

BLOCK AND WEDGE TIMING CHAIN RETAINER USER GUIDE

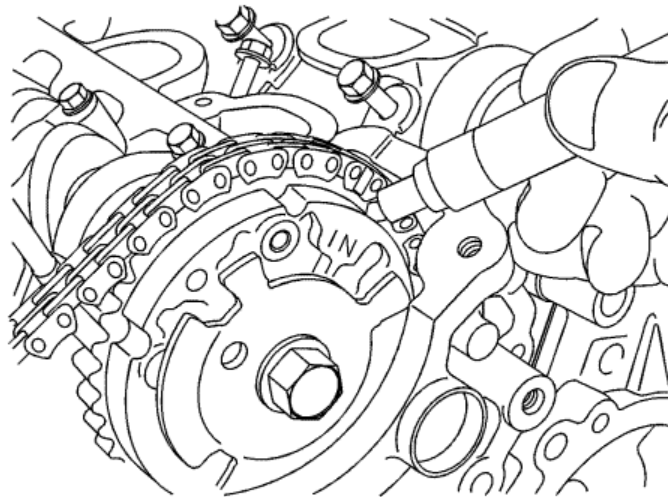
SIDI Camshaft Position Actuator Replacement

Removal Procedure

1. Remove the camshaft cover.
2. Remove the camshaft position actuator solenoid valve solenoid - intake.
3. Remove the intake camshaft position sensor.
4. Remove the exhaust camshaft position sensor.
5. Remove the camshaft position actuator solenoid valve solenoid - exhaust.
6. Rotate engine clockwise using crankshaft dampener retaining bolt until the flats at the rear ends of the camshafts are pointing up. This puts the camshafts on "base circle" and will reduce their tendency to rotate from valve spring pressure when the camshaft position actuators/drive chains are removed.

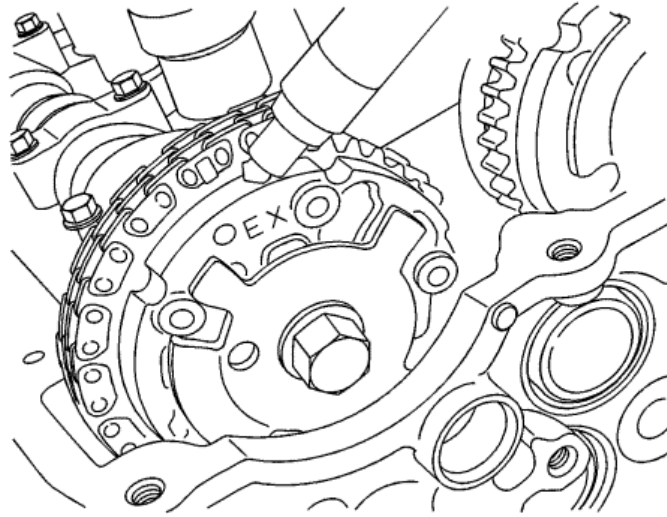
Note: Do NOT remove or back out the camshaft position actuator bolt(s) significantly, simply break them loose from their fully-torqued position. The position actuators must stay firmly attached until the retaining tools are in place, but they should be broken loose while the chain is still tight and in position.

7. Loosen intake and/or exhaust camshaft position actuator retaining bolts, depending on which camshaft position actuator and/or camshaft you will be servicing. If servicing both camshaft position actuators and/or camshafts, loosen both bolts.

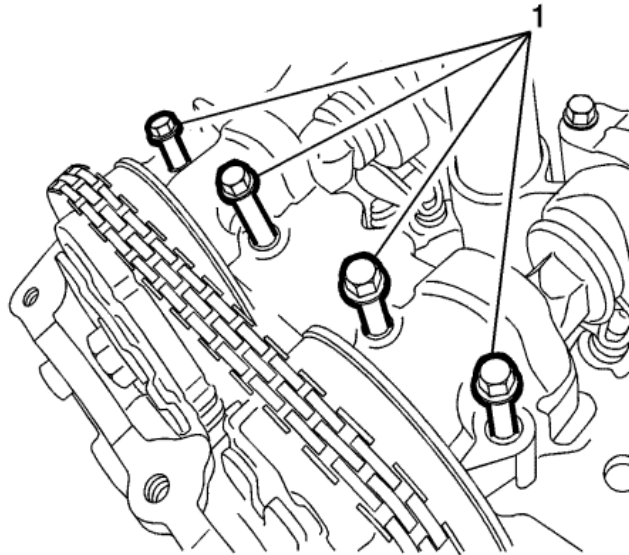


Note: Be certain to clearly mark the position of the chain to the camshaft position actuator(s). Though the engine does not need to be set to a specific timing mark before starting the procedure, the relationship of the chain to the actuator(s) is critical and must be re-established on assembly.

