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Installation Instructions

Cam Timing Tool

850 all, S/V/C70 1998 only
ipd #25.0039



SUGGESTED TOOLS

- 10mm, 12mm, 30mm sockets
- ratchet

SAFETY WARNINGS



- Always support the vehicle with jack stands before working underneath
- Use only the parts supplied by ipd to install this kit
- Check ALL the fasteners for tightness before and after road testing the vehicle
- Do not use air impact wrench when re-installing bolts as stripped threads may result

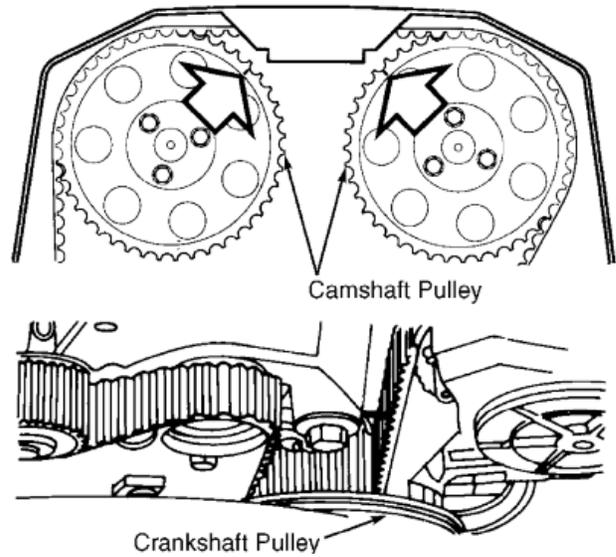
REMOVAL

- 1 Remove the 12mm bolt holding the front timing cover in place and remove the timing cover from the engine.

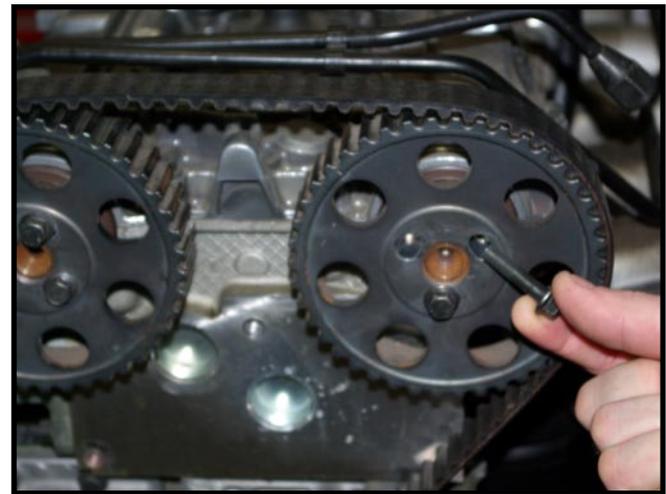
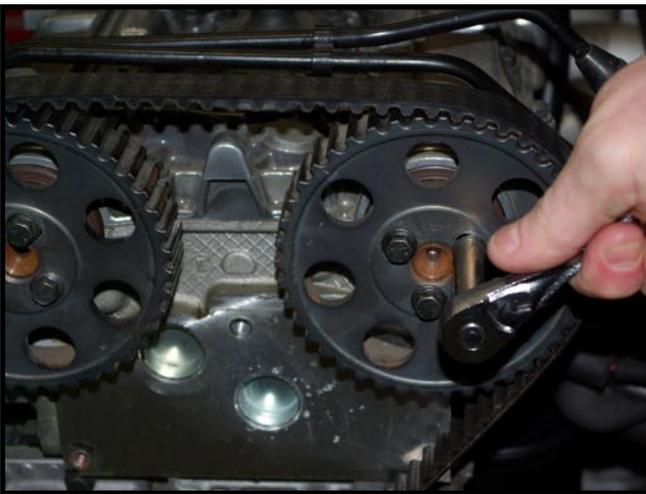


INSTALLATION

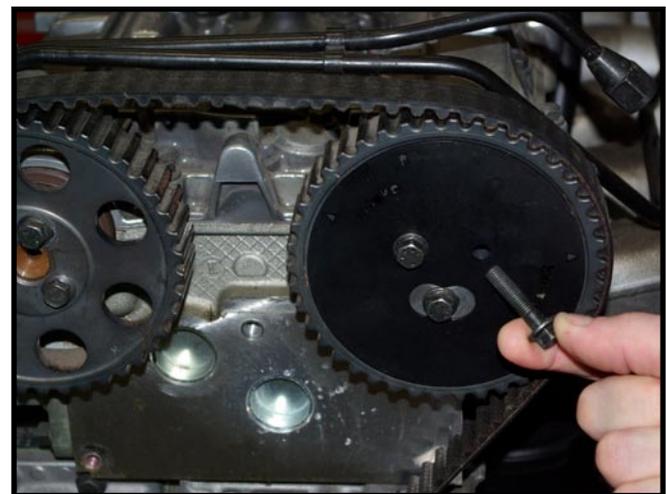
- Using a 30mm socket rotate the engine clockwise at the crank pulley nut until the factory cam gear marks line up with the corresponding top engine cover marks.



