Volvo Timing Belt

A timing belt replacement on Volvo eight valve four cylinder engines is nice work if you can get it, for a number of reasons:

- This is not a complicated job.
- It doesn't take long to do, even with accessory belt removal.
- It doesn't require any special tooling purchases.
- The belt driven overhead cam four cylinder engine in our article has been used for years in Volvo cars, so there are a lot of them out there.
- The recommended replacement interval for these timing belts is between 45,000 and 50,000 miles, unlike many others recommending a 60,000 mile replacement interval, so you get to do them sooner.

Quick Tips

Here are some things to keep in mind before we start:

- **The accessory belt adjusters on our 1987 Volvo are of the "screw-jack" variety.** A long bolt is screwed against a stop to move the accessory and tension its drive belt. Then a pinch bolt (or in the case of the air conditioner compressor, two pinch bolts) holds the accessory tight. The threads on the adjustment bolts will corrode after time, and may freeze in their collars. Some penetrant on the threads before loosening or tightening of these bolts will keep you from snapping them in two. Some anti-seize compound on the threads will make the next belt adjustment a lot easier.
- **Be gentle with the cast crankshaft pulley**. Lay it somewhere it can't fall. Our host shop had a nasty experience that involved gravity and a concrete floor. When the pulley fell to the floor, both the outer lip of the pulley and the profit margin on that particular job were ruined.
- **Turbo models don't give you much room between the crankshaft pulley center bolt and the intercooler**. Since your impact won't fit in this narrow space, you'll have to improvise. We talked to a number of techs

about this particular problem and came up with three different approaches to removing the crankshaft nut.

• **One possibility is to drop the pan beneath the engine and use a swivel impact socket and an extension to remove the crankshaft bolt from below the car.**

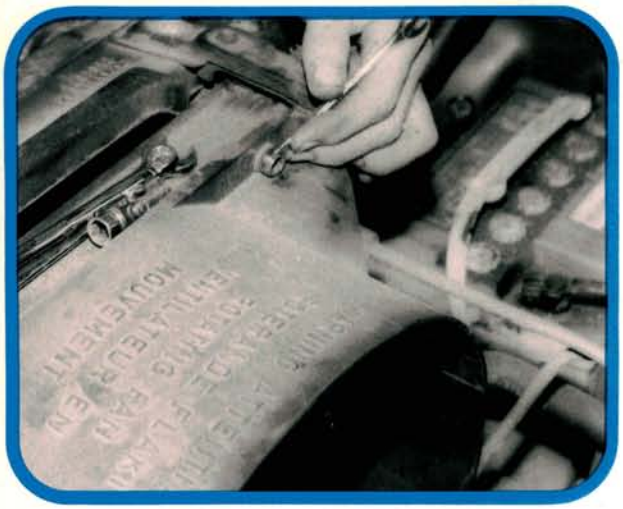
• **Another method is to remove number one spark plug and push a broken piece of fan belt through the plug hole with the piston just before TDC on the compression stroke.** Turn the crankshaft bolt with a socket and a breaker bar in a counterclockwise direction until the piston jams against the soft rubber belt. Then you can loosen the bolt.

• **One source didn't like either of the first two approaches at all.** He suggested that the use of a swivel and extension costs you a lot of torque, both removing and reinstalling the bolt. He was also a little doubtful about using the piston-to-crankshaft connection as a leverage point. Just to play it safe, he removes the turbo cooler and repositions the radiator so he can place his impact wrench and impact socket right on the crank bolt.

• **Most replacement belts have marks on them to help you line up the timing belt and sprockets.** This is especially helpful when you install the belt, since it will eliminate parallax error as you sight down on the sprocket marks from above.

• **Since we'll look at both old and new style belt and accessory set ups, we want to emphasize that photo captions numbered 15 through 19 are of an old style configuration.** We included these steps on the old style engine so you could note the main differences in the old and the new.

—By Ralph Birnbaum

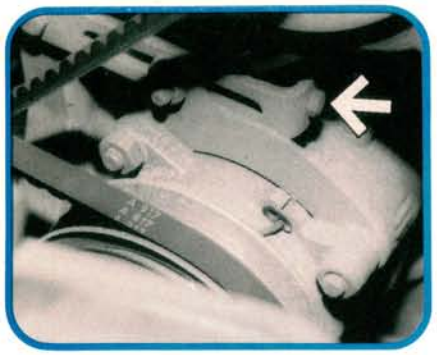


1

Remove the four nuts holding the fan blade to the water pump studs and lay the fan aside. Then remove the two screws holding the top of the radiator shroud to the radiator. Cut the tie wrap holding the air intake hose to the bottom of the shroud and remove the shroud.

