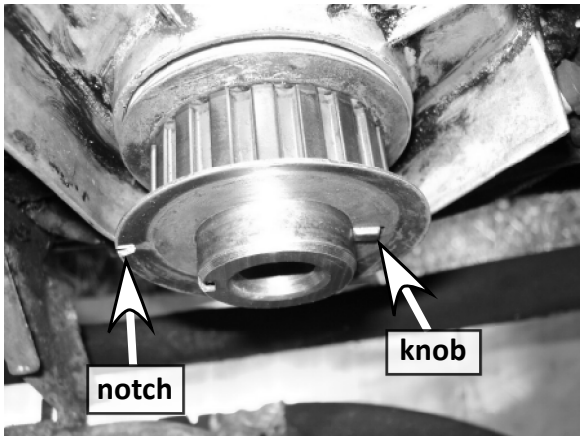


Figure B15. Put on the rear crankshaft shim, crankshaft pulley boss (with knob showing in front), and front crankshaft shim, as shown. The pulley boss has a ridge (see **Figure B8**) that aligns to the groove in the crankshaft. Remember, the concave sides of the shims face away from the timing belt (otherwise the shims will rub against the belt). Also note that the u-shaped notch (arrow, for aligning TDC) of the front shim is opposite the knob (arrow) on the pulley boss.

Tightening torque
- overhead camshaft bolt: 37 ft-lbs.
- intermediate shaft bolt: 37 ft-lbs.

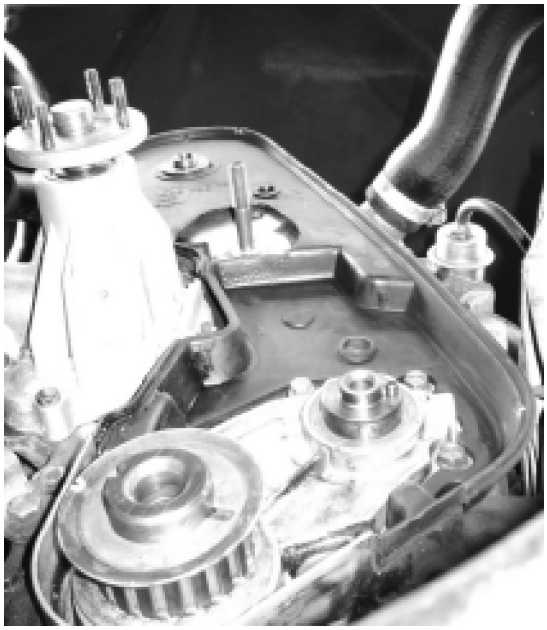


Figure B16. Once the new seals are installed, place the clean back plate in position, as shown.

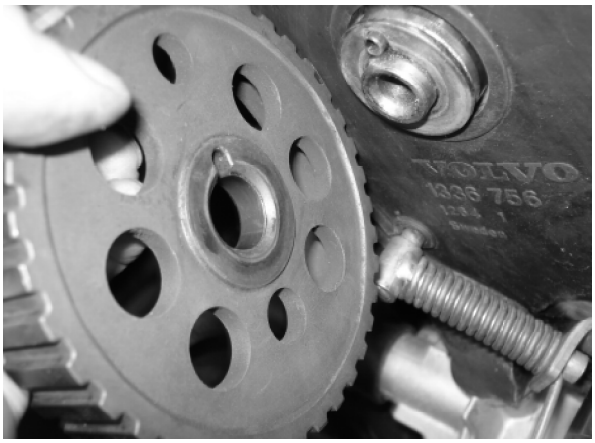


Figure B17. Install the overhead camshaft gear and intermediate shaft gear as shown, making sure the notch on back of each gear is locked onto the cylindrical key. Install the pulley bolts finger tight. You will need to set up resistance in order to properly torque the bolts.

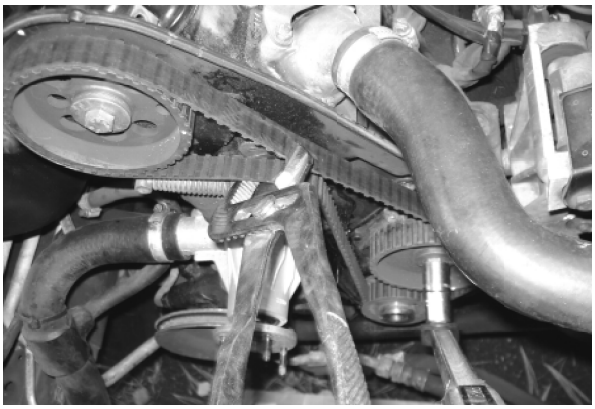
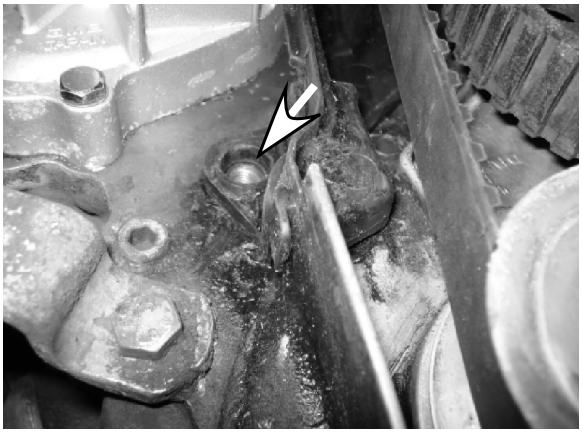


Figure B18. Install the tensioner roller. Slip on the *old* timing belt over all the pulleys. Use the large pliers to hold both the underside and upper side of the *old* belt as shown while you torque the intermediate shaft bolt to 37 ft-lbs. You can also torque the overhead camshaft bolt now using the same technique, or you can wait to do the overhead camshaft bolt when the crankshaft pulley holder is in place. Slip old timing belt off.



(a)

Figure B19. (a) Make sure that notch of lower left side of the back plate slips over the metal lip near crankshaft, as shown. Note hole (arrow) for 10 mm, 1.5" long bolt.
(b) This shows lower right side of back plate. Note hole (arrow) where the 12 mm, 1.5" long bolt goes. Refer to **Figure 12** in 740 timing belt guide.

(b)

All the front seals are now set. The overhead camshaft gear and intermediate shaft gear are in place, as well as the crankshaft pulley boss and shims. The intermediate shaft bolt has been torqued properly. The overhead camshaft bolt may or may not have been torqued yet. If not, be sure to torque it to 37 ft-lbs when you set up the crankshaft pulley holder to torque the crankshaft bolt.

This ends the instructions for replacing the front seals.

Go to **Figure 15**, in the main guide, to complete installation of the new timing belt.

Thanks go to the tech guys at IPD for some help with questions about seal replacement.