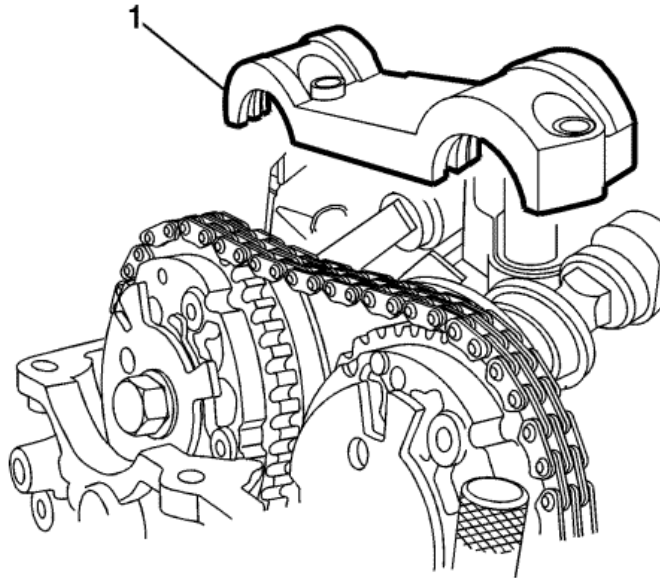
8. Mark the position of the chain to the camshaft position actuator - intake.



9. Mark the position of the chain to the camshaft position actuator - exhaust.

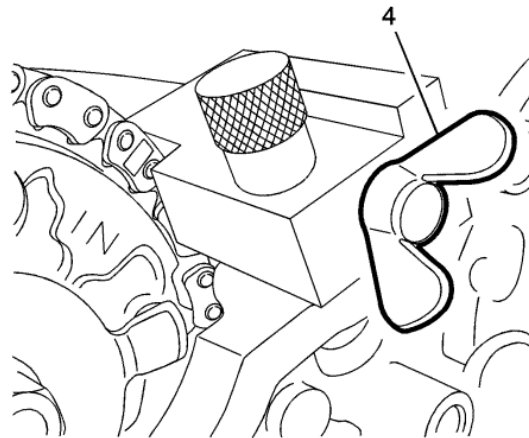


10. Remove camshaft front cap bolts (1).

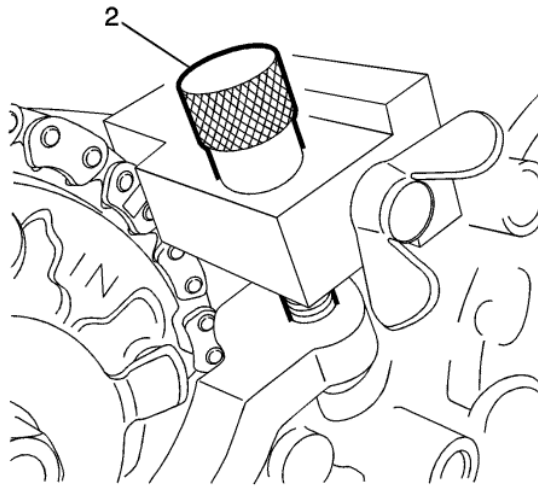


Note: Do NOT remove or loosen any other camshaft bearing caps at this time, even if you intend to eventually remove the camshaft.

