

2013 Chevrolet Colorado

Submodel: | **Engine Type:** | **Liters:**
Fuel Delivery: | **Fuel:**

The camshaft (CMP) actuator system enables the engine control module (ECM) to change camshaft timing of all camshafts while the engine is running. The CMP actuator assembly varies the camshaft position in response to directional changes in oil pressure. The CMP actuator solenoid valve controls the oil pressure that is applied to advance or retard a camshaft. Modifying camshaft timing under changing engine demand provides better balance between the following performance concerns:

- Engine power output
- Fuel economy
- Lower tailpipe emissions

The CMP actuator solenoid valve is controlled by the ECM. The crankshaft position (CKP) sensor and the CMP sensors are used to monitor changes in camshaft positions. The ECM uses the following information in order to calculate the desired camshaft positions:

- The engine speed
- The engine load
- The camshaft position (CMP) sensors
- The crankshaft position (CKP) sensor
- The manifold absolute pressure (MAP) sensor
- The throttle position (TP) sensors
- The barometric pressure (BARO)

Operation

The CMP actuator assembly has an outer housing that is driven by an engine timing chain. Inside the assembly is a rotor with fixed vanes that is attached to the camshaft. Oil pressure that is applied to the fixed vanes will rotate a specific camshaft in relationship to the crankshaft. The movement of the intake camshafts will advance the intake valve timing. The movement of the exhaust camshafts will retard the exhaust valve timing. When oil pressure is applied to the return side of the vanes, the camshafts will return to 0 crankshaft degrees, or top dead center (TDC). The CMP actuator solenoid valve directs the oil flow that controls the camshaft movement. The ECM commands the CMP solenoid to move the solenoid plunger and spool valve until oil flows from the advance passage. Oil flowing through the CMP actuator assembly from the CMP solenoid advance passage applies pressure to the advance side of the vanes in the CMP actuator assembly. When the camshaft position is retarded, the CMP actuator solenoid valve directs oil to flow into the CMP actuator assembly from the retard passage. The ECM can also command the CMP actuator solenoid valve to stop oil flow from both passages in order to hold the current camshaft position.

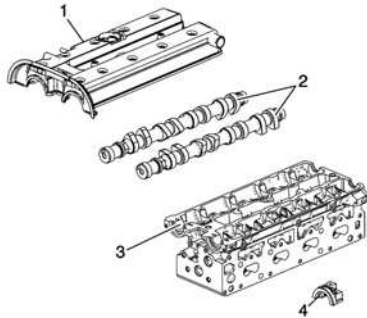
The ECM operates the CMP actuator solenoid valve by pulse width modulation (PWM) of the solenoid coil. The higher the PWM duty cycle, the larger the change in camshaft timing. The CMP actuator assembly also contains a lock pin that prevents movement between the outer housing and the rotor vane assembly. The lock pin is released by oil pressure before any movement in the CMP actuator assembly takes place. The ECM is continuously comparing CMP sensor inputs with CKP sensor input in order to monitor camshaft position and detect any system malfunctions. If a condition exists in either the intake or exhaust camshaft actuator system, the opposite bank, intake or exhaust, camshaft actuator will default to 0 crankshaft degrees.

CMP Actuator System Operation

Driving Condition	Change in Camshaft Position	Objective	Result
Idle	No Change	Minimize Valve Overlap	Stabilize Idle Speed
Light Engine Load	Retard Valve Timing	Decrease Valve Overlap	Stable Engine Output
Medium Engine Load	Advance Valve Timing	Increase Valve Overlap	Better Fuel Economy with Lower Emissions
Low to Medium RPM with Heavy Load	Advance Valve Timing	Advance Intake Valve Closing	Improve Low to Mid-range Torque
High RPM with Heavy Load	Retard Valve Timing	Retard Intake Valve Closing	Improve Engine Output

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1. Inspect and clean the following:
2. Inspect the camshaft journals and lobes (2) for wear or scoring.
3. Inspect the camshaft cover (1) for cracks or damage.
4. Inspect the camshaft housing to camshaft mating surfaces (3) for wear or scoring.
5. Inspect the camshaft rear cover sealing surface (4) for damage.
6. Clean the camshaft cover.
7. Clean the camshaft housing.
8. Clean the camshaft rear cover.
9. Wash the camshaft in solvent.
10. Oil the camshaft.

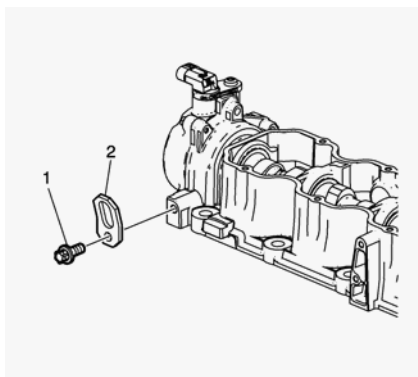
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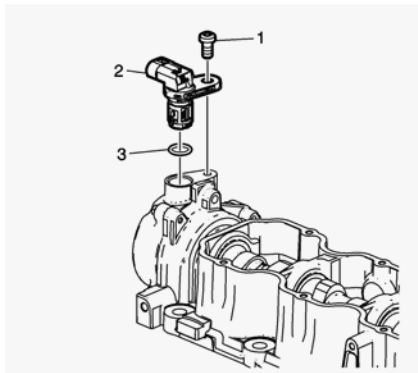
Special Tools

J 810619 Camshaft Seal Installer

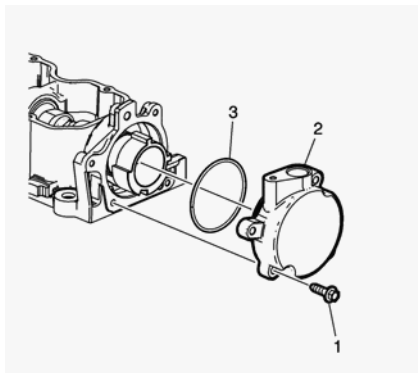
For equivalent regional tools, refer to Special Tools.



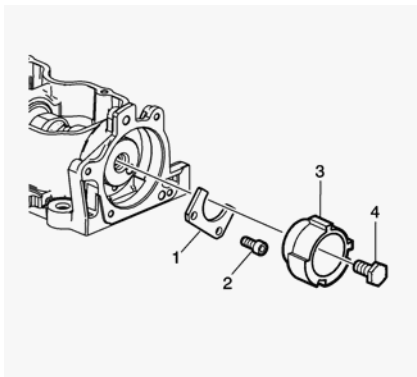
1. Remove the engine lift bracket bolt (1) and engine lift bracket (2).



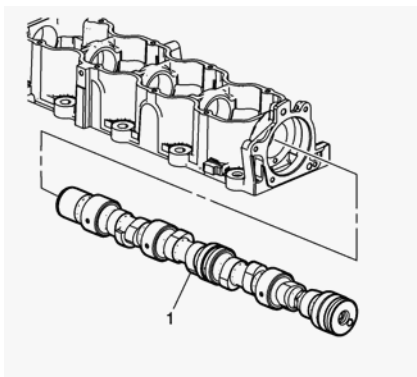
2. Remove the camshaft position sensor bolt (1) and camshaft position sensor (2).
3. Remove and discard the camshaft position sensor O-ring seal (3).



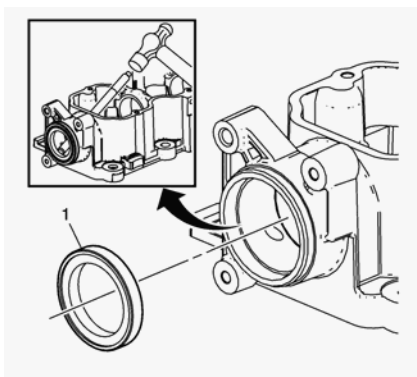
4. Remove the camshaft rear cover bolts (1) and camshaft rear cover (2).
5. Remove and discard the camshaft rear cover O-ring seal (3).



6. Remove the camshaft position actuator bolt (4) and camshaft position sensor exciter wheel (3).
7. Remove the camshaft retainer bolts (2) and camshaft retainer (1).

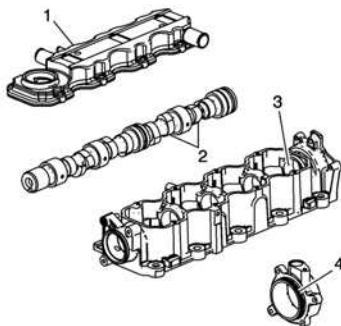


8. Remove the camshaft (1).



Caution: Do not nick, scratch or damage the sealing surface. The sealing surface is a machined surface. Damage to the machined surface can cause leakage.

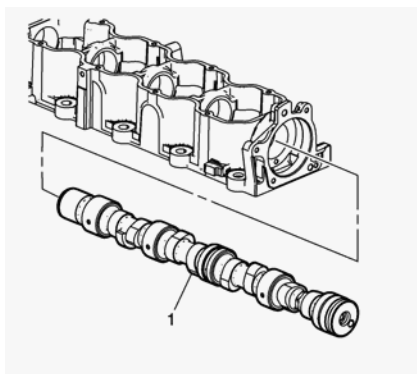
9. Remove the camshaft front oil seal (1) using a suitable punch.



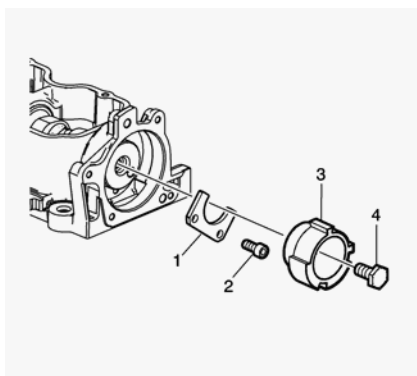
10. Inspect and clean the following:

- Inspect the camshaft journals and lobes (2) for wear or scoring.
- Inspect the camshaft cover (1) for cracks or damage.
- Inspect the camshaft housing to camshaft mating surfaces (3) for wear or scoring.
- Inspect the camshaft rear cover sealing surface (4) for damage.
- Clean the camshaft cover.

- Clean the camshaft housing.
- Clean the camshaft rear cover.
- Wash the camshaft in solvent.
- Oil the camshaft.



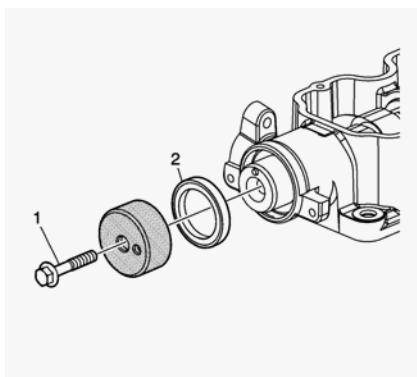
- Install the camshaft (1).



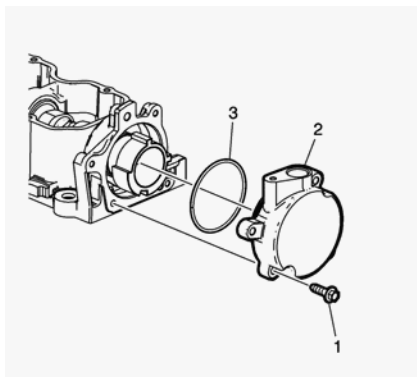
- Install the camshaft retainer (1) and camshaft retainer bolts (2).

Caution: Refer to Fastener Caution.

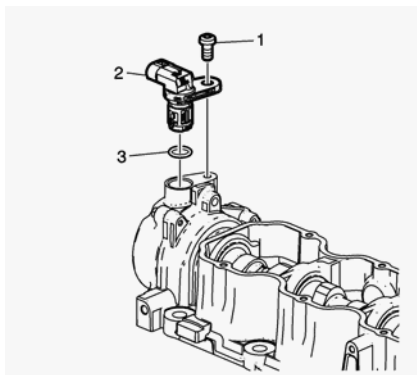
- Tighten the camshaft retainer bolts to **8.5 Y (75 lb in)**.
- Install the camshaft position sensor exciter wheel (3) and camshaft position actuator bolt (4).
- Tighten the camshaft position actuator bolt to **10 Y (89 lb in)**.
- Tighten the bolt an additional 30° to 45°



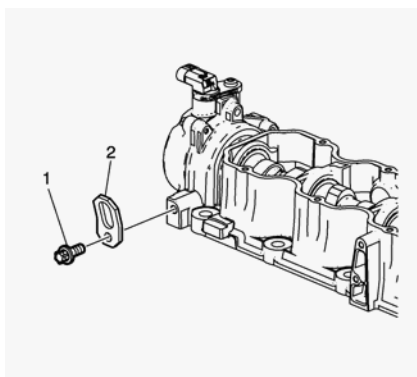
- Install the camshaft front oil seal (2) using the J 810619 installer and the camshaft sprocket bolt (1).



- Install the NEW camshaft rear cover O-ring seal (3) and camshaft rear cover (2).
- Install the camshaft rear cover bolts (1).
- Tighten the camshaft rear cover bolts to **8 Y (71 lb in)**.



- Install the NEW camshaft position sensor O-ring seal (3).
- Install the camshaft position sensor (2) and camshaft position sensor bolt (1).
- Tighten the camshaft position sensor bolt to **10 Y (88.5 lb in)**.



- Install the engine lift bracket (2) and engine lift bracket bolt (1).
- Tighten the engine lift bracket bolt to **67.5 Y (49.7 lb ft)**.

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Special Tools

GE 7872 Magnetic Base Dial Indicator

For equivalent regional tools, refer to Special Tools.

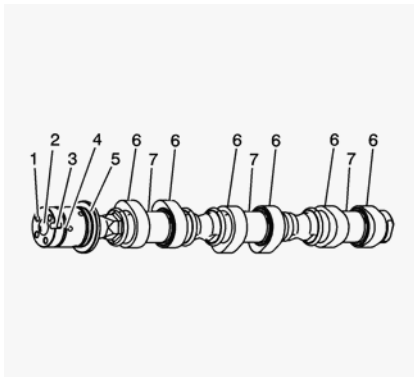
[Cleaning Procedure](#)

1. Clean the camshaft in solvent.

Warning: Refer to Safety Glasses Warning.

2. Dry the camshaft with compressed air.

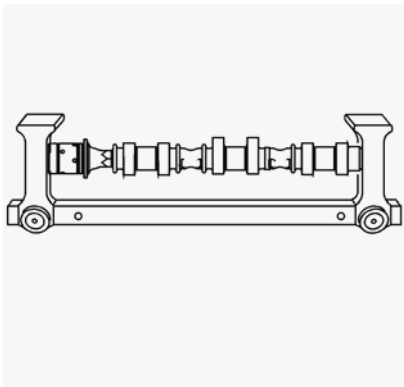
[Visual Inspection](#)



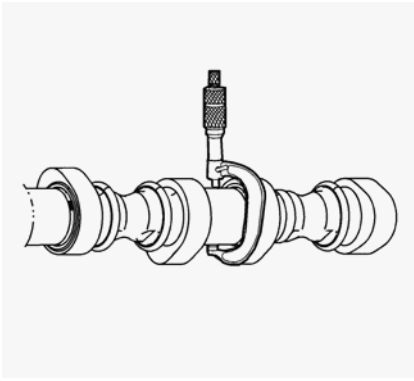
1. Inspect the camshaft oil feed holes (1) to the camshaft position actuator for dirt, debris or blockage.
2. Inspect the threaded hole (2) for damage.
3. Inspect the camshaft position actuator locating notch (3) for damage or wear.
4. Inspect the camshaft sealing grooves (4) for damage.
5. Inspect the camshaft thrust surface (5) for damage.
6. Inspect the camshaft lobes (6) and journals (7) for the following conditions:

- Excessive scoring or pitting
- Discoloration from overheating
- Deformation from excessive wear, especially the camshaft lobes
- If any of the above conditions exist on the camshaft, replace the camshaft.

[Camshaft Measurement](#)

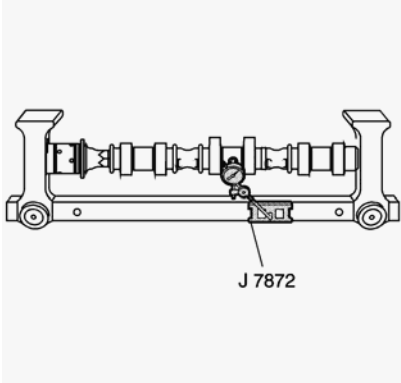


1. With the camshaft in a suitable fixture, measure the camshaft for wear.

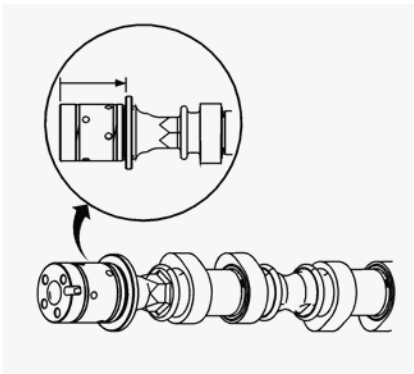


2. Measure the camshaft journals for diameter and out-of-round using an outside micrometer. Refer to Engine Mechanical Specifications.

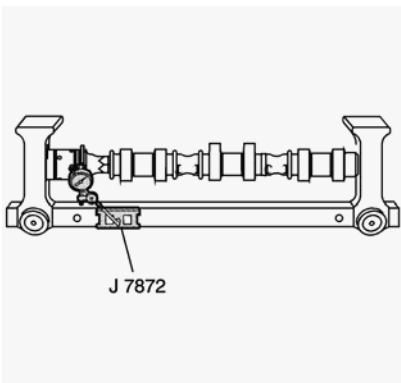
- If the diameter is smaller than specifications, replace the camshaft.
- If the out-of-round exceeds specifications, replace the camshaft.