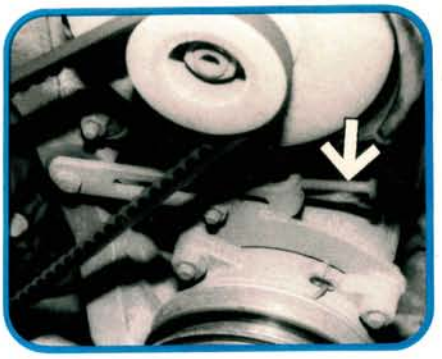
2

Remove the three bolts holding the upper timing belt cover to the engine. Don't forget the small phillips head screw that comes in from the backside of the inner cover. A stubby screwdriver works nicely. This screw is easy to miss if you're facing the engine.



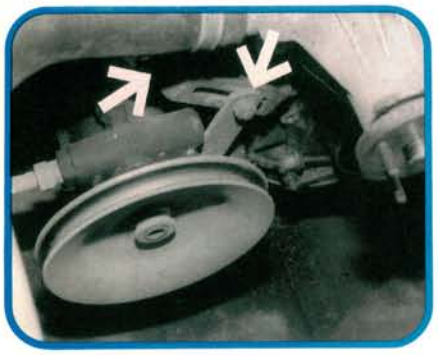
3

Here's one of those screw-jack adjusters used to tension the accessory belts. The alternator and power steering pump are held tight by one pinch bolt each, but the compressor in our photo is held by two bolts, one in front and one hidden on a rear support bracket beneath the alternator.



4

Loosen the pinch bolts on the support brackets and back off the tensioner bolt as shown. Swing the compressor toward the engine and remove the belt. The tensioner bolt for the alternator is located beneath it, just above the bolt for the compressor. Remove the alternator and compressor belts.

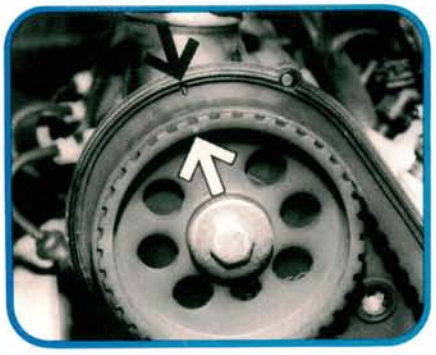


5

The screw tensioner for the power steering pump is directly below the water pump hose to the radiator. Loosen the pinch bolt in the support bracket (right arrow). Then back off the screw-jack tensioner bolt (left arrow) until you can remove the power steering belt.

6

If we take time now to set the engine for TDC on number one cylinder, we'll have everything properly timed to install the new belt. If the old belt isn't broken, turn the engine until the notch on the crankshaft pulley is aligned with the zero degree reference mark on the lower timing belt cover.



7

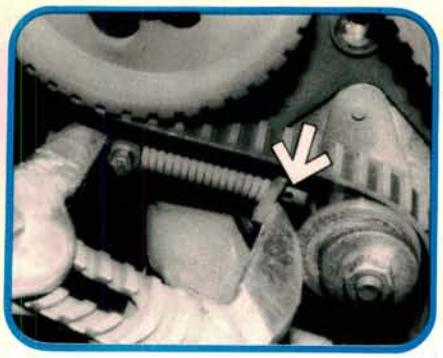
If you're not sure if you're on number one cylinder, look at these marks on the camshaft sprocket and inner cover. With the crankshaft "zeroed" these marks should align if you're on number one. If the belt has jumped a tooth, you'll have to remove the old belt and realign the camshaft.

8

Remove the crankshaft pulley bolt. You should be able to remove the pulley by hand, but don't get rambunctious. Hold the pulley with both hands as shown and wiggle it slightly as you pull it off. The pulley is heavy and if it comes off too easily, a hard tug may send your knuckles crashing into the radiator.

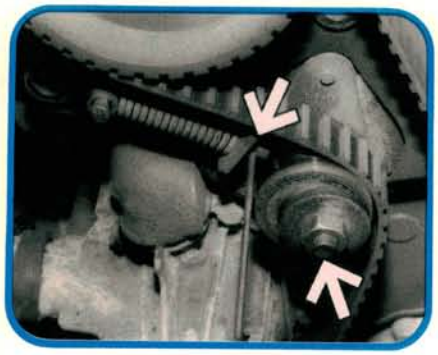
9

With the pulley out of the way, we can remove the lower timing belt cover. Loosen and remove the three bolts holding the cover in place. With the cover removed, you should see this baffle plate. Remove it but keep it handy so you won't forget it at reassembly.