11. Remove the camshaft front cap (1).

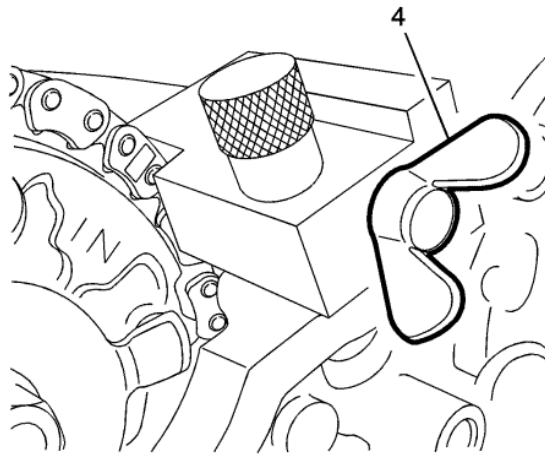


12. Loosen wing nut (4) to open the clamping area of EN49982-1 retainer.



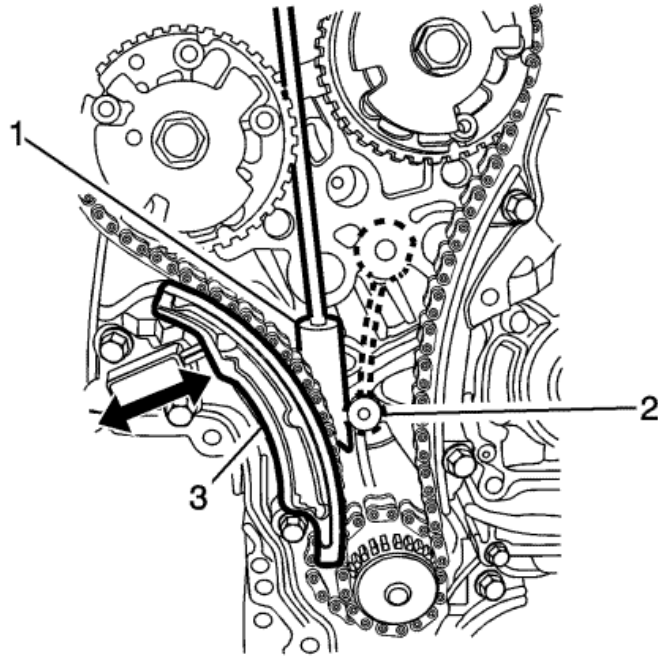
Note: Do NOT over tighten the thumbscrew. The block should be able to slide slightly via the slot the screw goes through. This fore/aft movement will allow easier removal and installation of the chain later.

13. Install block intake side chain holder onto front cover by screwing in the thumbscrew (2) on the block retainer finger-tight.



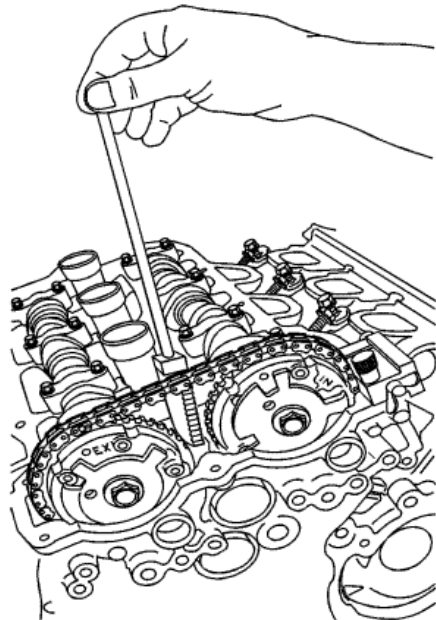
Note: Do NOT tighten the wing nut with a tool of any kind. Firm finger-tightening is sufficient.

14. Tighten wing nut (4) so block retainer closes over and firmly grasps the timing chain.

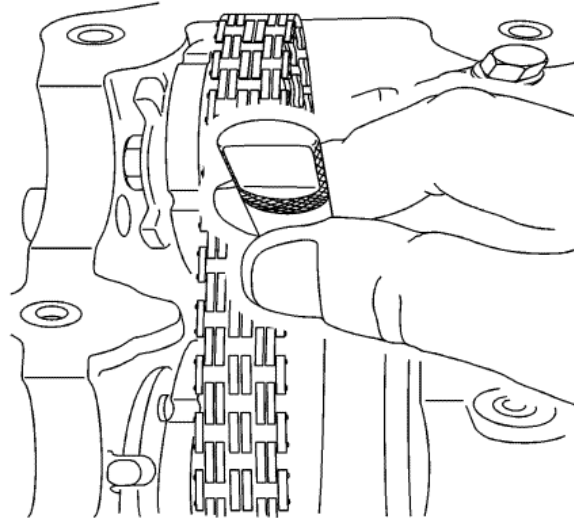


Note: The engine front cover is removed for clarity in the following graphics, but is NOT required to be removed to perform the procedure.