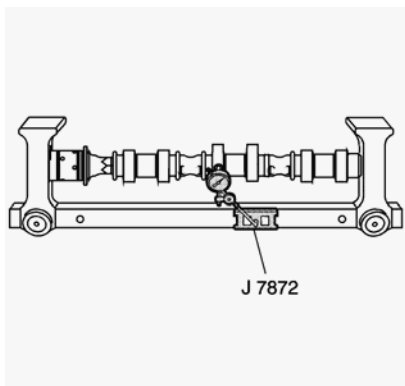
- Measure the camshaft runout using the GE 7872 indicator . Refer to Engine Mechanical Specifications.



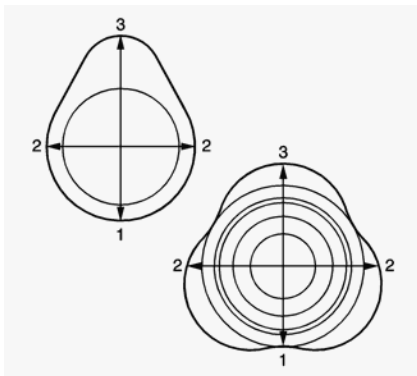
- Measure the camshaft thrust width for wear using a depth micrometer. Refer to Engine Mechanical Specifications.



- Measure the camshaft thrust wall surface for runout using GE 7872 indicator . Refer to Engine Mechanical Specifications.
- If the camshaft is damaged or worn beyond specifications, replace the camshaft. No machining of the camshaft is allowed.



- Measure the camshaft lobes for wear using the GE 7872 indicator .

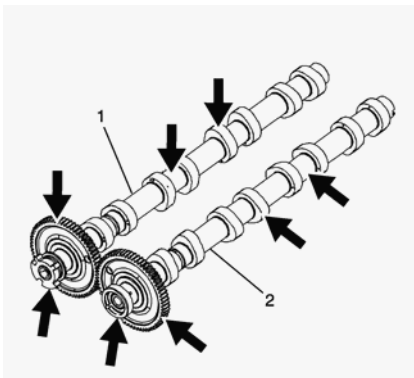


- Place the GE 7872 indicator with the indicator tip on the base circle (1) of the camshaft lobe.
 1. Place the GE 7872 indicator at zero.
 2. Rotate the camshaft until the indicator tip is at the highest point (3) on the lobe. This reading is the lift of the camshaft lobe. Refer to Engine Mechanical Specifications.
 3. If the indicated measurement is significantly lower than these specifications, replace the camshaft or engine performance will be reduced.

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Clean the intake camshaft (2) and exhaust camshaft (1) and perform the following:

- Wash the camshaft in solvent
- Inspect the camshaft journals and lobes for wear or scoring
- Inspect the camshaft sprocket alignment notch for damage
- Oil the camshaft

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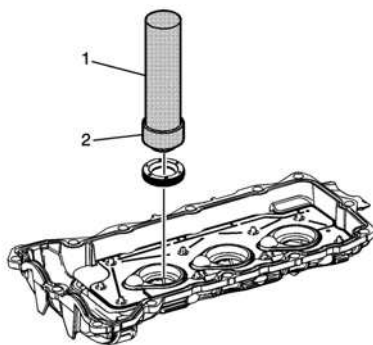
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Special Tools

- DT 5590 Bearing and Seal Driver
- DT 24254-A Oil Seal Installer

For equivalent regional tools, refer to Special Tools.

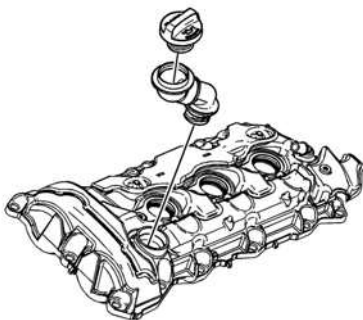
[Left Camshaft Cover](#)



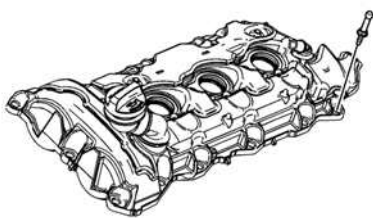
1. Install the NEW left spark plug shield tube seals using the DT 5590 driver (1) and DT 24254-A installer (2) .



2. Install the NEW left camshaft cover gasket.

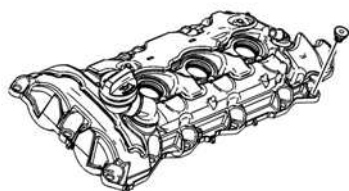


3. Install the oil fill cap.



Caution: Refer to Fastener Caution.

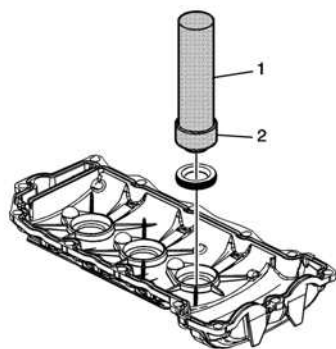
4. Install the fuel injector sight shield cover ballstud and tighten to **10 Y (89 lb in)**.



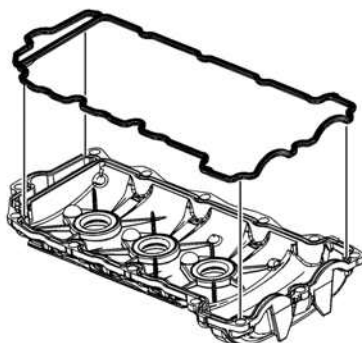
Note: The camshaft cover bolt grommet must be installed into the camshaft cover bolt hole before installing the camshaft cover bolt.

5. Install the NEW left camshaft cover bolt grommets.

Right Camshaft Cover

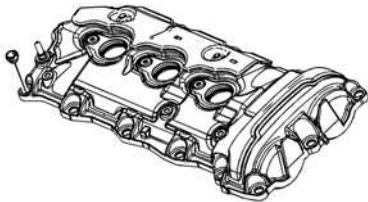


1. Install the NEW right spark plug shield tube coil seals using the *DT 5590* driver (1) and *DT 24254-A* installer (2) .



2. Install the NEW right camshaft cover gasket.

Camshaft Cover Assemble (LY7/LP1)



Note: The camshaft cover bolt grommet must be installed into the camshaft cover bolt hole before installing the camshaft cover bolt.

3. Install the NEW right camshaft cover bolt grommets.

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[Cleaning Procedure](#)

1. Clean the camshaft covers in solvent.

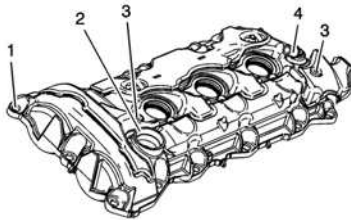
Warning: Refer to Safety Glasses Warning.

2. Dry the camshaft covers with compressed air.

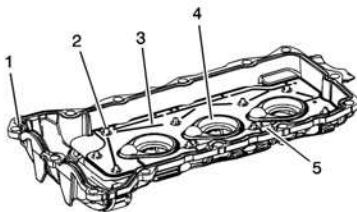
[Inspection Procedure](#)

1. Inspect each camshaft cover for the dents or damage to the exterior. A dented or damaged camshaft cover may:

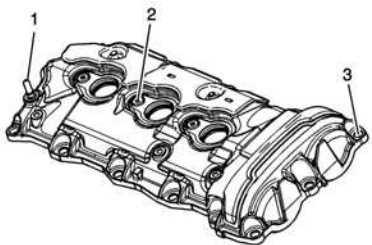
- Leak engine oil
- Effect crankcase ventilation
- Interfere with the camshafts
- Interfere with the ignition coil sealing
- Allow water or condensation to enter the engine



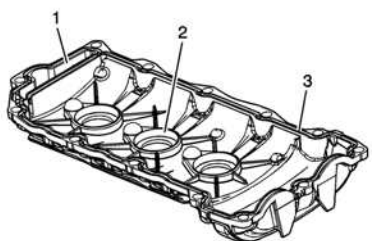
- Inspect the exterior of the left camshaft cover for the following conditions:
 - Damage to the camshaft cover bolt holes (1)
 - Damage to the oil fill hole (2)
 - Damage to the mounting holes (3) for the ignition coil assembly and fuel injector sight shield ballstud.
 - Damage to the positive crankcase ventilation (PCV) hose connector (4)—A damaged PCV hose connector is replaceable.



- Inspect the interior of the left camshaft cover for the following conditions:
 - Gouges or damage to the camshaft cover sealing groove (1)
 - Damaged, loose or missing baffle fasteners (2)
 - Damaged, loose or missing baffle (3)
 - Gouges or damage to the spark plug shield seal bore (4)
 - Restrictions to the ventilation system (5)

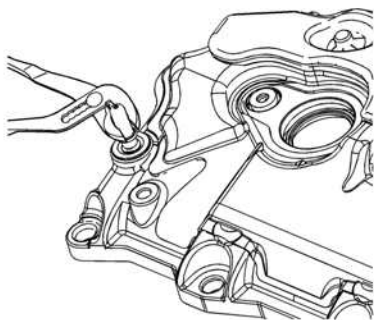


- Inspect the exterior of the right camshaft cover for the following conditions:
 - Damage to the PCV orifice (1)—A damaged PCV orifice can be replaced. Refer to PCV Orifice Replacement.
 - Damage to the mounting holes (2) for the ignition coil assembly
 - Damage to the camshaft cover bolt holes (3)



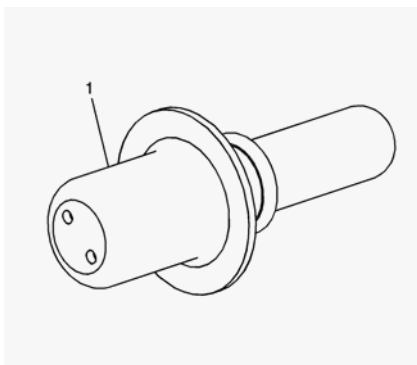
- Inspect the interior of the right camshaft cover for the following conditions:
 - Restrictions to the ventilation system (1)
 - Gouges or damage to the spark plug shield seal bore (2)
 - Gouges or damage to the camshaft cover sealing groove (3)
 - Repair or replace the camshaft cover or covers as necessary.

[PCV Orifice Replacement](#)

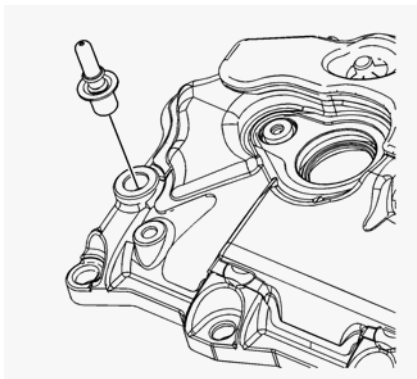


Note: If the PCV orifice is damaged or plugged and cannot be cleaned out, the PCV orifice can be replaced.

1. Remove the old PCV orifice by gripping the neck of the orifice with pliers and twisting and pulling out of the right camshaft cover.

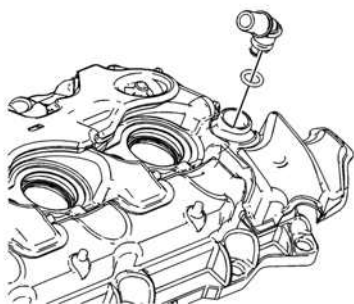


2. Apply sealant GM P/N 12378521 (Canadian P/N 88901148) or equivalent to the NEW PCV orifice (1).



3. Install the NEW PCV orifice into the right camshaft cover. After insertion, twist the PCV orifice in order to eliminate any vertical leak paths in the sealant.

[PCV Fitting Replacement](#)



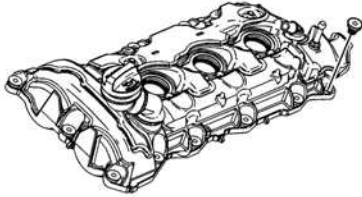
Note: If the PCV fitting is damaged or plugged and cannot be cleaned out, the PCV fitting can be replaced.

1. Remove the old PCV fitting.
2. Install the new PCV fitting with a NEW O-ring.

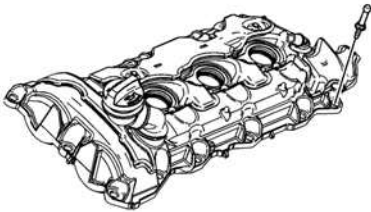
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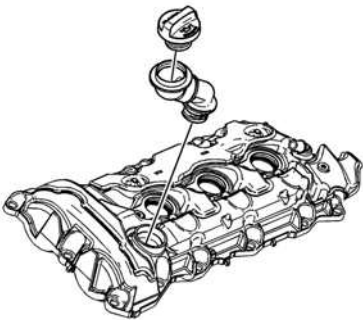
[Left Camshaft Cover](#)



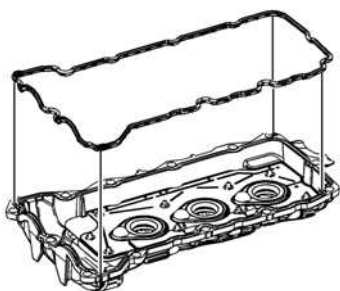
1. Remove and discard the left camshaft cover bolt grommets.



2. Remove the fuel injector sight shield ballstud.

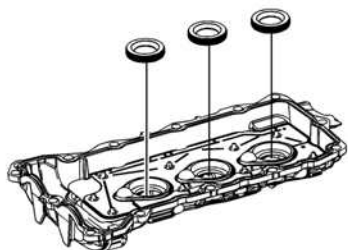


3. Remove the oil fill cap.



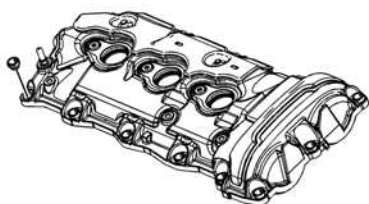
Important: Do not reuse the camshaft cover gasket and spark plug shield tube seals.

4. Remove and discard the left camshaft cover gasket.

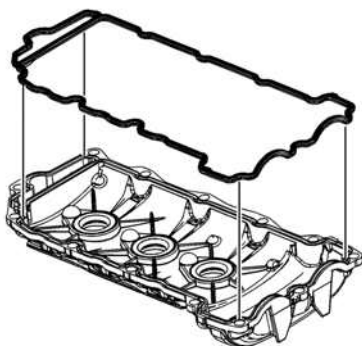


5. Remove and discard the left spark plug shield tube seals.

[Right Camshaft Cover](#)



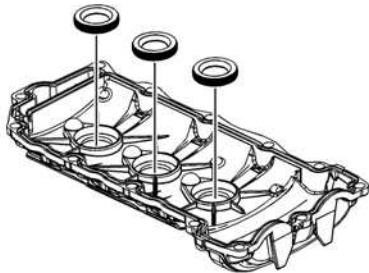
1. Remove and discard the right camshaft cover bolt grommets.



Important: Do not reuse the camshaft cover gasket and spark plug shield tube seals.

2. Remove and discard the right camshaft cover gasket.

Camshaft Cover Disassemble (LY7/LP1)



3. Remove and discard the right spark plug shield tube seals.

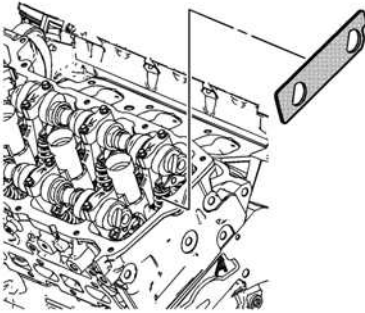
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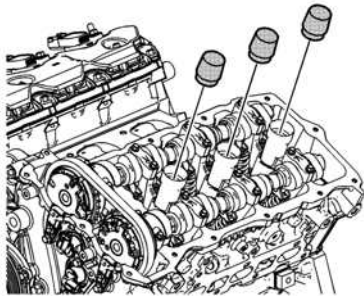
Special Tools

- EN 46101 Spark Plug Tube Seal Guide
- EN-48383 Camshaft Retaining Tools

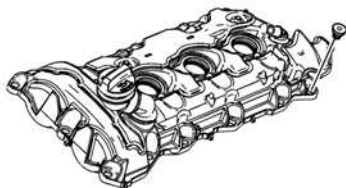
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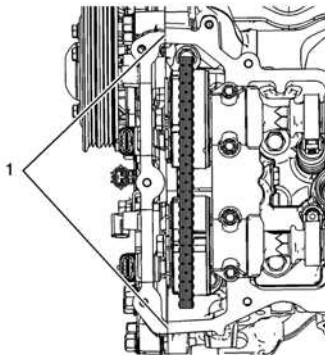
1. Remove the EN 48383-2 from the rear of the left camshafts.



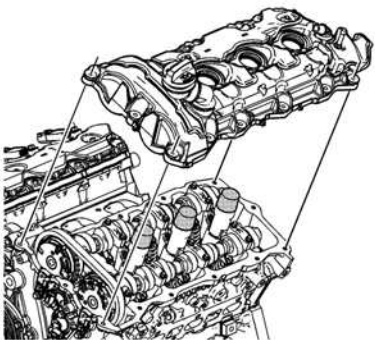
2. Install the EN 46101 guide onto the spark plug tubes of the left cylinder head.



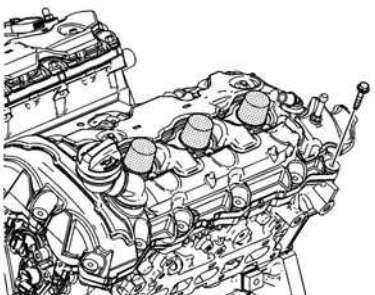
3. Install the NEW camshaft cover bolt grommets prior to installing the camshaft cover bolts.
4. Wipe the camshaft cover sealing surface on the left cylinder head with a clean, lint-free cloth.