- Starting with the intake camshaft gear, remove two of the 10mm bolts from the cam gear as shown.

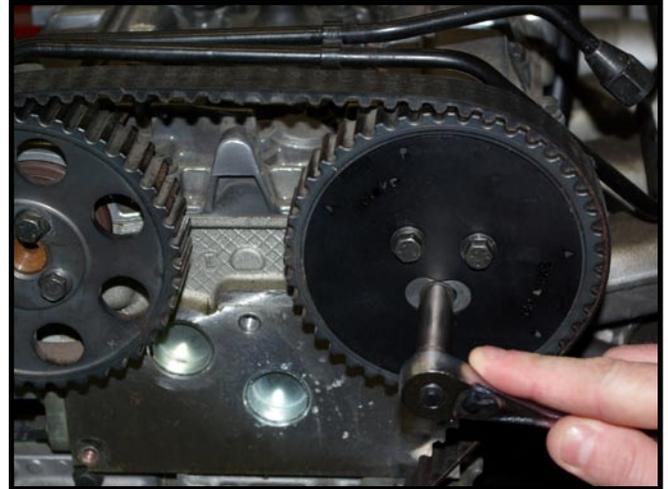


- Install the cam timing tool as shown with the graduation marks that are labeled "intake" aligned to the factory mark on the intake cam gear and reinstall the two 10mm bolts, screw the bolts in to take up the slack but do not tighten.

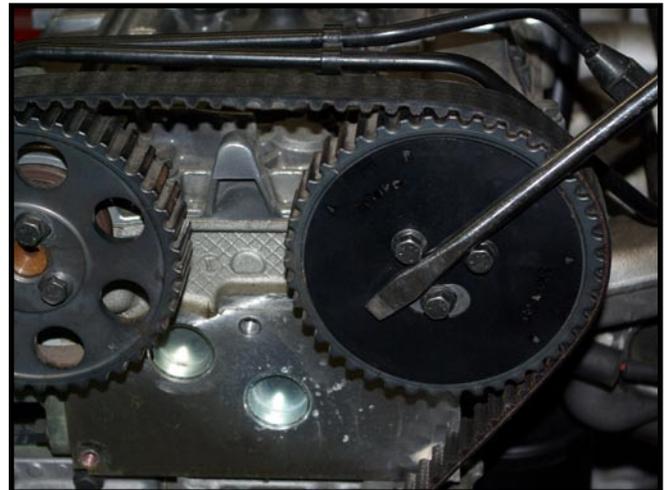


INSTALLATION

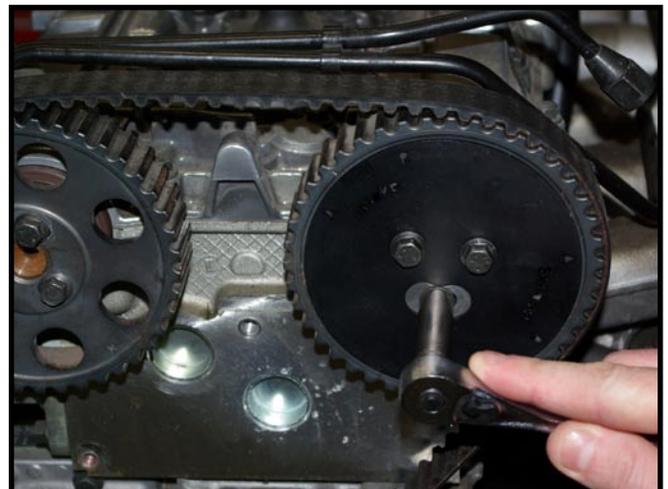
- 5 Loosen the remaining 10mm bolt as shown but do not remove it.



- 6 Rotate the cam shaft (not the cam sprocket) via the bolts as shown to either advance or retard the cam as desired based on the graduations on the cam timing tool. Each mark on the cam timing tool is 1 degree at the cam which equals 2 degrees as compared to crankshaft rotation.