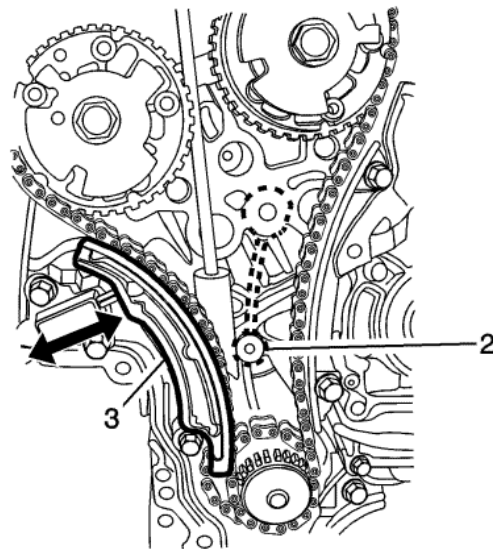
15. Wedge (1) will be installed in the following steps such that it wedges between an internal rib (2) that is cast into the inside of the front cover (shown in dotted line above) and the timing chain and spring-loaded tensioner shoe (3), holding the chain in position. The wedge will be left in place during the cam position actuator and/or camshaft service.



16. Insert the wedge between the two camshaft position actuators with the "teeth" on the wedge facing toward the front cover.

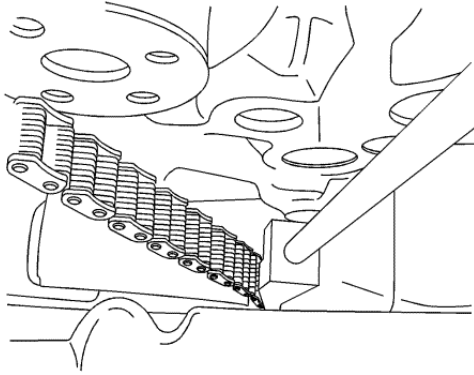


17. Once the rippled portion of the wedge is below the camshaft position actuators, rotate the wedge until the flat in the handle faces toward the intake camshaft position actuator. This orients the "teeth" toward the chain.

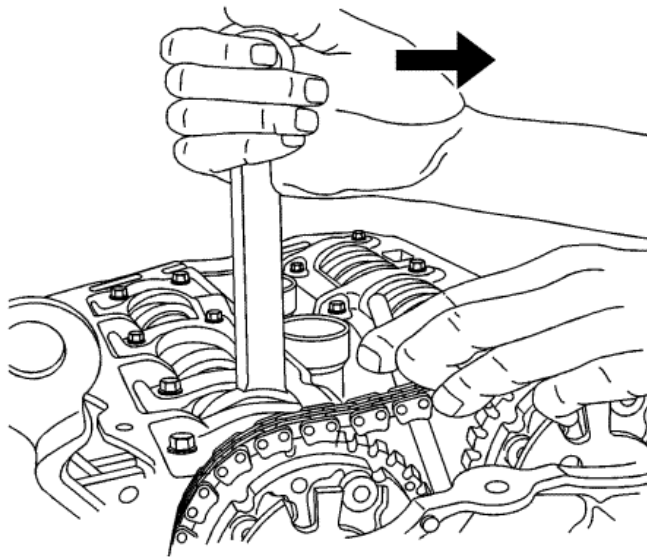


Note: Do not try to force the wedge into position, simply ensure it is loosely engaged in the timing chain and in the correct overall position.

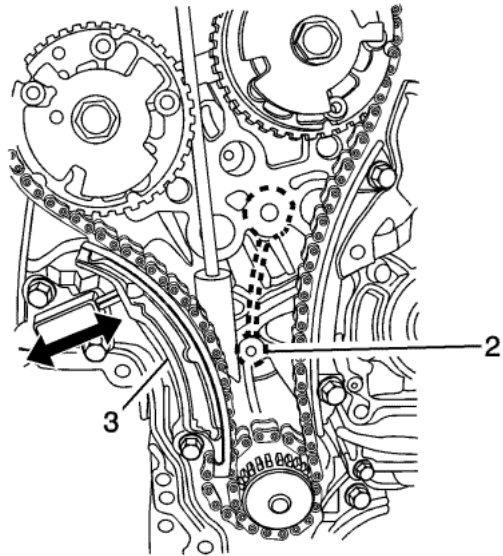
18. Drop the wedge down until it begins to engage the timing chain and the belt casting (2).



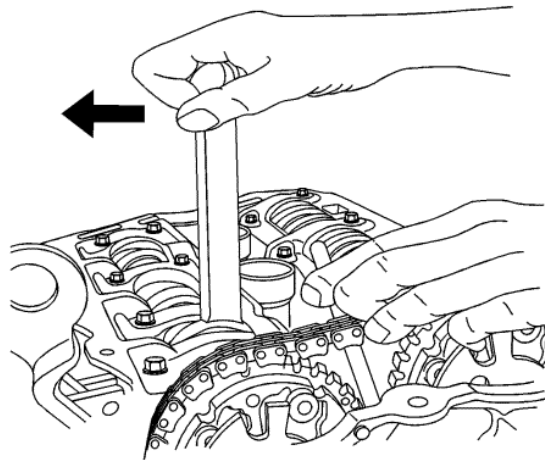
19. If possible, shine a strong light down from above, between the camshaft position actuators, and see the wedge in overall position as shown in the above graphic.