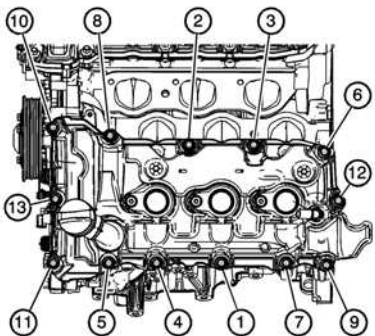
5. Place a bead 8 mm (0.3150 in) in diameter by 4 mm (0.1575 in) in height of RTV sealant, GM P/N 12378521 (Canadian P/N 88901148) or equivalent, on the engine front cover split lines (1).



6. Place the left camshaft cover into position onto the left cylinder head.

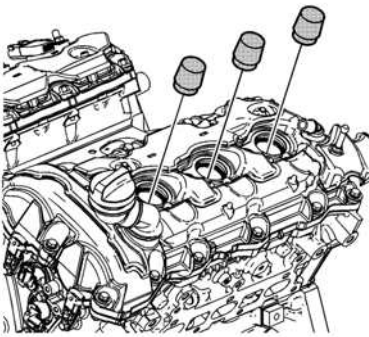


7. Loosely install the left camshaft cover bolts.

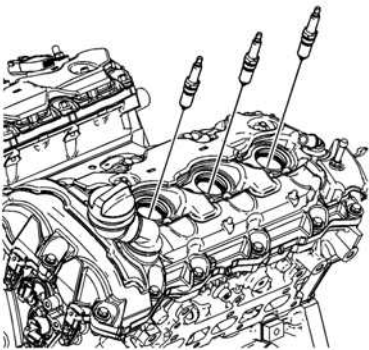


Caution: Refer to Fastener Caution.

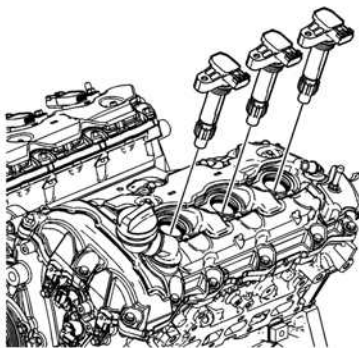
8. Tighten the left camshaft cover bolts in the sequence shown and tighten to 10 Y (89 lb in).



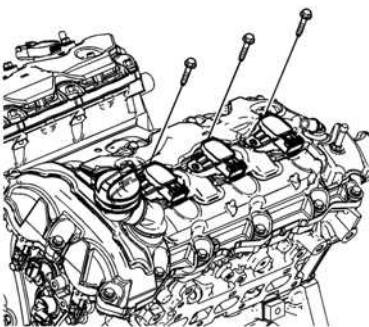
9. Remove the *EN 46101* guide from the spark plug tubes of the left cylinder head.



10. Install the **NEW** spark plugs into the left cylinder head and tighten to **18 Y (13 lb ft)**.



11. Inspect the inside of the ignition coil rubber boot for a thin, even coat of grease. If there is no grease present or additional grease is necessary, complete the following procedure:
 1. Apply a thin coating of dielectric grease evenly to the inside of the ignition coil rubber boot, up to a depth of 15 mm from the end of the boot. Refer to Adhesives, Fluids, Lubricants, and Sealers.
 2. Remove any excess grease from around the end of the boot, and ensure there is not an excessive amount within the boot.
12. Install the ignition coils.



13. Install the ignition coil bolts and tighten to **10 Y (89 lb in)**.

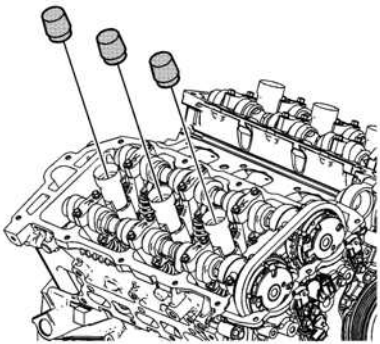
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

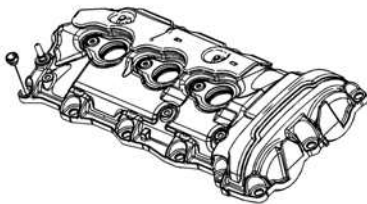
Special Tools

EN-46101 Spark Plug Tube Seal Guide

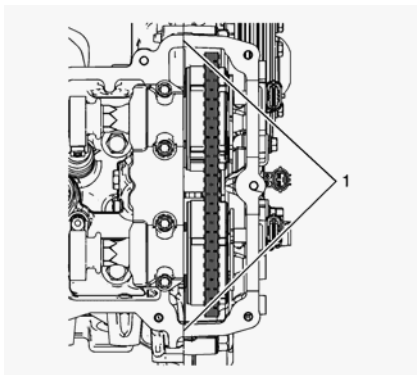
For equivalent regional tools, refer to Special Tools.



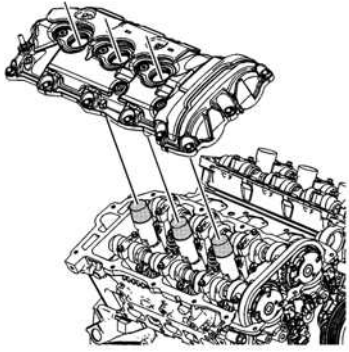
1. Install the EN-46101 guide onto the spark plug tubes of the right cylinder head.



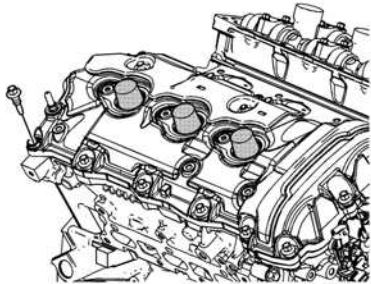
2. Install the NEW camshaft cover bolt grommets prior to installing the camshaft cover bolts.
3. Wipe the camshaft cover sealing surface on the right cylinder head with a clean, lint-free cloth.



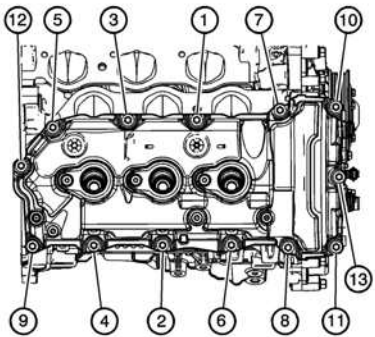
4. Place a bead 8 mm (0.3150 in) in diameter by 4 mm (0.1575 in) in height of RTV sealant, GM P/N 12378521 (Canadian P/N 88901148) or equivalent, on the engine front cover split lines (1).



5. Place the right camshaft cover into position onto the right cylinder head.

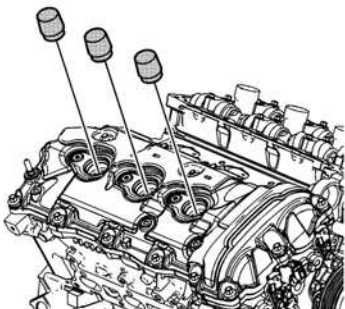


6. Loosely install the right camshaft cover bolts.

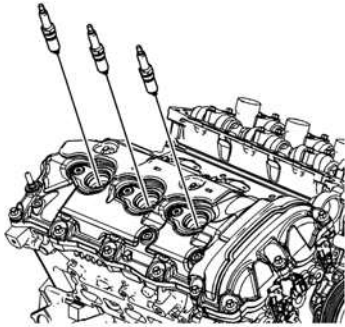


Caution: Refer to Fastener Caution.

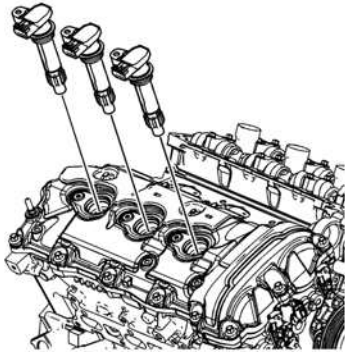
7. Tighten the right camshaft cover bolts in the sequence shown.
- Tighten the right camshaft cover bolts to **10 Y (89 lb in)**.
 - Tighten the right camshaft cover bolts a second pass to **10 Y (89 lb in)**.



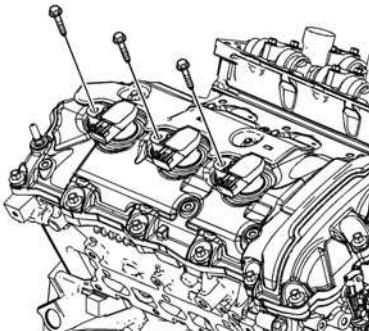
- Remove the *EN-46101* guide from the spark plug tubes of the right cylinder head.



- Install the NEW spark plugs into the right cylinder head and tighten to **18 Y (13 lb ft)**.



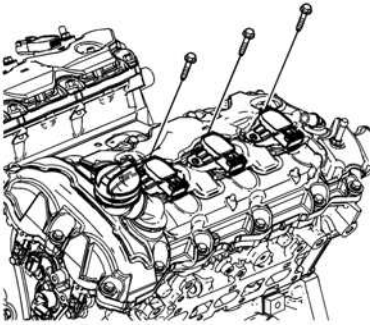
- Inspect the inside of the ignition coil rubber boot for a thin, even coat of grease. If there is no grease present or additional grease is necessary, complete the following procedure:
 1. Apply a thin coating of dielectric grease evenly to the inside of the ignition coil rubber boot, up to a depth of 15 mm from the end of the boot. Refer to Adhesives, Fluids, Lubricants, and Sealers.
 2. Remove any excess grease from around the end of the boot, and ensure there is not an excessive amount within the boot.
- Install the ignition coils.



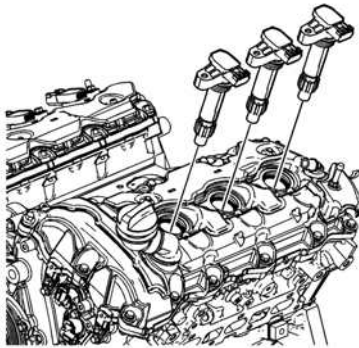
- Install the ignition coil bolts and tighten to **10 Y (89 lb in)**.

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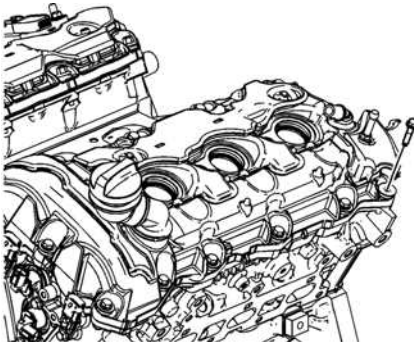
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



1. Remove the ignition coil bolts.

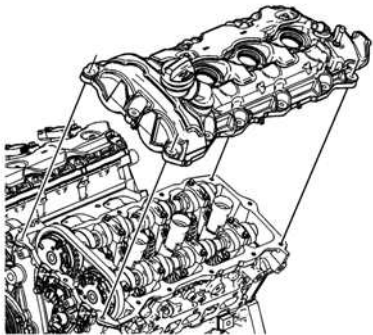


2. Remove the ignition coils.



3. Remove the left camshaft cover bolts.
4. Remove and discard the camshaft cover grommets and camshaft cover bolts if they are serviced with the grommet.

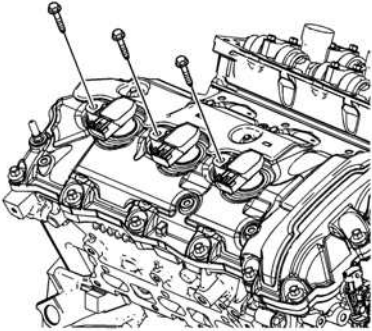
Camshaft Cover Removal - Left Side (LY7/LP1)



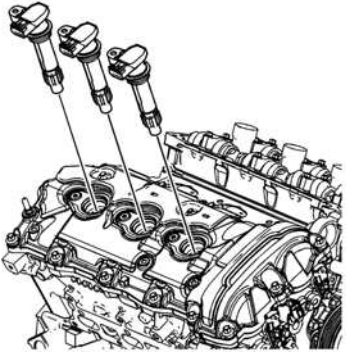
5. Remove the left camshaft cover from the left cylinder head.

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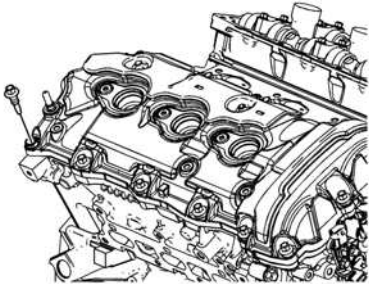
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



1. Remove the ignition coil bolts.

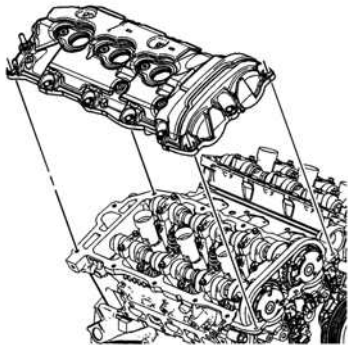


2. Remove the ignition coils.



3. Remove the right camshaft cover bolts.
4. Remove and discard the camshaft cover grommets and camshaft cover bolts if they are serviced with the grommet.

Camshaft Cover Removal - Right Side



5. Remove the right camshaft cover from the right cylinder head.

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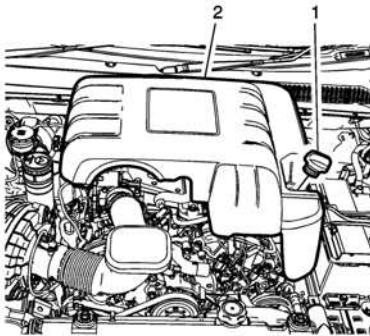
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Special Tools

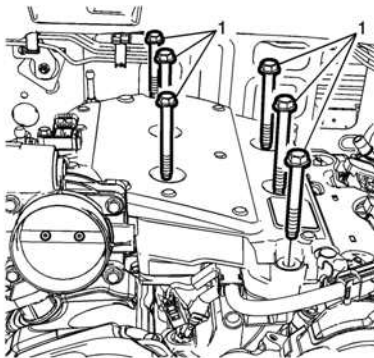
EN-46101 Spark Plug Tube Seal Guide

For equivalent regional tools, refer to Special Tools.

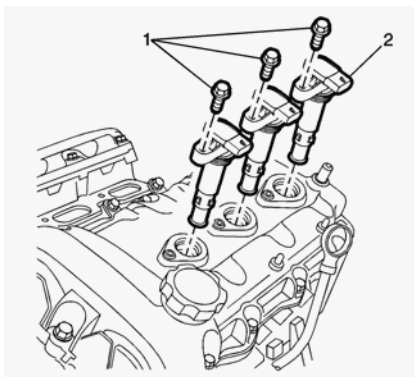
[Removal Procedure](#)



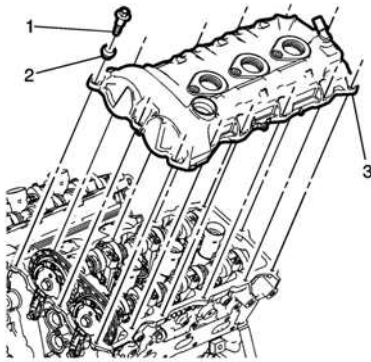
1. Remove the intake manifold cover (2). Refer to Intake Manifold Cover Replacement.



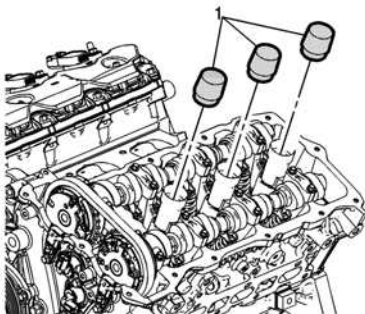
2. Remove the upper intake manifold bolts (1) and remove the upper intake manifold. Refer to Upper Intake Manifold Replacement.



3. Remove the ignition coil bolts (1) and remove the ignition coils (2). Refer to Ignition Coil Replacement - Bank 2.
4. Disconnect and remove the engine harness from the camshaft cover.

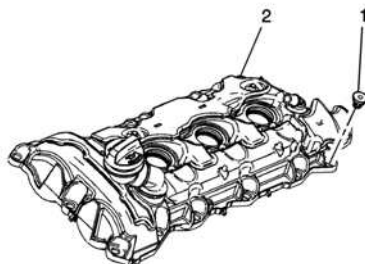


5. Remove the left camshaft cover bolts (1).
6. Remove the left camshaft cover (3) from the left cylinder head.
7. Clean the mating surfaces of the cylinder head and the camshaft cover. Refer to Camshaft Cover Cleaning and Inspection.

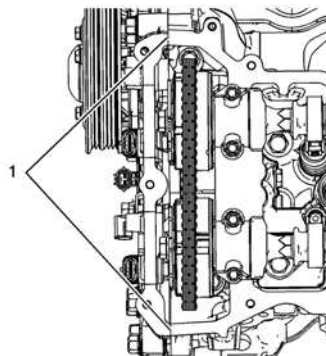


8. Install the EN-46101 guide onto the spark plug tubes of the left cylinder head.

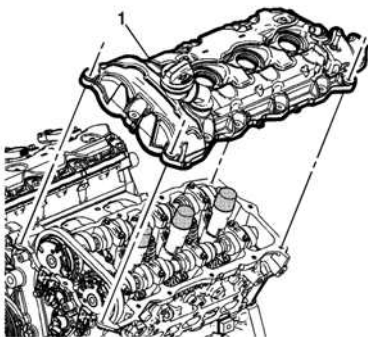
[Installation Procedure](#)



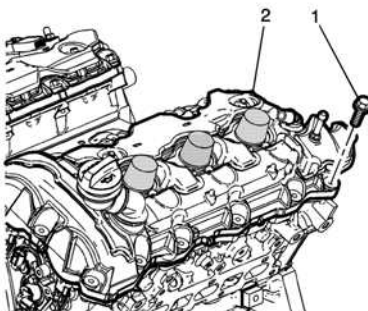
1. Install new camshaft cover bolt grommets (1) prior to installing the camshaft cover bolts.