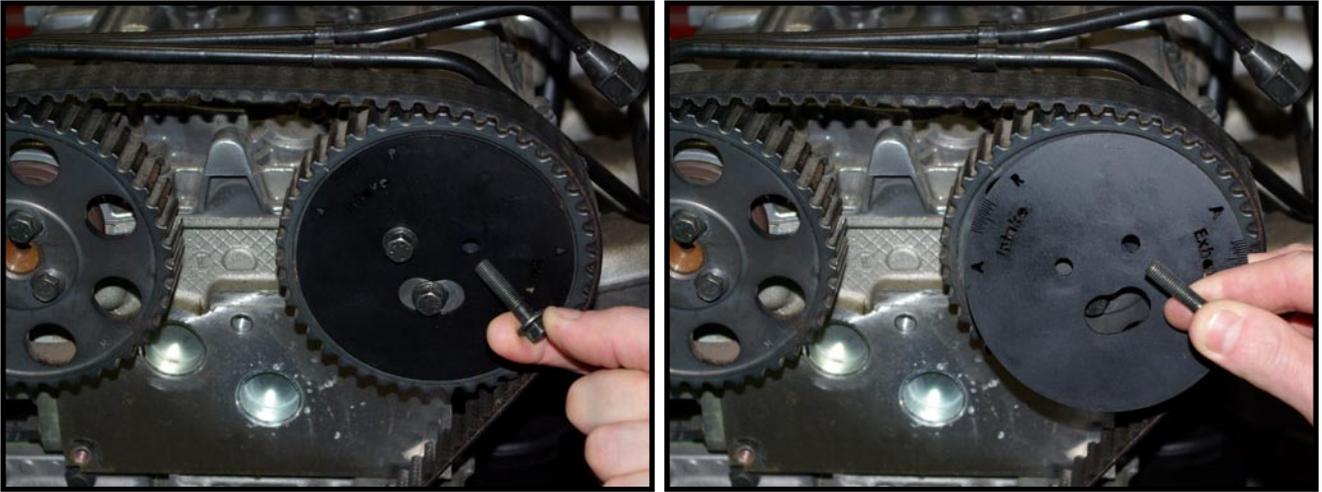


- 7 Once you have reached the setting that you desire (see the end of this instruction for suggestions on cam timing) tighten the cam gear bolt as shown to 15 ft/lbs.

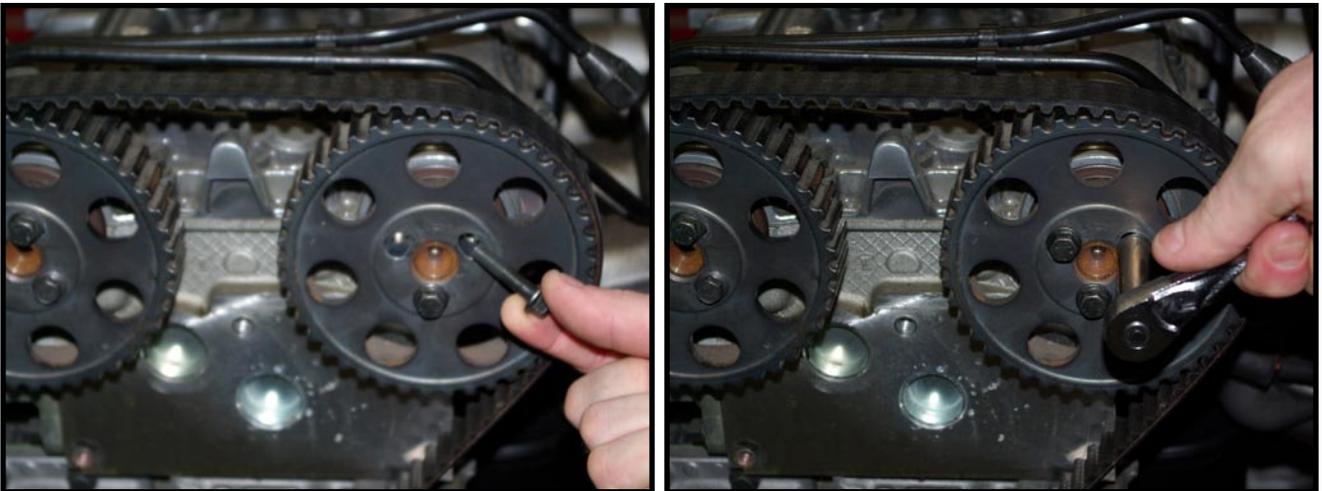


INSTALLATION

- 8** Remove the two 10mm bolts that held the cam timing tool to the cam gear and remove the tool.