20. Using a 20 mm wrench on the cast hexagonal portion of the exhaust camshaft, rotate the camshaft toward the intake camshaft while pushing down on the handle of the wedge.

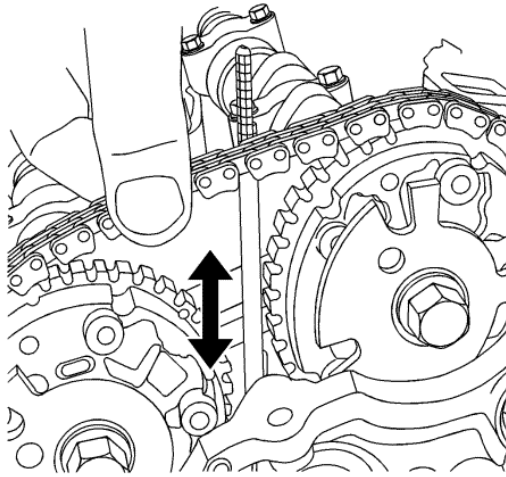


21. This rotation of the camshaft will compress the tensioner shoe (3) against the spring force of the tensioner, opening up a gap between the chain and the internal rib in the front cover. The wedge will then drop into this gap. You will feel a distinct click as the teeth engage the chain.

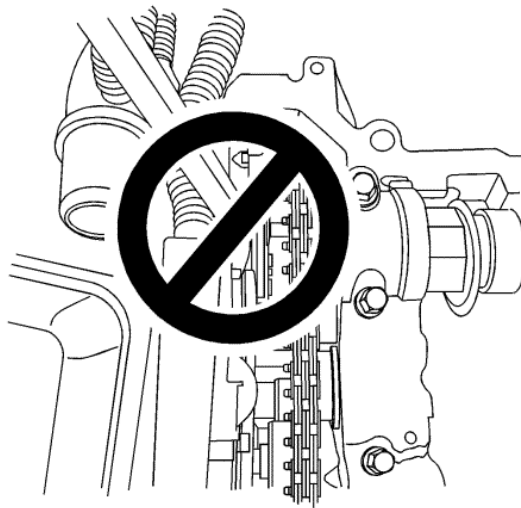


Caution: Be sure the EN49982-2 is captured firmly as described before continuing. This is critical to ensuring the camshaft drive chains stay properly timed.

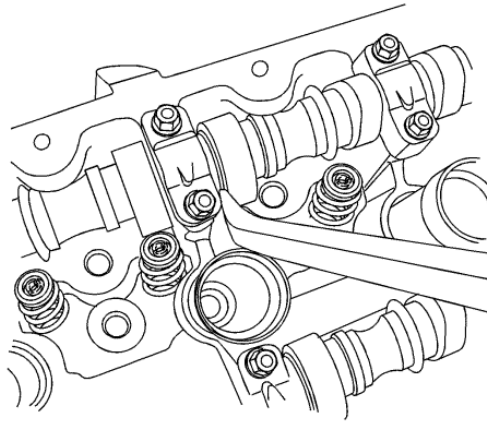
22. Release the force on the wrench, allowing the spring tension to close the tensioner shoe against the rippled portion of the wedge. You should be able to lightly tug on the wedge and it should stay in position. Repeat Steps 20 and 21 if necessary to re-insert the wedge until you are certain it is in position and will stay in position.



23. With the wedge in position and with the 20 mm wrench removed, there should now be some slack in the timing drive chain as indicated in the graphics shown.