2. Place a bead 8 mm (0.3150 in) in diameter by 4 mm (0.1575 in) in height of RTV sealant equivalent, on the engine front cover split lines (1).

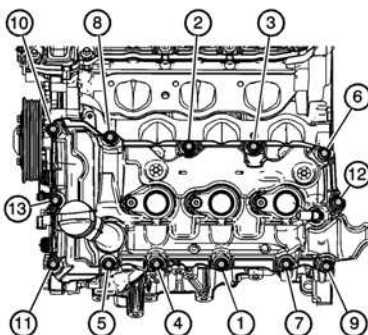


3. Place the left camshaft cover (1) into position onto the left cylinder head.

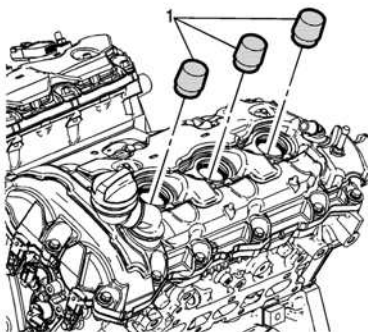


Caution: Refer to Fastener Caution

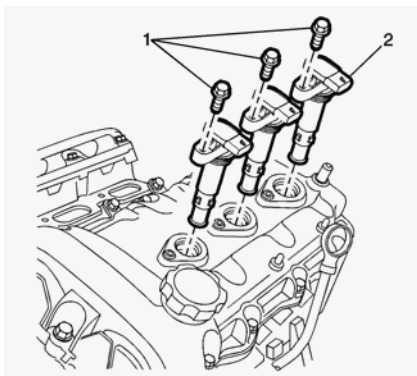
4. Loosely install the left camshaft cover bolts (1).



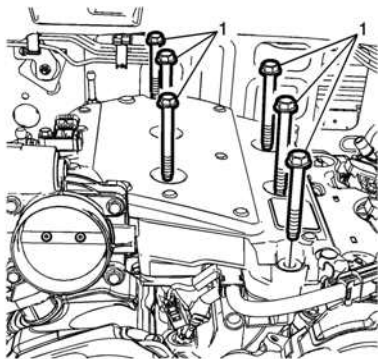
5. Tighten the left camshaft cover bolts in the sequence shown to **10 Y (89 lb in)**.
6. Connect and install the engine harness to the camshaft cover.



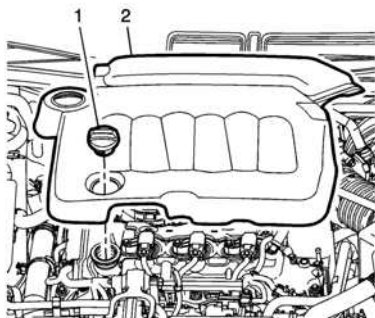
7. Remove the EN-46101 guide (1) from the spark plug tubes of the left cylinder head.



8. Install the ignition coils (2) and ignition coil bolts (1). Refer to Ignition Coil Replacement - Bank 2.
9. Install and connect the engine harness to the camshaft cover.



10. Install the upper intake manifold and the upper intake manifold bolts (1). Refer to Upper Intake Manifold Replacement.



11. Install the intake manifold cover (1). Refer to Intake Manifold Cover Replacement.

2013 Chevrolet Colorado

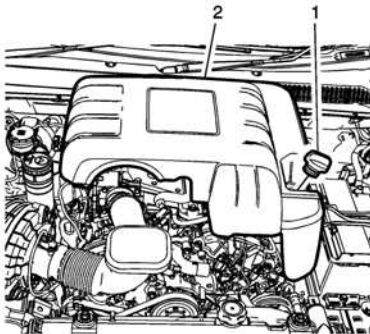
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Special Tools

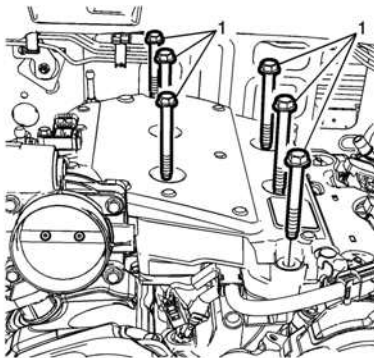
EN-46101 Spark Plug Tube Seal Guide

For equivalent regional tools, refer to Special Tools.

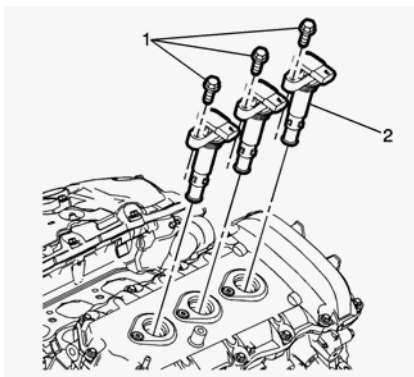
[Removal Procedure](#)



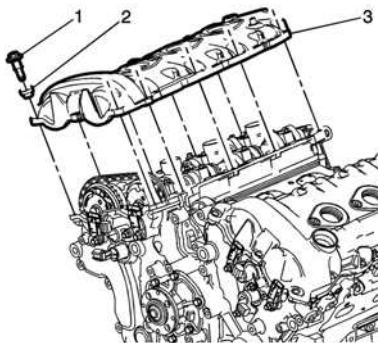
1. Remove the intake manifold cover (2). Refer to Intake Manifold Cover Replacement.



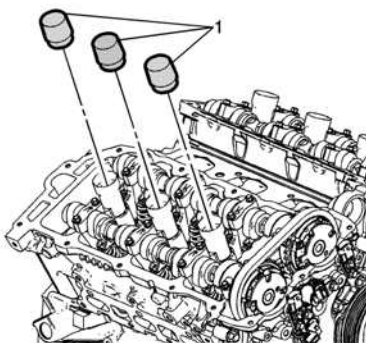
2. Remove the upper intake manifold bolts (1) and remove the upper intake manifold. Refer to Upper Intake Manifold Replacement.



3. Remove the ignition coil bolts (1) and remove the ignition coils (2). Refer to Ignition Coil Replacement - Bank 2.
4. Disconnect and remove the engine harness from the camshaft cover.

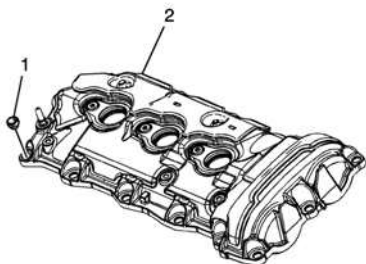


5. Remove the right camshaft cover bolts (1).
6. Remove the right camshaft cover (3) from the right cylinder head.
7. Clean the mating surfaces of the cylinder head and the camshaft cover. Refer to Camshaft Cover Cleaning and Inspection.

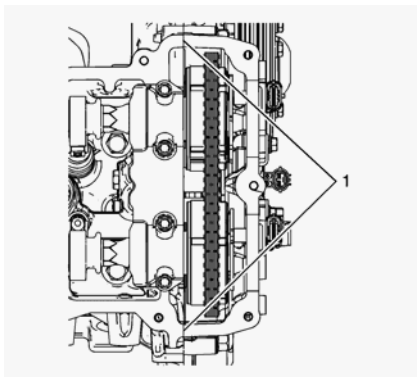


8. Install the EN-46101 guide onto the spark plug tubes of the right cylinder head.

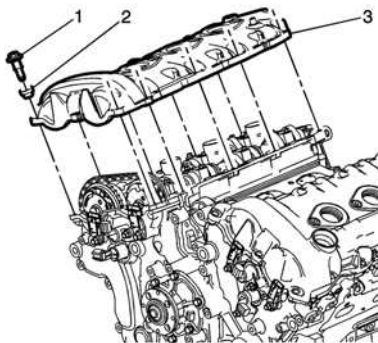
[Installation Procedure](#)



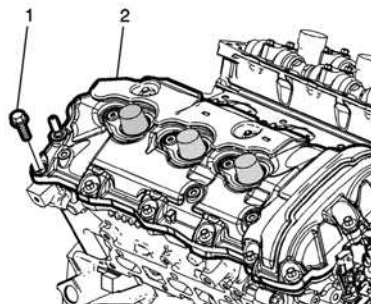
1. Install new camshaft cover bolt grommets (1) prior to installing the camshaft cover bolts.



2. Place a bead 8 mm (0.3150 in) in diameter by 4 mm (0.1575 in) in height of RTV sealant, on the engine front cover split lines (1).

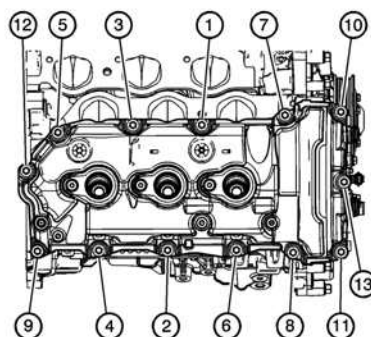


3. Place the right camshaft cover (1) into position onto the right cylinder head.

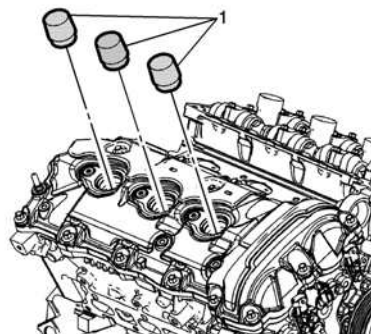


Caution: Refer to Fastener Caution

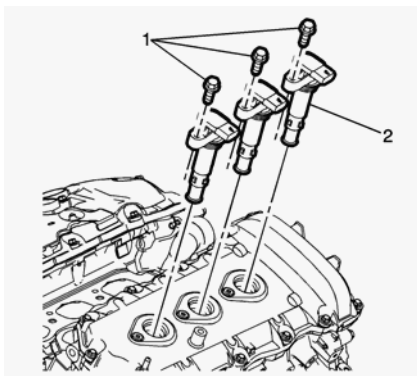
4. Loosely install the right camshaft cover bolts (1).



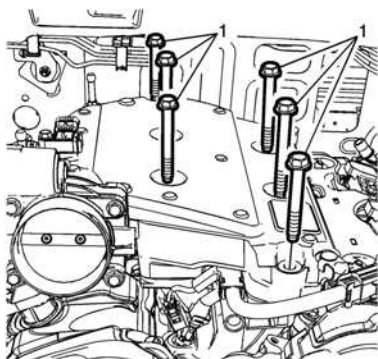
5. Tighten the right camshaft cover bolts in the sequence shown to **10 Y (89 lb in)**.
6. Connect and install the engine harness to the camshaft cover.



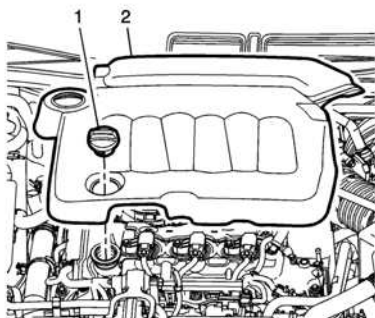
7. Remove the EN-46101 guide (1) from the spark plug tubes of the right cylinder head.



8. Install the ignition coils (2) and install the ignition coil bolts (1). Refer to Ignition Coil Replacement - Bank 1.



9. Install the upper intake manifold and install the upper intake manifold bolts (1). Refer to Upper Intake Manifold Replacement.



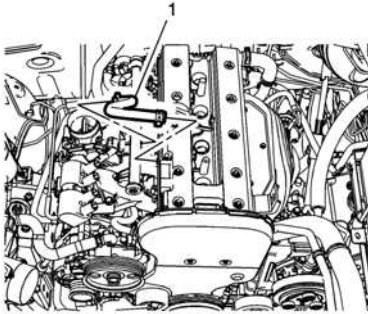
10. Install the intake manifold cover (2). Refer to Intake Manifold Cover Replacement.

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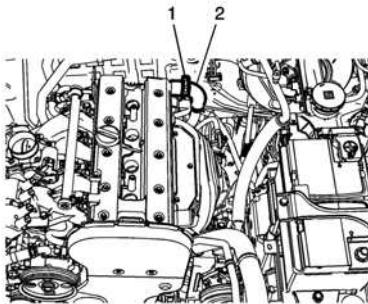
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

[Removal Procedure](#)

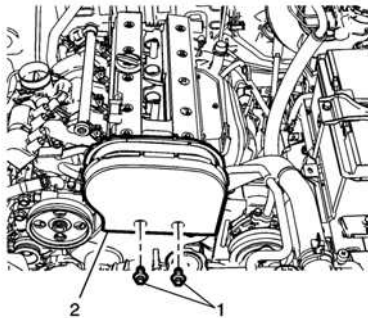
1. Remove the spark plug wires. Refer to Spark Plug Wire Replacement.



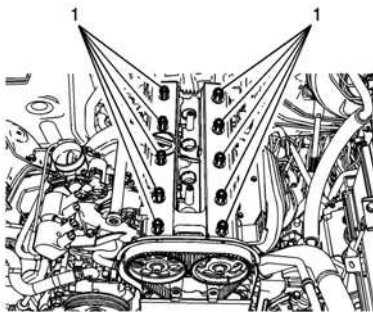
2. Remove the PCV hose (1).



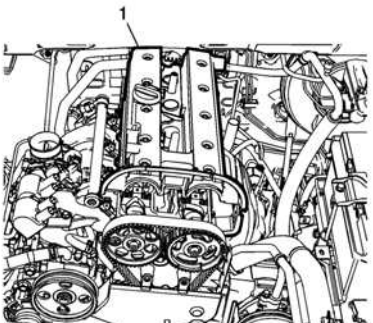
3. Remove the vent clamp (1)
4. Disconnect the vent hose (2) from the camshaft cover.



5. Remove the upper front timing cover fasteners (1).
6. Remove the front upper timing cover (2).

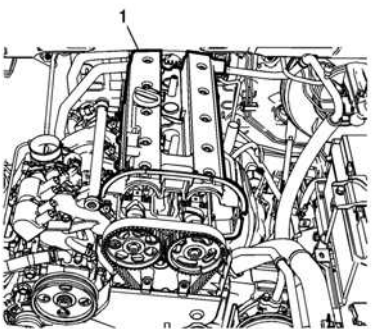


7. Remove the camshaft cover fasteners (1).



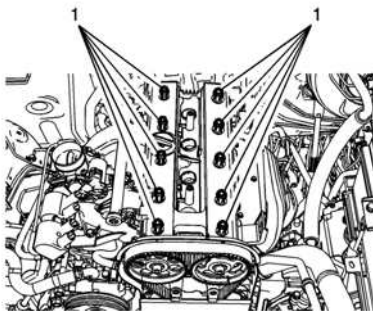
8. Remove the camshaft cover (1).

[Installation Procedure](#)

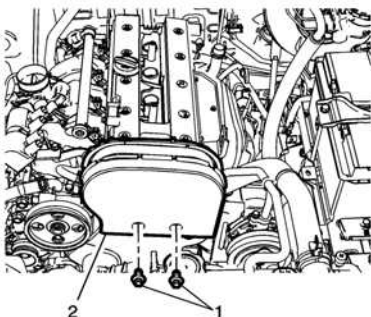


Note: Do not reuse the camshaft gasket. Also use a NEW gasket whenever removing or replacing camshaft cover.

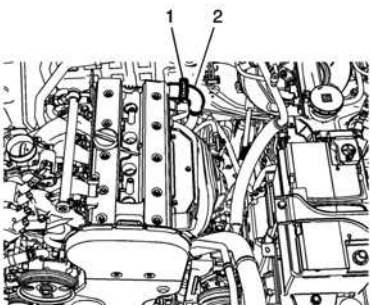
1. Install camshaft cover (1).



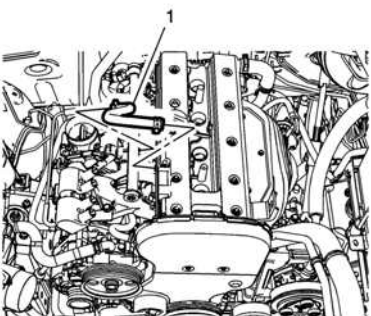
2. Install camshaft cover fastener (1) and tighten to 8 Y (6 lb ft).



3. Install upper front timing cover (2).
4. Install upper front timing cover fastener and tighten to **6 Y (53 lb in)**.



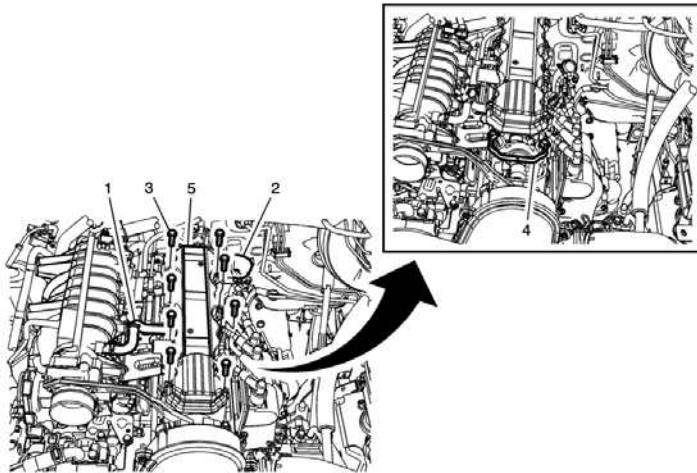
5. Install the vent hose (2).
6. Install vent hose clamp (1).



7. Install PCV hose (1).
8. Install the spark plug wires. Refer to Spark Plug Wire Replacement

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



Camshaft Cover Replacement

Callout

Component Name

Preliminary Procedure

Remove the air cleaner outlet duct. Refer to Air Cleaner Outlet Resonator Replacement.

- 1 PCV
Note: Disconnect and reposition the PCV hose.

- 2 Vent Hose
Note: Disconnect and reposition the vent hose.

- 3 Camshaft Cover Fastener (Qty: 8)
Caution: Refer to Fastener Caution.