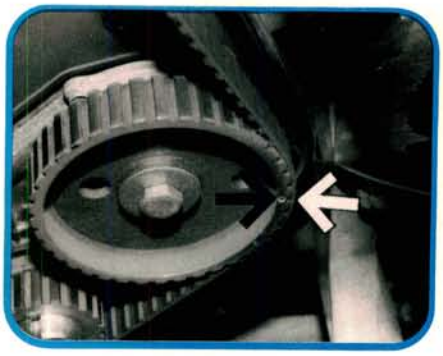
10

These fellows attack the tensioner with a wrench in each hand. They loosen the pivot bolt with one hand, and compress the tensioner spring with adjustable pliers in the other hand. They keep the spring compressed just long enough to retighten the pivot bolt. Once the bolt is tight, the tensioner stays out of the way.



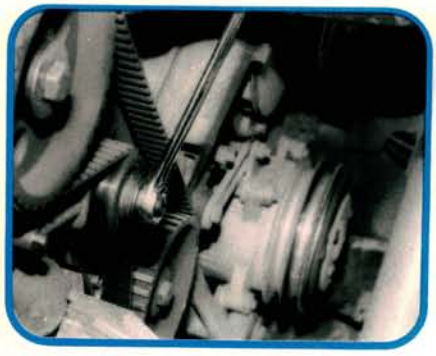
11

Another method is to loosen the tensioner pivot bolt. Grab your large adjustable pliers and compress the spring on the tensioner. Once you've compressed the spring, you'll see this drilling in the shaft. Slide a small allen key or drill bit into the hole to keep the spring compressed.



12

Remove the old belt. On older model engines with the distributor in the engine block, the intermediate shaft had to be timed as well. With the engine at TDC on number one, the intermediate shaft timing mark is at three o'clock and aligns with a mark on the inner timing belt cover.

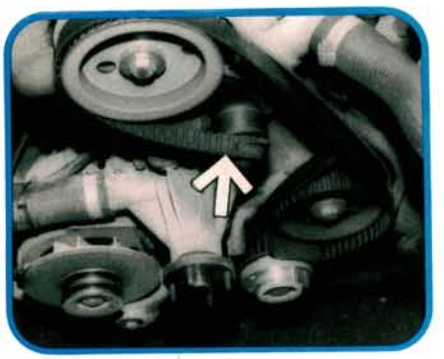


13

Keep the new belt pulled tight between the crankshaft and intermediate shaft sprockets, and also between the intermediate and camshaft sprockets. Loosen the tensioner bolt. Turn the engine over clockwise to let the tensioner settle and tighten the belt. Then retighten the pivot bolt.

14

Turn the engine to TDC on number one. Recheck the timing marks. (The installation marks on the belt won't help once you've turned the engine.) Check for a small amount of deflection at the center of the longest length of unsupported belt between the camshaft sprocket and the intermediate shaft sprocket.

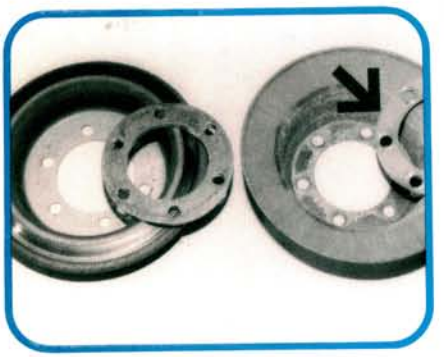


15

This customer went to the well once too often with this timing belt. The belt broke at about sixty thousand miles. This older style B21 engine has a one piece timing belt cover, and accessory belt adjustments for the alternator and power steering do not use those screw-jack adjusters.

16

My friend Bob knows what a broken timing belt sounds like when he cranks the engine. She turns over real easy. Since the belt on this engine was broken, he'll have to turn the cam and crankshaft to their proper timing marks separately. The valves won't interfere with the pistons.



17

Pre-1984 compressor belt adjustment is tedious. Volvo uses a split pulley and shims to tension the compressor belt. Adding shims between the pulley halves loosens the belt. Removing shims tightens it. Be sure there's at least one shim on the outside pulley half (arrow) beneath the bolt heads.

18

There's a third piece to the crankshaft pulley on the old style engines. This pulley sits closest to the engine. Note the six bolt holes. All pulleys and shims are held to the engine with four bolts, and two nuts on studs in the crankshaft. Also note the locator notch in the pulley (arrow).

19

We're emphasizing the locator notch for a good reason. This dowel pin in the crankshaft doesn't stick out very far. It's possible to miss it completely and still bolt the pulleys on the engine. The pulley assembly won't sit flat on the crankshaft, and will end up broken as a result.

20

It's not a bad idea to run the engine briefly before replacing all the belts and covers, just to be sure it's running quietly. Don't forget that baffle plate between the crankshaft sprocket and lower timing belt cover. Reinstall the timing belt covers and accessory belts in reverse order of removal.