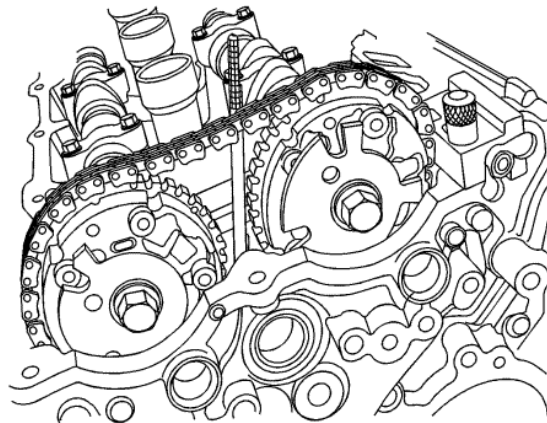


24. Do not prise against the face of the camshaft position actuators or the position actuator retaining bolt.



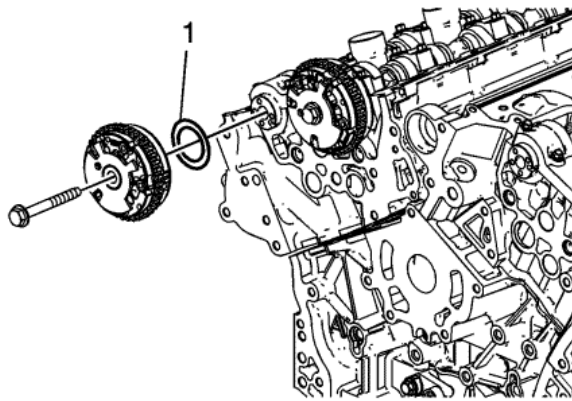
Caution: Do not prise against the face of the camshaft position actuators or the position actuator retaining bolts as the position actuators will be damaged.

25. Position a screwdriver or small pry bar between a camshaft cap and camshaft lobe. Carefully move/prise the camshafts as far as possible toward the rear/flywheel end of the engine.

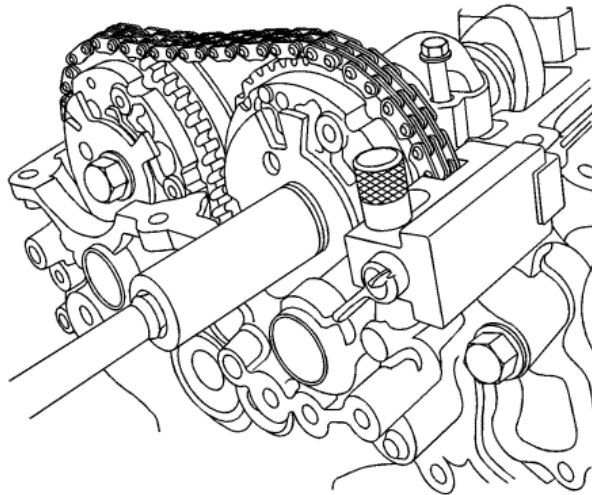


Note: Do not move or disturb the EN49982 retainer components after their installation or the timing chains may be lost inside the front cover.

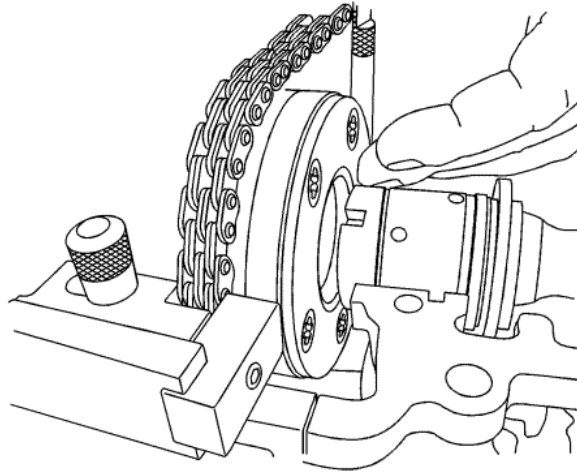
26. The block and wedge should be in position as shown, they must be left in position during the servicing of the camshaft position actuator(s) and/or camshaft(s).



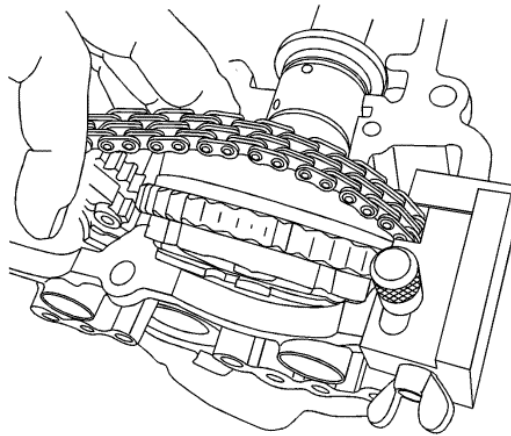
27. Remove and capture the plastic thrust washers (1) in the following steps. Ensure the plastic thrust washer does not fall into the front cover area.



28. To remove the intake camshaft position actuator, remove the loosened retaining bolt. To remove only the exhaust camshaft position actuator, skip the steps for removing the intake camshaft position actuator. However, the block **MUST** be installed as discussed even if the intake side will not be serviced or the timing of the camshaft chains will be lost.