- 3 **Tighten**
12 Y (9 lb ft)

- 4 Camshaft Cover Gasket

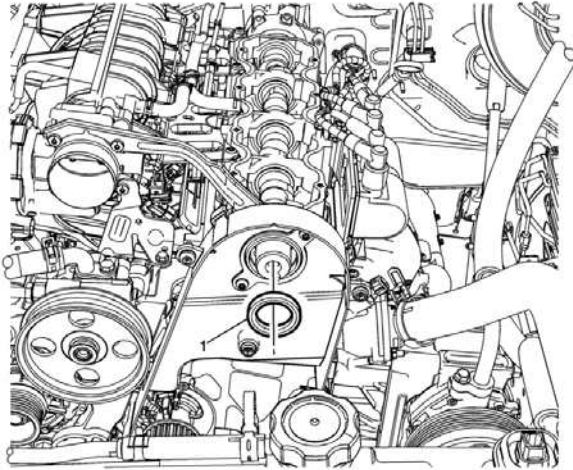
Camshaft Cover

Procedure

- 5
1. Use a new gasket when removing or replacing camshaft cover.
 2. Transfer components as necessary.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



Camshaft Front Oil Seal Replacement

Callout

Component Name

Preliminary Procedure

Remove the camshaft gear. Refer to Camshaft Gear Replacement.

Camshaft Front Oil Seal

Procedure

1. Use 7-0006832 remover and M-680770 remover to remove the camshaft front oil seal.
2. Use J-810619 installer to install the new camshaft front oil seal.

1

Special Tools

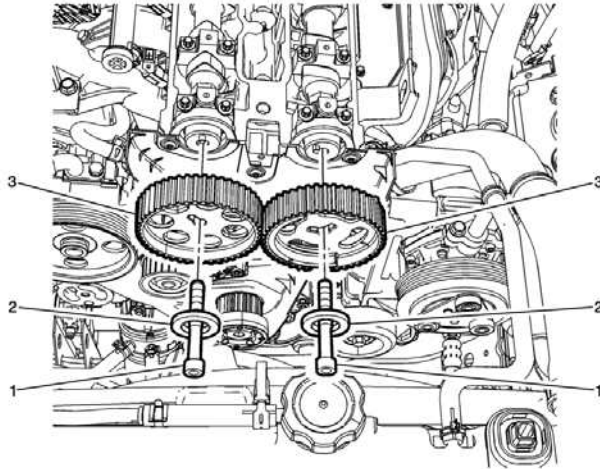
- J-810619 Camshaft Front Oil Seal Installer
- M-680770 Camshaft Front Oil Seal Remover.
- 7-0006832 Camshaft Front Oil Seal Remover

For equivalent regional tools, refer to Special Tools.

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Camshaft Gear Replacement

Callout

Component Name

Preliminary Procedures

1. Remove the timing belt. Refer to Timing Belt Replacement.
2. Remove the camshaft cover. Refer to Camshaft Cover Replacement.

Camshaft Gear Fastener

Caution: Refer to Fastener Caution.

Procedure

1

- Use a wrench to hold the camshaft while loosening the camshaft sprocket bolts.
- Use care to properly align the sprocket with the locating pins on the camshafts.

Tighten

50 Y + 60° + 15° (37 lb ft + 60° + 15°)

2

Camshaft Gear Washer

3

Camshaft Gear

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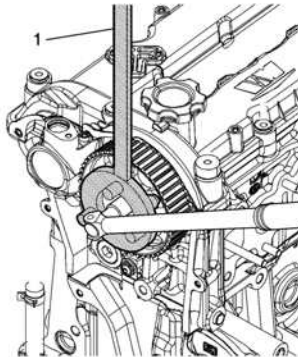
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Special Tools

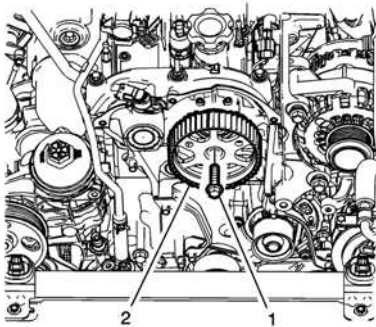
EN-50025 Pulley Holding Wrench

[Removal Procedure](#)

1. Remove the timing belt. Refer to Timing Belt Replacement.

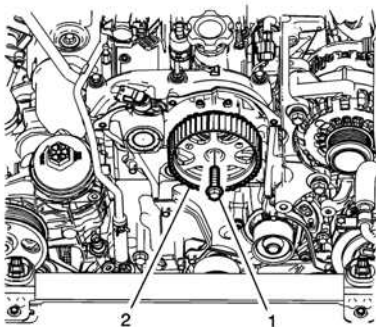


2. Hold the camshaft drive pulley with the EN-50025 wrench (1) and loosen the retaining bolt.



3. Remove the camshaft drive pulley bolt (1) and pulley (2).

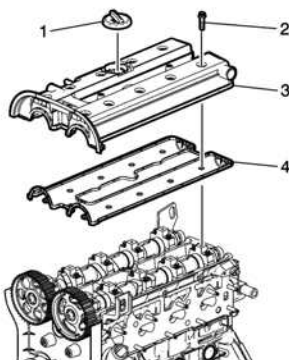
[Installation Procedure](#)



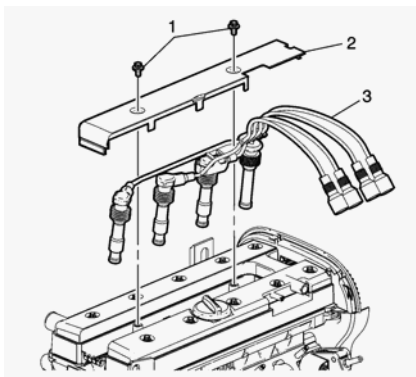
1. Install the camshaft drive pulley (2) and bolt (1).
2. For the tighten, but do not torque, bolt. Refer to Timing Belt Installation for final torque specification.
3. Install the timing belt. Refer to Timing Belt Replacement

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1. Install a NEW camshaft housing cover gasket (4).
 2. Install the camshaft housing cover (3).
- Caution:** Refer to Fastener Caution.
3. Install the housing cover bolts (2). Tighten the bolts to **8.0 Y (6 lb ft)**.

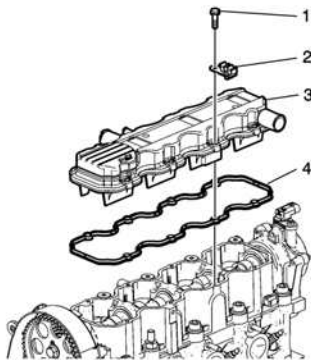


4. Install the spark plug wires (3).
5. Install the engine emblem cover (2) and bolts (1).

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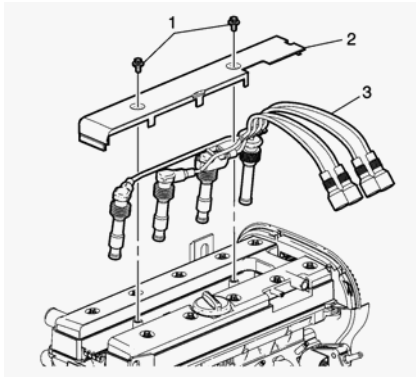
1. Install a NEW camshaft housing cover gasket (4).
2. Install the camshaft housing cover (3).

Caution: Refer to Fastener Caution.

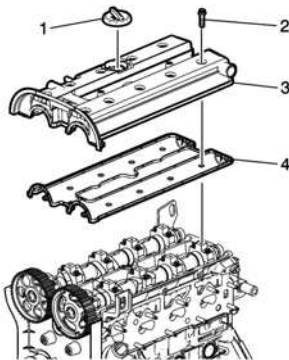
3. Install the housing cover bolts (1) and spark plug wire clip (2). Tighten the bolts to **8.0 Y (71 lb in)**.

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1. Remove the engine emblem cover bolts (1).
2. Remove the engine emblem cover (2).
3. Remove the spark plug wires (3)

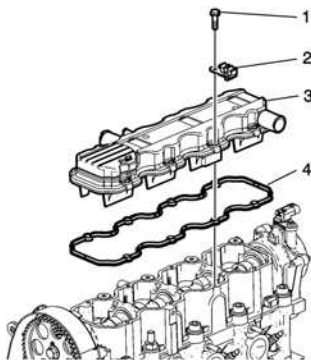


4. Remove the oil filler cap (1).
5. Remove the camshaft housing cover bolts (2).
6. Remove the camshaft housing cover (3) and gasket (4).

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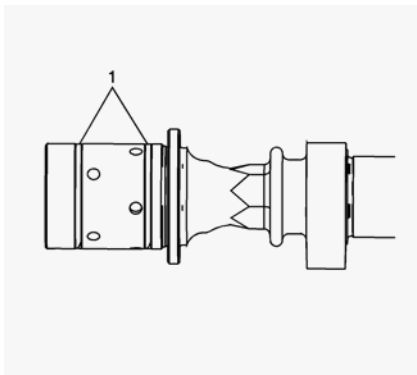
Fuel Delivery: | Fuel:



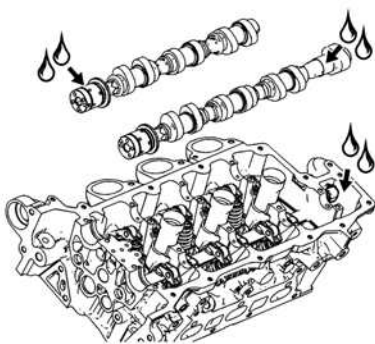
1. Remove the camshaft housing cover bolts (1).
2. Remove the spark plug wire retainer (2).
3. Remove the camshaft housing cover (3) and gasket (4).

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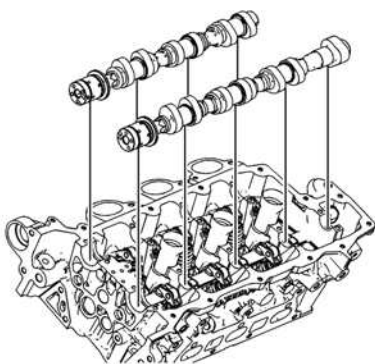
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



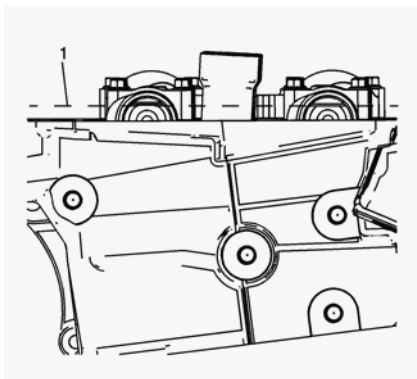
1. Ensure that the camshaft sealing rings (1) are in place in the camshaft grooves. Camshaft sealing rings must be in place below the surface of the camshaft journal in order to avoid being pinched between the cylinder head and the camshaft caps.



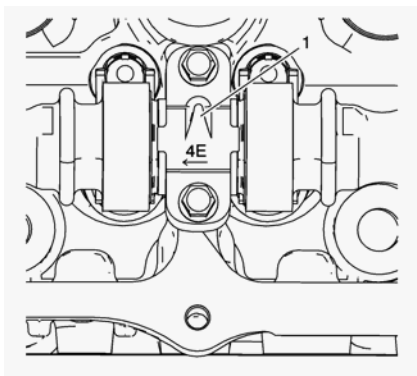
2. Apply a liberal amount of lubricant to the camshaft journals and the left cylinder head camshaft carriers. Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.



3. Place the left intake and left exhaust camshafts in position in the left cylinder head.

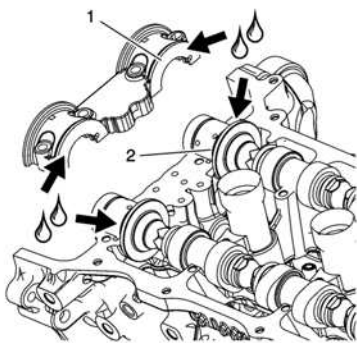


4. Position the camshaft lobes in a neutral position with the flats on the back of the camshafts up and parallel (1) with the left cylinder head camshaft cover rail.

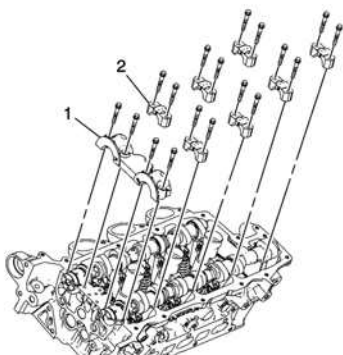


5. Observe the markings on the left cylinder head camshaft bearing caps. Each bearing cap is marked in order to identify its location. The markings have the following meanings:

- The raised feature (1) must always be oriented toward the center of the cylinder head.
- The I indicates the intake camshaft.
- The E indicates the exhaust camshaft.
- The number 2, 4, 6 indicates the cylinder position from the front of the engine.
- Apply a liberal amount of lubricant to the camshaft bearing caps. Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.

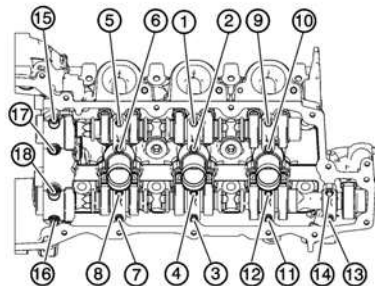


- Apply a liberal amount of lubricant to the camshaft bearing cap (1) and camshaft thrust surface (2). Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.



Camshaft Installation - Left Side

- Install the camshaft bearing thrust cap (1) in the first journal of the left cylinder head.
- Install the remaining bearing caps (2) with their orientation mark toward the center of the cylinder head.
- Hand start all the camshaft bearing cap bolts.

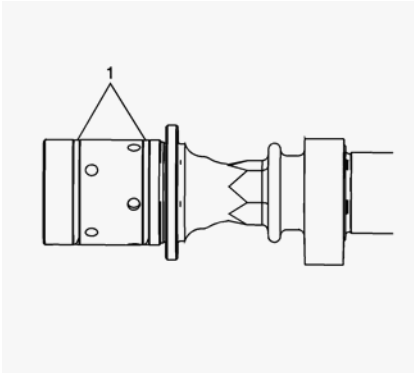


Caution: Refer to Fastener Caution.

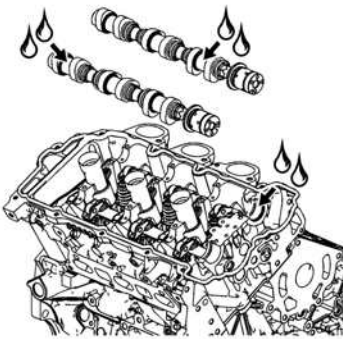
- Tighten the camshaft bearing cap bolts in the sequence shown and tighten to **10 Y (89 lb in)**.
- Loosen the center intake camshaft bearing cap bolts 1, 2 and the center exhaust camshaft bearing cap bolts 3, 4.
- Retighten the center camshaft bearing cap bolts 1, 2, 3, 4 and retighten the camshaft bearing cap bolts to **10 Y (89 lb in)**.

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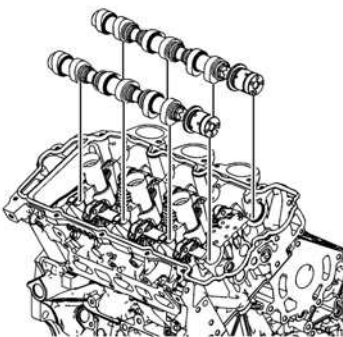
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



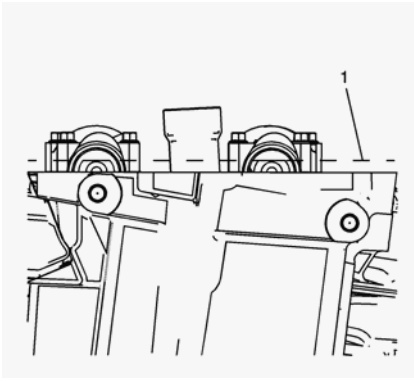
1. Ensure that the camshaft sealing rings (1) are in place in the camshaft grooves. Camshaft sealing rings must be in place below the surface of the camshaft journal in order to avoid being pinched between the cylinder head and the camshaft caps.



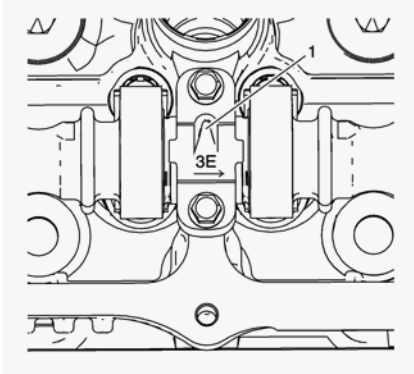
2. Apply a liberal amount of lubricant to the camshaft journals and the right cylinder head camshaft carriers. Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.



3. Place the right intake and right exhaust camshafts in position in the right cylinder head.

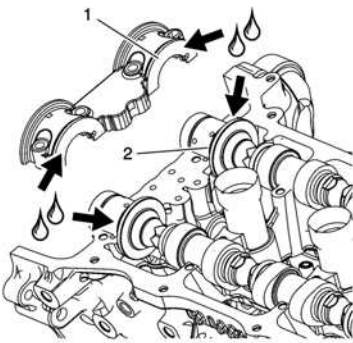


4. Position the camshaft lobes in a neutral position with the flats on the back of the camshafts up and parallel (1) with the right cylinder head camshaft cover rail.

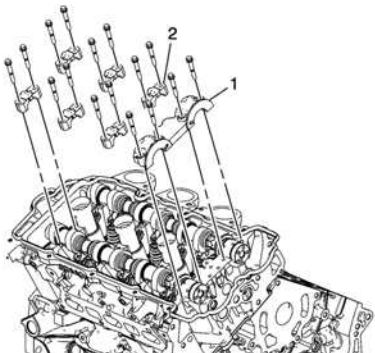


5. Observe the markings on the right cylinder head camshaft bearing caps. Each bearing cap is marked in order to identify its location. The markings have the following meanings:

- The raised feature (1) must always be oriented toward the center of the cylinder head.
- The I indicates the intake camshaft.
- The E indicates the exhaust camshaft.
- The number 1, 3, 5 indicates the cylinder position from the front of the engine.
- Apply a liberal amount of lubricant to the camshaft bearing caps. Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.