- 9** Reinstall the two 10mm bolts to the cam gear and torque to 15 ft/lbs.



- 10** Repeat this process for the exhaust cam gear if desired. For exhaust cam timing, align the tools graduation marks as indicated by the scale labeled "exhaust" to the factory mark on the exhaust cam gear.

INSTALLATION

Cam Timing Suggestions:

For both turbo and non turbo engines cam timing can be adjusted such that each gears (intake and exhaust) are adjusted the same amount. I.E. both advanced or both retarded equally. When advancing both cams the same amount, the engines power band will be shifted so that the power band occurs earlier in the RPM range. When the cams are retarded the same amount the power band will be shifted later in the RPM range.

For turbo engines:

Generally turbocharged engines will have very little overlap. Overlap is defined as the period where the exhaust and intake valves are open at the same time during the exhaust stroke. In most instances turbocharged engines will perform best with minimal overlap. To reduce overlap, advance the exhaust cam and retard the intake came. For more overlap, retard the exhaust cam and advance the intake cam. Certain engine modifications to turbocharged cars can create a situation where more overlap can be desirable. These modifications are generally anything that effects exhaust back pressure or intake restriction. For instance; larger turbocharger, higher flowing downpipe and cat back exhaust or higher flowing intakes, intercoolers, or porting/polishing of the intake manifold.

A popular upgrade to Volvo 5 cylinder turbocharged engines, without variable valve timing, is to replace either one or both of the factory camshafts with camshafts from a non turbo engine of the same family. These non turbo cam shafts have more lift (total valve opening) and longer duration (total time the valve is open). Non turbo intake camshafts have 0.020 inch more lift and 7 degrees more camshaft duration. The non turbo intake cam also starts its opening 4 degrees sooner than the turbo camshafts. So if a non turbo intake camshaft were to be used in a turbocharged engine, and the same overlap were desired, then the intake cam would need to be retarded by 4 degrees from the factory base setting.

Non turbo exhaust cam shafts have 0.014 inch more lift (total valve opening) and 3 degrees longer duration (total time the valve is open). The non turbo exhaust cams start opening 2 degrees later than the turbo cam shaft. So to maintain the same overlap, a non turbo exhaust cam in a turbocharged engine would need to be advanced 5 degrees from the factory base setting.

For non turbo engines:

Non turbo engines generally have more overlap than a turbo charged engine. The reason for this overlap is to take advantage of what is referred to as "cylinder flushing". By having both the exhaust valve and intake valve open at the same time, the incoming intake charge effectively helps to push out the exhaust gasses and promote cylinder filling. The proper amount of overlap can be tricky to determine especially as engine modifications are added. The lower the exhaust backpressure and higher the intake flow, the more overlap can be increased to promote engine performance. For the most part there is no single answer and some experimentation is required.

***NOTE:** Anytime cam shaft timing is adjusted it is imperative that the engine be slowly rotated over twice by hand (via the 30mm crankshaft nut) to confirm that there is no valve to piston interference. While this interference is unlikely, the age of these engines suggests that most have had the timing belt replaced and it is possible that the cam timing is not correct from previous service. If valve to piston contact is felt STOP IMMEDIATELY. Rotate the engine back to its factory alignment marks and recheck the cam timing to confirm it is set correctly. Valve to piston contact can cause expensive engine damage, be sure to take the above steps to avoid this possibility.

One Year Limited Warranty

ipd warrants to the original purchaser that the parts manufactured and/or sold by ipd (the Product) is free from defects in material and workmanship under normal use. ipd warrants that the Product will perform substantially in accordance with the specifications set forth in the documentation provided with it. The above express warranties are made for a period of the lesser of 12,000 miles or 12 months from the date the Product is installed in your vehicle.

Any improper use, operation beyond capacity, substitution of parts not approved by ipd in writing, any alteration or repair by others, or any removal, defacing or altering of the identification shall void this warranty. There is no warranty on high-performance or race related parts due to the nature of usage.

The purchaser shall notify ipd at 1-800-444-6473 of any defect within the warranty period no later than thirty (30) days after purchaser discovers the defect. Should any failure to conform to this warranty appear within the warranty period, ipd shall, on notification, correct the nonconformity at its option, either by repairing any defective part, or by making available, FOB ipd's plant, a repaired or replacement part. The purchaser must insure any defective item being returned because ipd does not assume risk of loss or damage while in transit. No payment or reimbursement shall be made for installation, removal, transportation or other charges. The remedies set forth in this instrument are exclusive, and the liability of ipd with respect to any sale shall not exceed the price of the product on which the liability is based.

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