29. Slide the camshaft position actuator forward and off the end of the intake camshaft. The slot in the block will allow the tool to move forward enough to disengage the camshaft position actuator from the front of the camshaft. Remove the plastic thrust washer when removing the camshaft position actuator from the end of the camshaft.

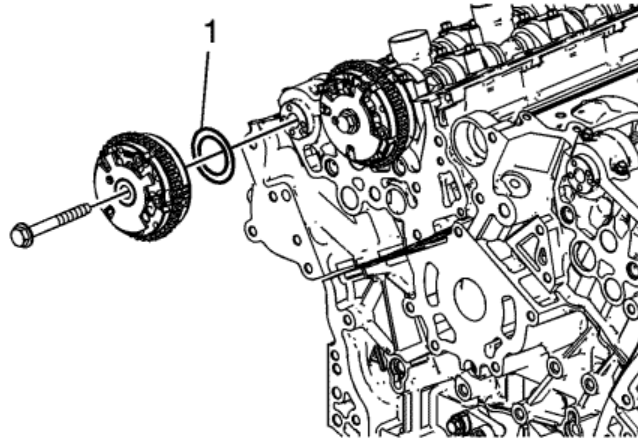


30. Tilt the camshaft position actuator forward and out/away from the engine.

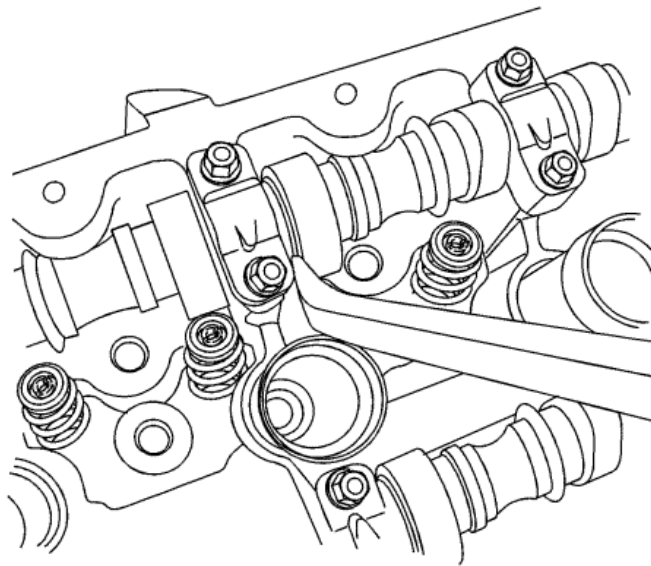
Note: DO NOT remove the EN49982 retainers . They are holding the cam chains to maintain their properly-timed positions.

31. Allow the chain to rest on the block and wedge in position during service

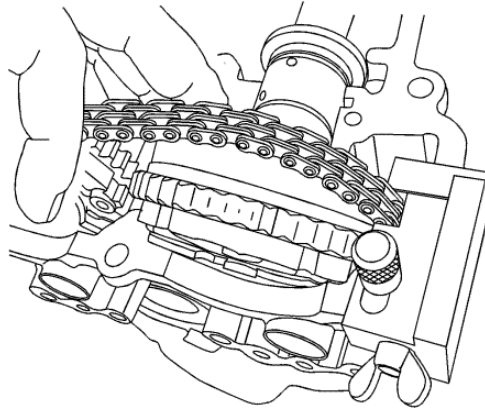
Installation Procedure



1. Install the plastic camshaft position actuator thrust washer (1) between cylinder head face and camshaft position actuator on assembly.

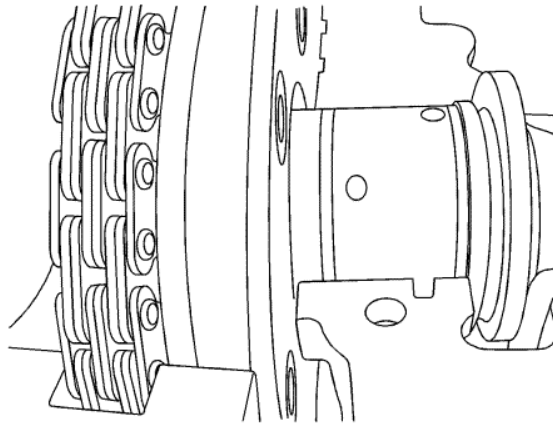


2. It may help to carefully prise the camshaft forward and to move the block backward via the slot to re-engage the position actuator to the camshaft. The dowel pin on the camshaft position actuator must be aligned with the slot in the camshaft nose for reassembly.