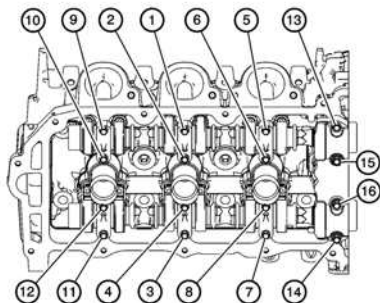


- Apply a liberal amount of lubricant to the camshaft bearing cap (1) and camshaft thrust surface (2). Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.



Camshaft Installation - Right Side

- Install the camshaft bearing thrust caps (1) in the first journal of the right cylinder head.
- Install the remaining bearing caps (2) with their orientation mark toward the center of the cylinder head.
- Hand start all the camshaft bearing cap bolts.



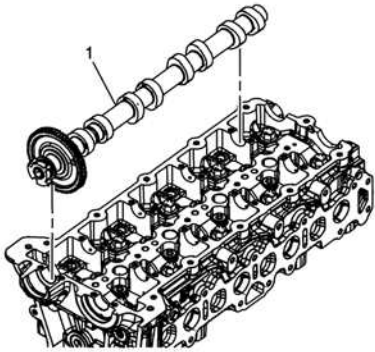
Caution: Refer to Fastener Caution.

Caution: This vehicle is equipped with torque-to-yield or single use fasteners. Install a NEW torque-to-yield or single use fastener when installing this component. Failure to replace the torque-to-yield or single use fastener could cause damage to the vehicle or component.

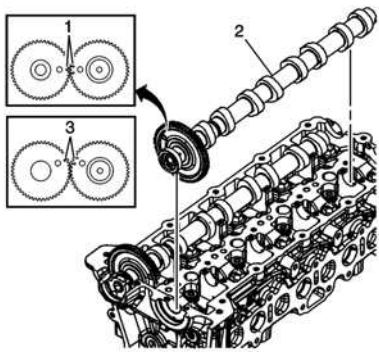
- Tighten the camshaft bearing cap bolts in the sequence shown and tighten to **10 Y (89 lb in)**.
- Loosen the center intake camshaft bearing cap bolts (1, 2) and the center exhaust camshaft bearing cap bolts (3, 4).
- Retighten the center camshaft bearing cap bolts (1, 2, 3, 4) and retighten the camshaft bearing cap bolts to **10 Y (89 lb in)**.

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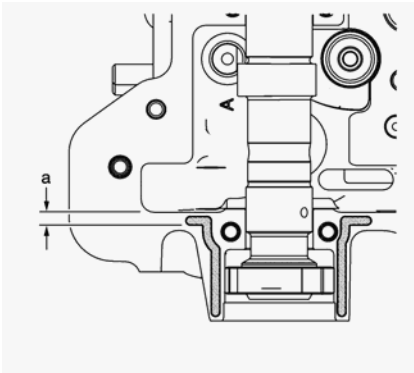
Submodel: | Engine Type: | Liters:
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1. Install the exhaust camshaft (1).

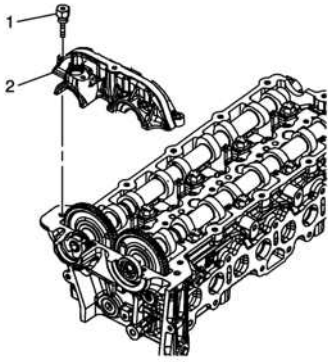


2. Install the intake camshaft (2) so that the timing marks on the camshaft sprockets are aligned (1). The final, relaxed alignment (3) for the camshaft sprockets will result during normal installation of the components.



Note:

- Ensure that all sealing material has been removed from the components, and the sealing surfaces are clean and free of contamination prior to applying the sealer.
 - Install and align the front cap within 20 minutes of applying the sealer.
 - Ensure the sealant does not drip into the intake or exhaust camshaft cap seats.
3. Apply a bead of sealant to the camshaft bearing front cap sealing surface. Refer to Adhesives, Fluids, Lubricants, and Sealers for the recommended sealant. Use a sponge to spread very carefully to the indicated areas.

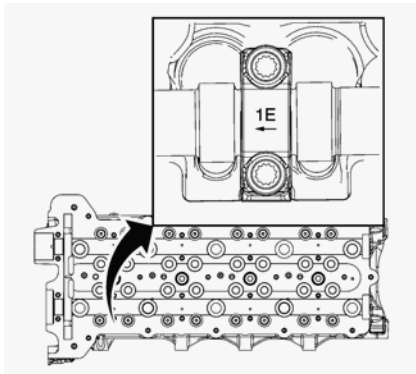


Note: It is critical during installation to ensure the bearing front cap and cylinder head alignment is correct and the mating surfaces are flush.

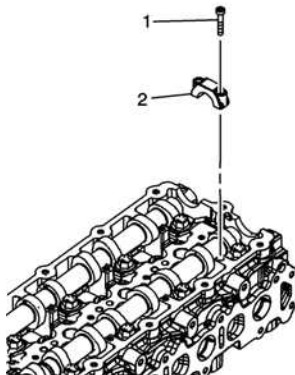
4. Inspect the intake and exhaust camshaft cap seats, and confirm that the seats are free of sealant.

Caution: Refer to Fastener Caution.

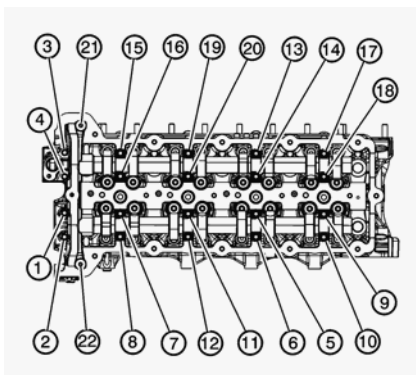
5. Install the camshaft bearing front cap (2). Tighten the cap bolts (1) to **11 Y (97 lb in)**.



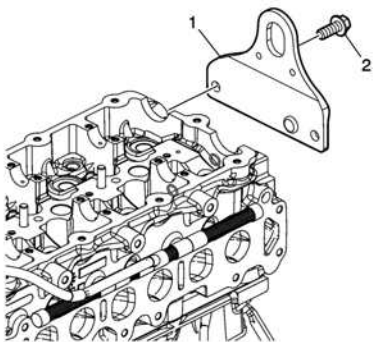
6. Match each camshaft cap to the correct location on the cylinder head. In the illustration, the camshaft cap is the first cylinder, indicated by the "1", on the intake side of the cylinder head, indicated by the "I". A camshaft cap on the exhaust side is indicated by an "E".



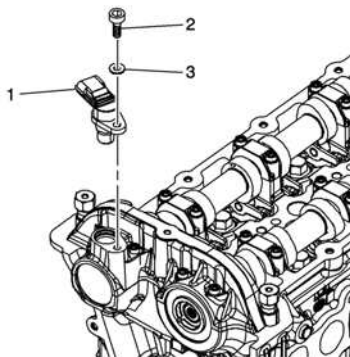
7. Install the camshaft caps (2).



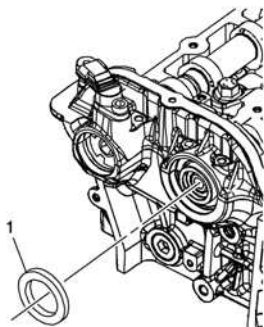
8. Tighten the cap bolts in sequence to **11 Y (97 lb in)**.



9. Install the engine lift rear bracket (1) and bracket bolt (2).
10. Tighten the bolt to **58 Y (43 lb ft)**.



11. Install the camshaft position (CMP) sensor (1), washer (3), and bolt (2). Tighten the bolt to **11 Y (97 lb in)**.



12. Install the intake camshaft oil seal (1).

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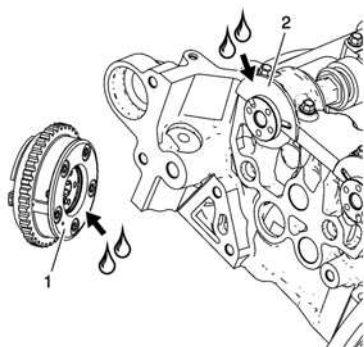
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



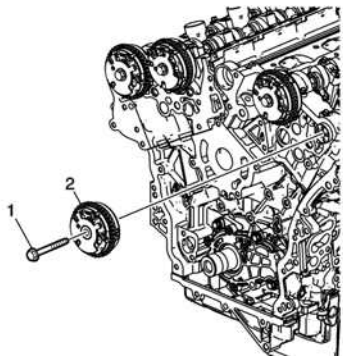
1. Ensure the proper camshaft position actuator is installed. Observe the body of the camshaft position actuator for the "EX" marking (1). The marking is for an exhaust camshaft position actuator.
2. Ensure the proper timing mark is used. Observe the outer ring of the camshaft position actuator for the circle marking (3). The marking is for alignment to the highlighted timing chain link on the left side of the engine.

Caution: Refer to Torque Reaction Against Timing Drive Chain Caution.

3. Use an open wrench on the hex cast into the camshaft in order to prevent camshaft rotation when tightening the camshaft position actuator bolt.



4. Apply a liberal amount of lubricant to the back of the camshaft position actuator (1) and front of the camshaft bearing cap (2). Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.



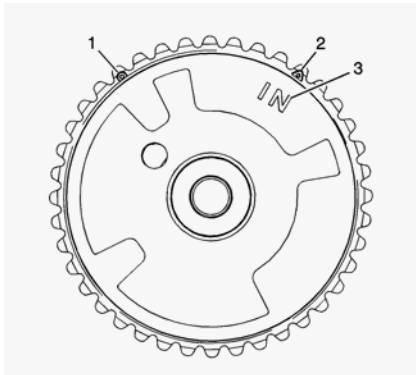
5. Install the left exhaust camshaft position actuator (2).

Caution: Refer to Fastener Caution.

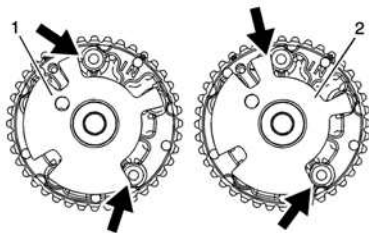
6. Install the camshaft position actuator bolt (1) and tighten to **58 Y (43 lb ft)**.

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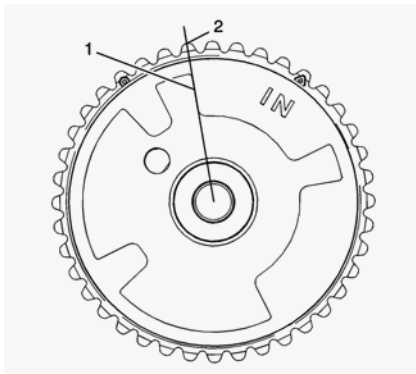


1. Ensure the proper camshaft position actuator is installed. Observe the body of the camshaft position actuator for the "IN" marking (3). The marking is for an intake camshaft position actuator.



Caution: Ensure the proper camshaft position actuator is installed in the correct position. Failure to install the proper camshaft position actuator can effect engine performance and set an engine code.

2. Ensure the proper camshaft position actuator is being installed. The reluctor wheel on the right intake camshaft position actuator (1) is indexed in a different position compared to the left intake camshaft position actuator (2).



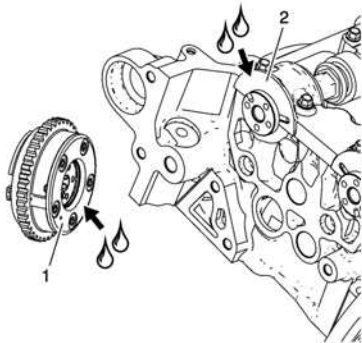
3. On the left intake camshaft actuator the edge of the reluctor wheel (1) lines up with the peak (2) of the sprocket tooth.



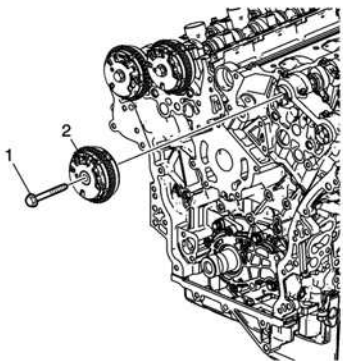
4. Ensure the proper timing mark is used. Observe the outer ring of the camshaft position actuator for the circle marking (1). The circle marking is for alignment to the highlighted timing chain link on the left side of the engine.

Caution: Refer to Torque Reaction Against Timing Drive Chain Caution.

5. Use an open wrench on the hex cast into the camshaft in order to prevent camshaft rotation when tightening the camshaft position actuator bolt.



6. Apply a liberal amount of lubricant to the back of the camshaft position actuator (1) and front of the camshaft bearing cap (2). Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.



7. Install the left intake camshaft position actuator (2).

Caution: Refer to Fastener Caution.

8. Install the camshaft position actuator bolt (1) and tighten to **58 Y (43 lb ft)**.

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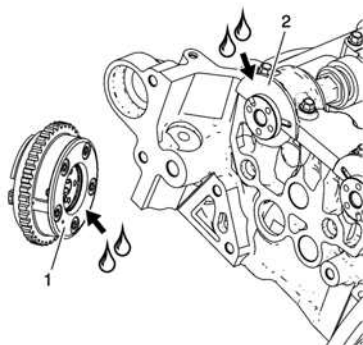
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



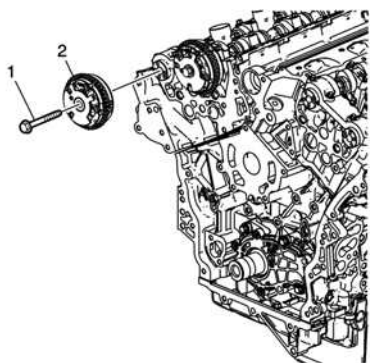
1. Ensure the proper camshaft position actuator is installed. Observe the body of the camshaft position actuator for the "EX" marking (1). The marking is for an exhaust camshaft position actuator.
2. Ensure the proper timing mark is used. Observe the outer ring of the camshaft position actuator for the triangle marking (2). The marking is for alignment to the highlighted timing chain link on the right side of the engine.

Caution: Refer to Torque Reaction Against Timing Drive Chain Caution.

3. Use an open wrench on the hex cast into the camshaft in order to prevent camshaft rotation when tightening the camshaft position actuator bolt.



4. Apply a liberal amount of lubricant to the back of the camshaft position actuator (1) and front of the camshaft bearing cap (2). Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.



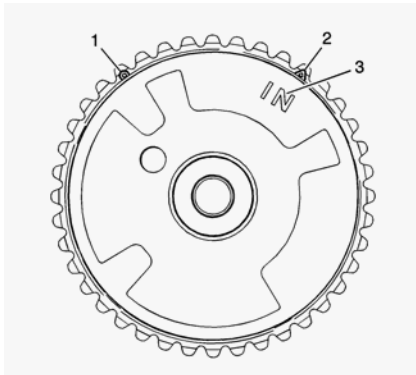
5. Install the right exhaust camshaft position actuator (2).

Caution: Refer to Fastener Caution.

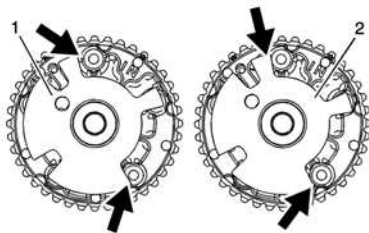
6. Install the camshaft position actuator bolt (1) and tighten to **58 Y (43 lb ft)**.

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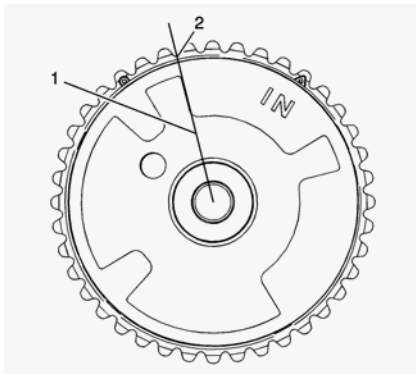


1. Ensure the proper camshaft position actuator is installed. Observe the body of the camshaft position actuator for the "IN" marking (3). The marking is for an intake camshaft position actuator.

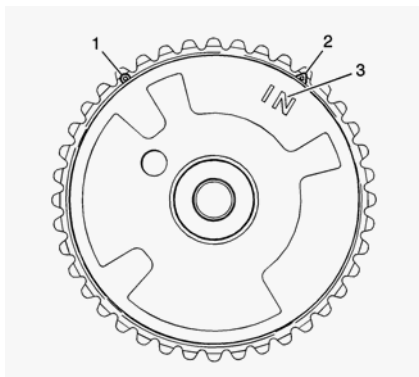


Caution: Ensure the proper camshaft position actuator is installed in the correct position. Failure to install the proper camshaft position actuator can effect engine performance and set an engine code.

2. Ensure the proper camshaft position actuator is being installed. The reluctor wheel on the right intake camshaft position actuator (1) is indexed in a different position compared to the left intake camshaft position actuator (2).



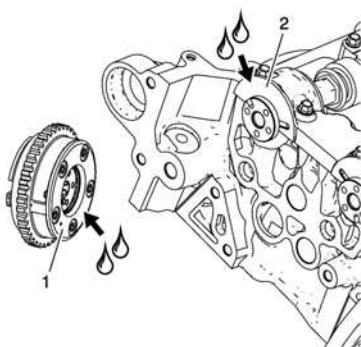
3. On the right intake camshaft actuator the edge of the reluctor wheel (1) lines up with the valley (2) of the sprocket tooth.



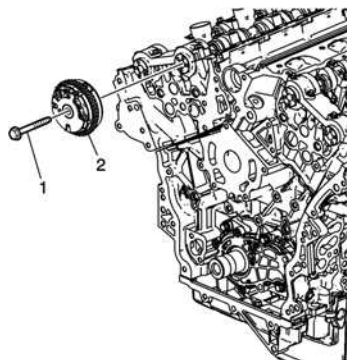
4. Ensure the proper timing mark is used. Observe the outer ring of the camshaft position actuator for the triangle marking (2). The triangle marking is for alignment to the highlighted timing chain link on the right side of the engine.

Caution: Refer to Torque Reaction Against Timing Drive Chain Caution.

5. Use an open wrench on the hex cast into the camshaft in order to prevent camshaft rotation when tightening the camshaft position actuator bolt.



6. Apply a liberal amount of lubricant to the back of the camshaft position actuator (1) and front of the camshaft bearing cap (2). Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.



7. Install the right intake camshaft position actuator (2).

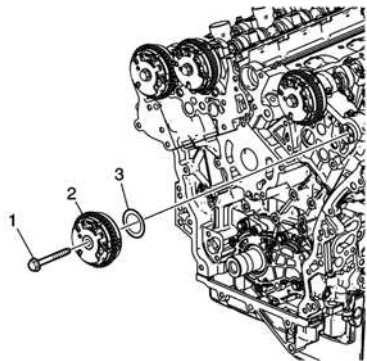
Caution: Refer to Fastener Caution.

8. Install the camshaft position actuator bolt (1) and tighten to **58 Y (43 lb ft)**.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:



Caution: Refer to Torque Reaction Against Timing Drive Chain Caution.

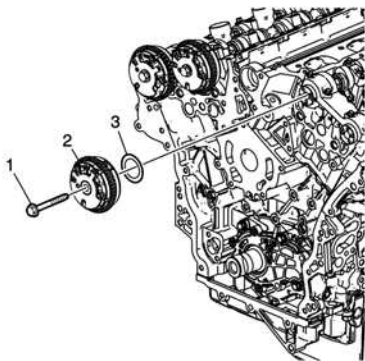
Note: Some 2009 applications may not be equipped with camshaft thrust washers.

1. Use an open wrench on the hex cast into the camshaft in order to prevent engine rotation when loosening the camshaft position actuator bolt.
2. Remove the left exhaust camshaft position actuator bolt (1).
3. Remove the left exhaust camshaft position actuator (2).
4. Remove the camshaft thrust washer if applicable (3).

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:



Caution: Refer to Torque Reaction Against Timing Drive Chain Caution.

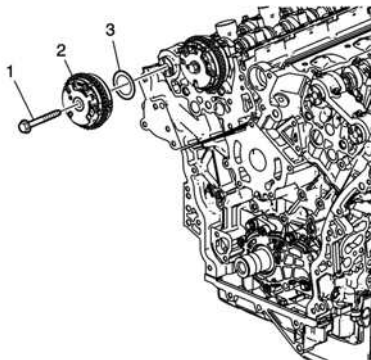
Note: Some 2009 applications may not be equipped with camshaft thrust washers.

1. Use an open wrench on the hex cast into the camshaft in order to prevent engine rotation when loosening the camshaft position actuator bolt.
2. Remove the left intake camshaft position actuator bolt (1).
3. Remove the left intake camshaft position actuator (2).
4. Remove the camshaft thrust washer if applicable (3).

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Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:



Caution: Refer to Torque Reaction Against Timing Drive Chain Caution.

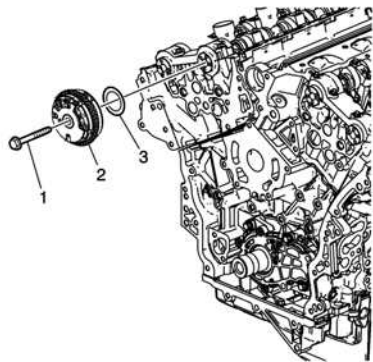
Note: Some 2009 applications may not be equipped with camshaft thrust washers.

1. Use an open wrench on the hex cast into the camshaft in order to prevent engine rotation when loosening the camshaft position actuator bolt.
2. Remove the right exhaust camshaft position actuator bolt (1).
3. Remove the right exhaust camshaft position actuator (2).
4. Remove the camshaft thrust washer if applicable (3).

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:



Caution: Refer to Torque Reaction Against Timing Drive Chain Caution.

Note: Some 2009 applications may not be equipped with camshaft thrust washers.

1. Use an open wrench on the hex cast into the camshaft in order to prevent engine rotation when loosening the camshaft position actuator bolt.
2. Remove the right intake camshaft position actuator bolt (1).
3. Remove the right intake camshaft position actuator (2).
4. Remove the camshaft thrust washer if applicable (3).

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Fuel Delivery: | Fuel:

Warning: Do not push or pull on the reluctor wheel of the camshaft position (CMP) actuator during removal or installation. The reluctor wheel is retained to the front of the CMP actuator by 3 roll pins. Pushing or pulling on the wheel may dislodge the wheel from the front of the actuator. The actuator return spring is under tension and may rotate the dislodged reluctor wheel, causing personal injury.

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Fuel Delivery: | Fuel:

Special Tools

- EN49982-1 Timing Chain Retainer
- EN49982-2 Timing Chain Retainer

For equivalent regional tools, refer to Special Tools.

Removal Procedure

1. Remove the camshaft cover. Refer to Camshaft Cover Replacement - Right Side.
2. Remove the camshaft position actuator solenoid valve solenoid – intake. Refer to Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 1 (Right Side) Intake.
3. Remove the intake camshaft position sensor. Refer to Camshaft Position Sensor Replacement - Bank 1 (Right Side) Intake.
4. Remove the exhaust camshaft position sensor. Refer to Camshaft Position Sensor Replacement - Bank 1 (Right Side) Exhaust.
5. Remove the camshaft position actuator solenoid valve solenoid – exhaust. Refer to Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 1 (Right Side) 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.

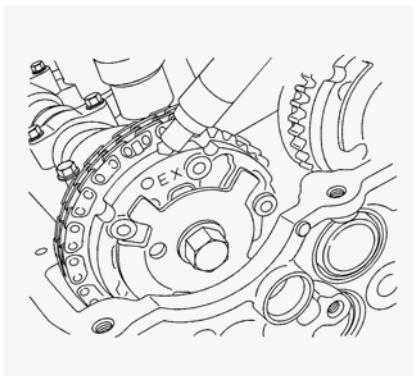
Note: Do NOT remove or back out the camshaft position actuator bolt(s) significantly, simply break them loose from their fully-torqued position. The position actuators must stay firmly attached until the retaining tools are in place, but they should be broken loose while the chain is still tight and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

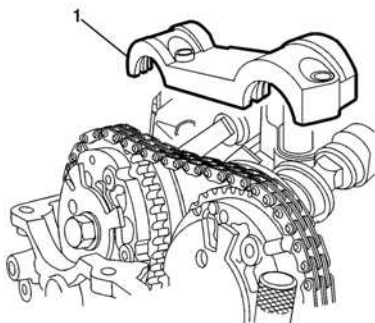
8. Mark the position of the chain to the camshaft position actuator – intake.



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

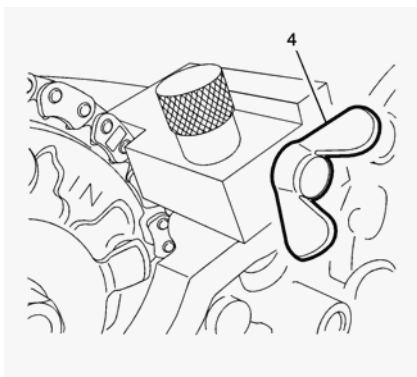


10. Remove camshaft front cap bolts (1).

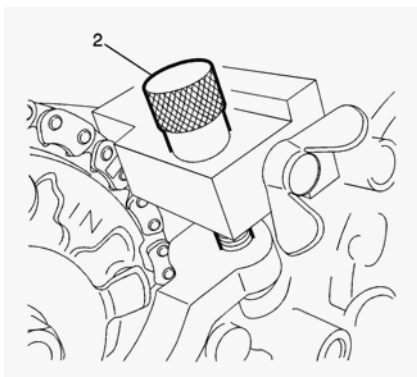


Note: Do NOT remove or loosen any other camshaft bearing caps at this time, even if you intend to eventually remove the camshaft.

11. Remove the camshaft front cap (1).

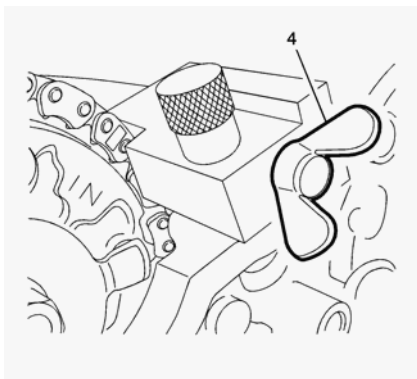


12. Loosen wingnut (4) to open the clamping area of EN49982-1 retainer.



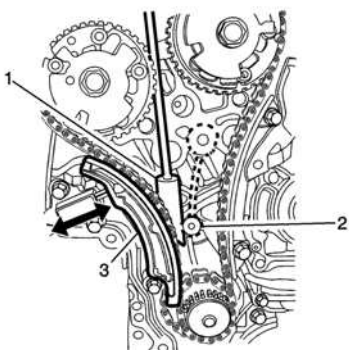
Note: Do NOT overtighten the thumbscrew. The EN49982-1 retainers should be able to slide slightly via the slot the screw goes through. This fore/aft movement will allow easier removal and installation of the chain later.

13. Install EN49982-1 retainer intake side chain holder onto front cover by screwing in the thumbscrew (2) on the EN49982-1 retainer finger-tight.



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

14. Tighten wingnut (4) so EN49982-1 retainer closes over and firmly grasps 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.

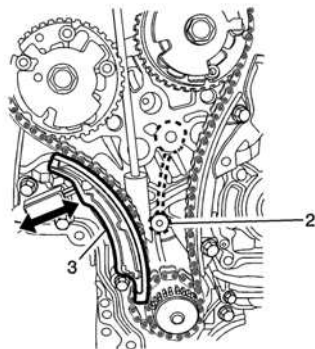
15. EN49982-2 retainer(1) will be installed in the following steps such that it wedges between an internal rib (2) that is cast into the inside of the front cover (shown in dotted line above) and the timing chain and spring-loaded tensioner shoe (3), holding the chain in position. The wedge will be left in place during the cam position actuator and/or camshaft service.



16. Insert the EN49982-2 retainer between the two camshaft position actuators with the "teeth" on the EN49982-2 retainer facing toward the front cover.



17. Once the wedge portion of EN49982-2 retainer is below the camshaft position actuators, rotate the EN49982-2 retainer until the flat in the handle faces toward the intake camshaft position actuator. This orients the "teeth" toward the chain.

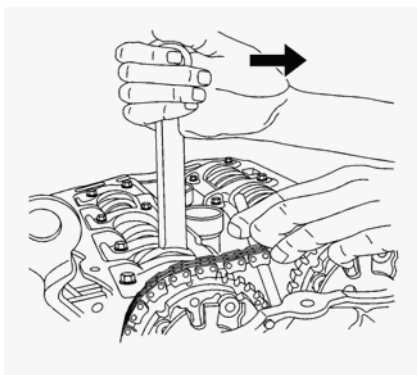


Note: Do not try to force the wedge into position, simply ensure it is loosely engaged in the timing chain and in the correct overall position.

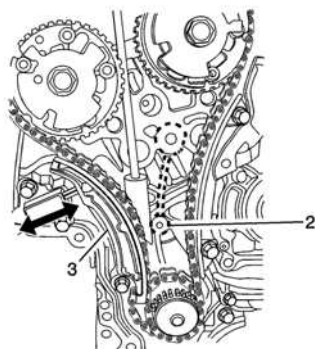
18. Drop the wedge down until it begins to engage the timing chain and the belt casting (2).



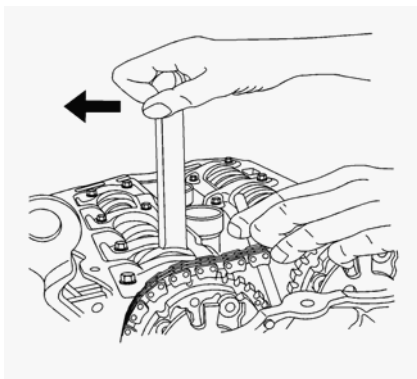
19. If possible shine a strong light down from above, between the camshaft position actuators, and see the wedge in overall position as shown in the above graphic.



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 EN49982-2 retainer.

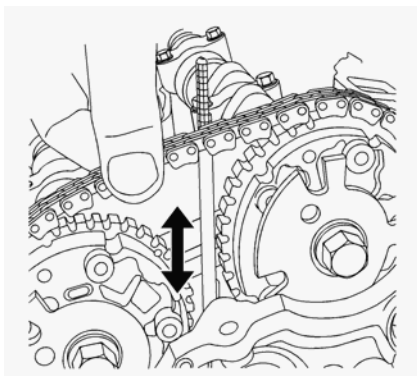


21. This rotation of the camshaft will compress the tensioner shoe (3) against the spring force of the tensioner, opening up a gap between the chain and the internal rib in the front cover. The wedge will then drop into this gap. You will feel a distinct click as the teeth engage the chain.



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.

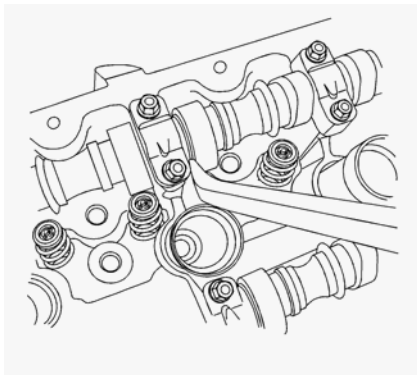
22. Release the force on the wrench, allowing the spring tension to close the tensioner shoe against the wedge portion of EN49982-2 retainer. You should be able to lightly tug on the EN49982-2 retainer and it should stay in position. Repeat Steps 20 and 21 if necessary to re-insert the EN49982-2 retainer until you are certain it is in position and will stay in position.



23. With EN49982-2 retainer 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.

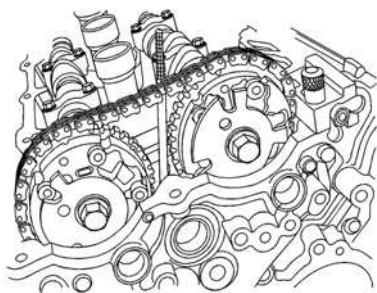


24. Do not pry against the face of the camshaft position actuators or the position actuator retaining bolt.



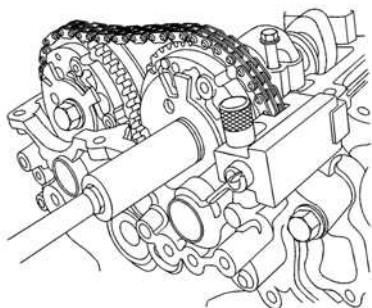
Caution: Do not pry against the face of the camshaft position actuators or the position actuator retaining bolts as the position actuators will be damaged.

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

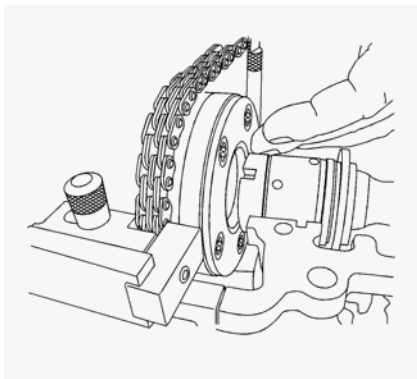


Note: Do not move or disturb the *EN49982* retainer components after their installation or the timing chains may be lost inside the front cover.

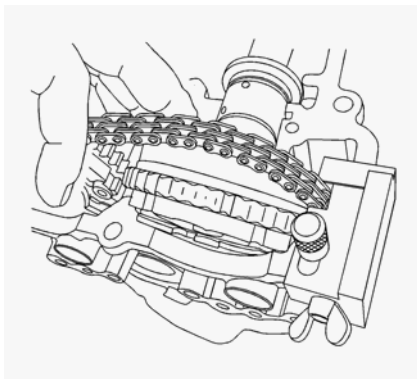
26. The *EN49982-1* retainer and *EN49982-2* retainers should be in position as shown, they must be left in position during the servicing of the camshaft position actuator(s) and/or camshaft(s).



27. 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 *EN49982-1* retainer **MUST** be installed as discussed even if the intake side will not be serviced or the timing of the camshaft chains will be lost.



28. Slide the camshaft position actuator forward and off the end of the intake camshaft. The slot in the *EN49982-1* retainer 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.

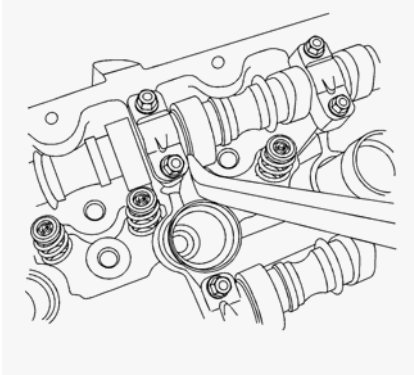


29. Tilt the camshaft position actuator forward and out/away from the engine.

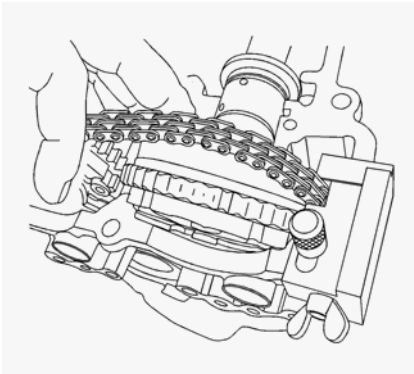
Note: DO NOT remove the *EN49982* retainers. They are holding the cam chains to maintain their properly-timed positions.