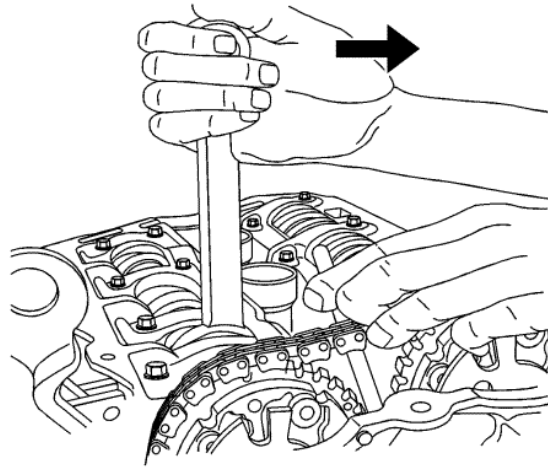


Note: Ensure the plastic thrust washer is in place before installing the actuator.

3. Install the intake camshaft position actuator first by inserting the actuator between the timing chain and front cover. Tilt the actuator in and engage the chain while aligning the marks you made on the chain and position actuator.



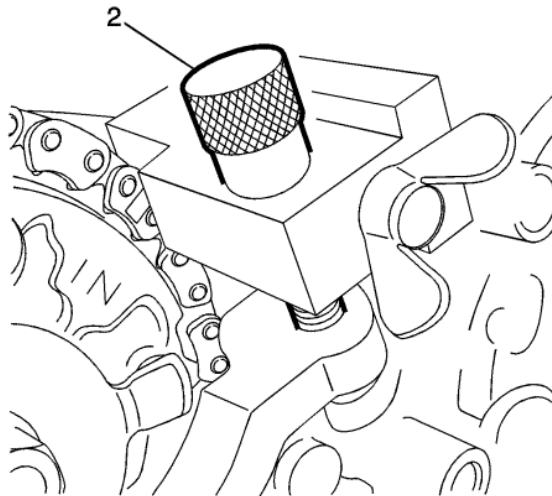
4. Ensure the camshaft position actuator fits snugly to the end of the camshaft.
5. Install the intake camshaft position actuator retaining bolt, and lightly tighten the bolt to hold the camshaft actuator in place. DO NOT torque at this time.
6. Install the exhaust camshaft position actuator retaining bolt, and lightly tighten the bolt to hold the camshaft actuator in place. DO NOT torque at this time.
7. Double-check the marks on both the intake and exhaust camshaft position actuators to ensure that they are aligned with their respective paint marks on the chain.



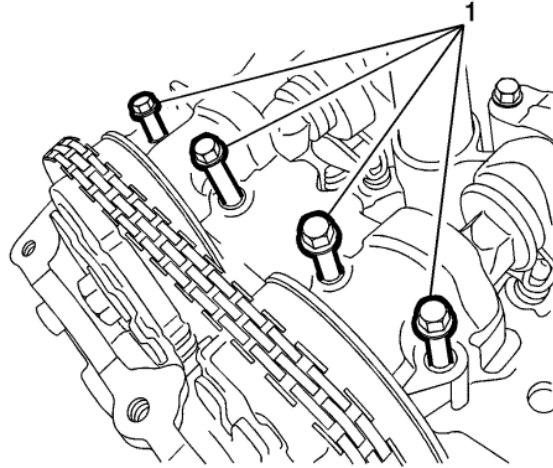
8. Using a 20 mm wrench on the cast hexagonal portion of the exhaust camshaft, rotate the camshaft clockwise while pulling up on the handle of the wedge.
9. Remove the wedge.
10. Release the pressure on the wrench. The timing chain should now be tight and should lose the slack the wedge was providing.

Note: Double-check the marks on the camshaft position actuators and chains to ensure they are correct.

11. Torque one or both camshaft position actuator retaining bolts to 58 N-m (43 lb ft).



12. Unscrew the wing nut on the block to release the timing chain, and then remove it from the front cover by unscrewing the thumbscrew (2).



13. Install camshaft front cap and bolts (1).
14. Tighten the camshaft front cap outer bolts to 10 N·m (89 lb in).
15. Tighten the camshaft front cap inner bolts to 10 N·m (89 lb in).
16. Install the camshaft position actuator solenoid valve solenoid - exhaust.
17. Install the camshaft position actuator solenoid valve solenoid-intake.
18. Install the intake camshaft position sensors.
19. Install the exhaust camshaft position sensor.
20. Install the camshaft cover.