30. Allow the chain to rest on the *EN49982-1* retainer and *EN49982-2* retainer in position during service.

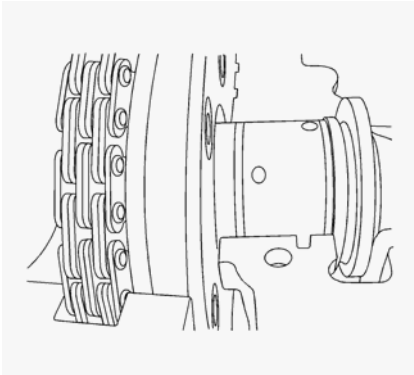
[Installation Procedure](#)



1. It may help to carefully pry the camshaft forward and to move the *EN49982-1* retainer backward via the slot to reengage 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.



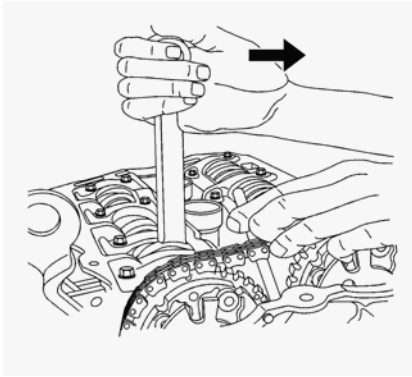
2. Install the intake camshaft position actuator first by inserting the actuator between the timing chain and front cover. Tilt the actuator in and engage the chain while aligning the marks you made on the chain and position actuator.



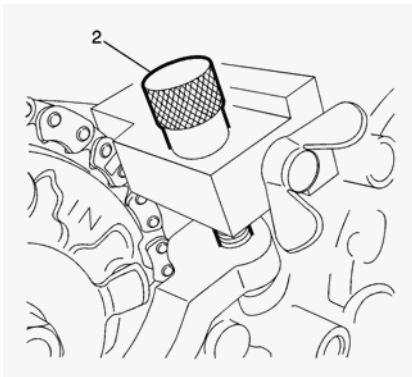
3. Ensure the camshaft position actuator fits snugly to the end of the camshaft.

Caution: Refer to Fastener Caution.

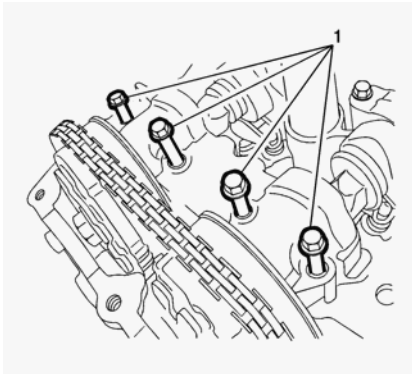
4. Install the intake camshaft position actuator retaining bolt, and lightly tighten the bolt to hold the camshaft actuator in place. DO NOT torque at this time.
5. Install the exhaust camshaft position actuator retaining bolt, and lightly tighten the bolt to hold the camshaft actuator in place. DO NOT torque at this time.
6. Double-check that 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.



7. 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 *EN49982-2* retainer.
 8. Remove *EN49982-2* retainer.
 9. 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.
10. Torque one or both camshaft position actuator retaining bolts to **58 Y (43 lb ft)**.



11. Unscrew the wingnut on *EN49982-1* retainer to release timing chain, and then remove *EN49982-1* retainer from the front cover by unscrewing the thumbscrew (2).



12. Install camshaft front cap and bolts (1).
13. Tighten the camshaft front cap outer bolts to **10 Y (89 lb in)**.
14. Tighten the camshaft front cap inner bolts to **10 Y (89 lb in)**.
15. Install the camshaft position actuator solenoid valve solenoid – exhaust. Refer to Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 1 (Right Side) Exhaust.
16. Install the camshaft position actuator solenoid valve solenoid-intake. Refer to Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 1 (Right Side) Intake.
17. Install the intake camshaft position sensors. Refer to Camshaft Position Sensor Replacement - Bank 1 (Right Side) Intake.
18. Install the exhaust camshaft position sensor. Refer to Camshaft Position Sensor Replacement - Bank 1 (Right Side) Exhaust.
19. Install the camshaft cover. Refer to Camshaft Cover Replacement - Right Side.

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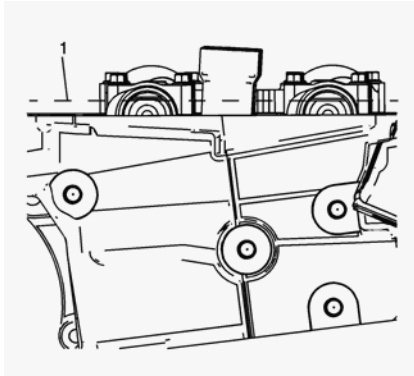
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Special Tools

EN-48313 Timing Chain Retention Tool

For equivalent regional tools, refer to Special Tools.

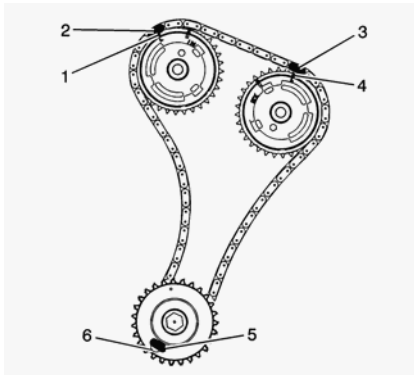
[Removal Procedure](#)



1. Remove the intake manifold. Refer to Lower Intake Manifold Replacement.
2. Remove the left camshaft cover. Refer to Camshaft Cover Replacement - Left Side.
3. Remove the left intake and exhaust camshaft position sensors. Refer to Camshaft Position Sensor Replacement - Bank 2 (Left Side) Intake and Camshaft Position Sensor Replacement - Bank 2 (Left Side) Exhaust.
4. Remove the left intake and exhaust camshaft position actuator solenoids. Refer to Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 2 (Left Side) Intake and Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 2 (Left Side) Exhaust.

Note: Rotate the crankshaft balancer bolt in a clockwise direction ONLY.

5. Rotate the crankshaft balancer using the balancer bolt until the camshafts are in a neutral (low tension) position. The camshafts will be parallel with the camshaft cover rail (1).

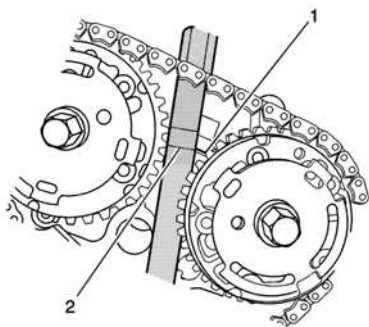


Note: Ensure that the camshaft timing chain and the camshaft position actuators are marked for proper assembly.

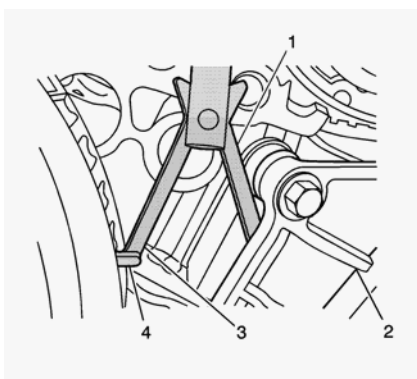
6. Use a paint stick to create an alignment mark on one of the timing chain links (2) and the adjacent tooth on the exhaust camshaft position actuator (1).
7. Use a paint stick to create an alignment mark on one of the timing chain links (3) and the adjacent tooth on the intake camshaft position actuator (4).

Caution: Refer to Torque Reaction Against Timing Drive Chain Caution.

8. Use an open end wrench on the hex cast into the left intake and exhaust camshafts and rotate the camshafts toward each other in order to create slack in the chain between the actuators.

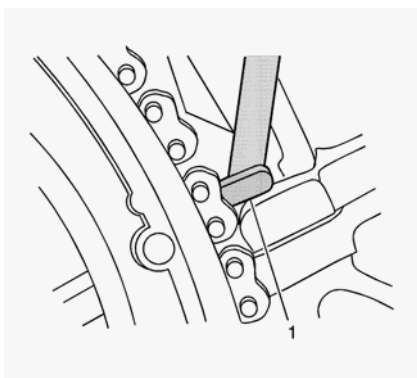


9. Unscrew the *EN-48313* tool so that the legs of the tool are retracted.
10. Insert the *EN-48313* tool between the camshaft actuators, rearward of the timing chain until the bottom line that is scribed in the body of the tool (2) is adjacent to the top surface of the cylinder head (1). This is the approximate installed position.



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

11. Ensure that the feet (4) on the legs of the tool are facing the front of the engine.
12. Partially expand the legs (1, 3) of the *EN-48313* tool by turning the T-shaped handle clockwise.
13. Insert the leg of the tool (1) behind the timing chain guide (2).
14. Continue expanding the *EN-48313* tool until the legs (1, 3) contact the timing chain. Do not tighten at this time.

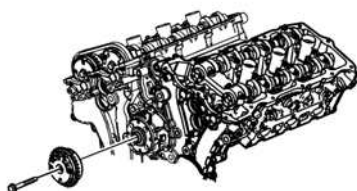


Note: Ensure that the foot (1) of the *EN-48313* tool is engaged into one of the link pockets to prevent tool slippage during tightening of the *EN-48313* tool.

15. Hand tighten the *EN-48313* tool.
16. Use an open end wrench on the hex cast into the left intake and exhaust camshafts and rotate the camshafts toward each other in order to create slack in the chain between the actuators.

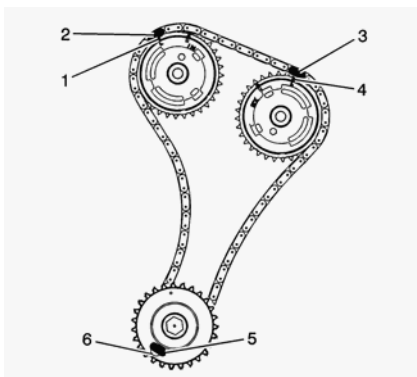


17. The *EN-48313* tool is now properly installed to hold the timing chain in position.



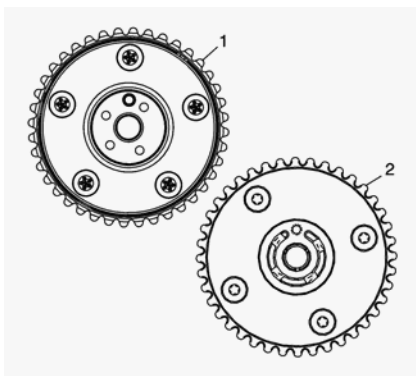
18. Use an open end wrench on the hex cast into the camshaft in order to prevent engine rotation when loosening the camshaft position actuator bolt.
19. If replacing the exhaust camshaft position actuator, then remove the bolt and the actuator.
20. If replacing the intake camshaft position actuator, then remove the bolt and the actuator.
21. If removing both the exhaust and intake camshaft actuators, the timing chain can be draped over the *EN-48313* tool once the actuators have been removed.
22. Rotate the actuator in order to align the opening in the actuator reluctor wheel with the cam sensor boss in the front cover, to allow actuator removal.
23. Remove the camshaft thrust washer.

[Installation Procedure](#)



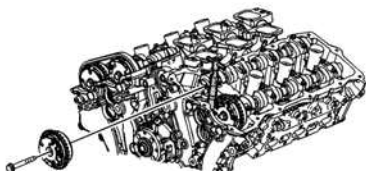
Note: Ensure that the camshaft timing chain and the camshaft position actuators are marked for proper assembly.

1. Align the exhaust camshaft actuator alignment mark (1) to the timing chain alignment mark (2) made during disassembly.
2. Ensure that the intake camshaft actuator alignment mark (4) and the timing chain alignment mark (3) are also aligned.
3. Position the exhaust camshaft actuator to the camshaft and install the actuator bolt hand tight.
4. Remove the *EN-48313* tool .



Note:

- The camshaft position actuator will vary depending on application.
 - Camshaft thrust washers must be installed on all 2010 applications when servicing the camshaft position actuators. Do not install washers on 2009 applications if they are not already present.
5. Ensure the proper camshaft thrust washer is used. Use a 1.6 mm (0.063 in) thrust washer on applications that have 5 attaching screws on the back side of the camshaft position actuator (1). Use a 1.1 mm (0.043 in) thick thrust washer with yellow speckles on applications that have 4 attaching screws on the back side of the camshaft position actuator (2).
 6. Install the thrust washer, if applicable.



Caution: Refer to Fastener Caution.

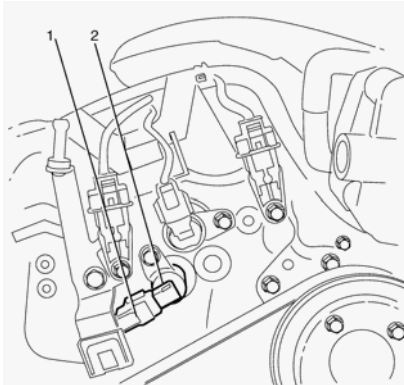
7. If the exhaust camshaft position actuator has been replaced, then tighten the bolt to **58 Y (43 lb ft)**.
8. If the intake camshaft position actuator has been replaced, then tighten the bolt to **58 Y (43 lb ft)**.
9. If both the exhaust and intake has been replaced, then tighten bolt to **58 Y (43 lb ft)**.
10. Install the left intake and exhaust camshaft position actuator solenoids. Refer to Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 2 (Left Side) Intake and Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 2 (Left Side) Exhaust.
11. Install the left intake and exhaust camshaft position sensors. Refer to Camshaft Position Sensor Replacement - Bank 2 (Left Side) Intake and Camshaft Position Sensor Replacement - Bank 2 (Left Side) Exhaust.
12. Install the left camshaft cover. Refer to Camshaft Cover Replacement - Left Side.
13. Install the intake manifold. Refer to Lower Intake Manifold Replacement.

2013 Chevrolet Colorado

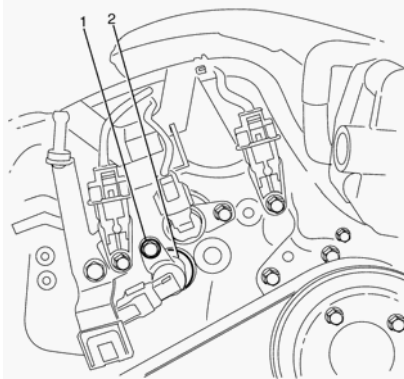
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

[Removal Procedure](#)

1. Turn the ignition OFF.
2. Disconnect the battery negative cable. Refer to Battery Negative Cable Disconnection and Connection.



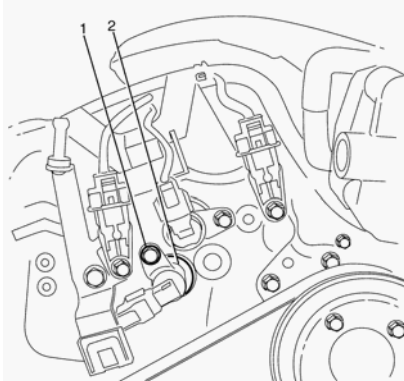
3. Remove the camshaft position (CMP) actuator valve electrical connector (1) from the CMP (2).



4. Remove the CMP actuator solenoid valve to engine front cover retaining bolt (1).
5. Remove the CMP actuator valve (2).
6. Inspect the CMP actuator valve seal and replace as necessary.

[Installation Procedure](#)

1. Inspect the CMP actuator valve seal for damage. Replace the seal if necessary.

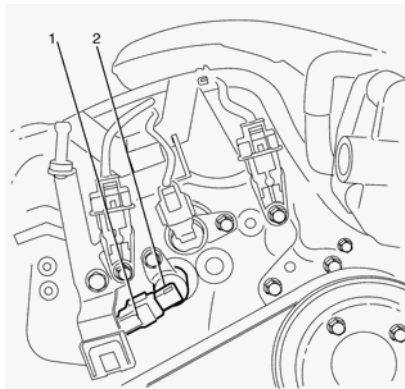


2. Install the CMP actuator valve (2) to the engine front cover.

Caution: Refer to Fastener Caution.

3. Install the CMP actuator solenoid valve to engine front cover retaining bolt (1).
Tighten
Tighten the bolt to 9 Y (80 lb in).

Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 1 (Right Side) Exhaust

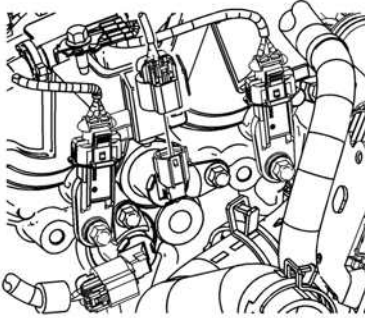


4. Install the CMP valve electrical connector (1) to the CMP actuator valve.
5. Connect the battery negative cable. Refer to Battery Negative Cable Disconnection and Connection.

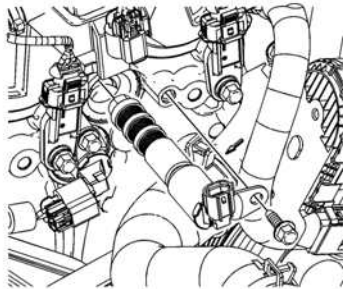
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

[Removal Procedure](#)



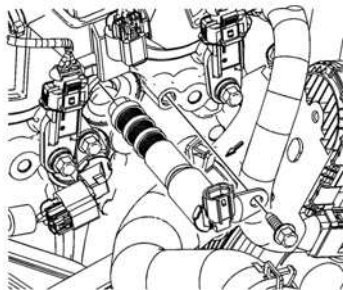
1. Turn the ignition OFF.
2. Disconnect the camshaft position (CMP) actuator valve electrical connector.



3. Remove the CMP actuator valve bolt.
4. Remove the CMP actuator valve.
5. Inspect the CMP actuator valve seal for damage. Replace the seal if necessary.

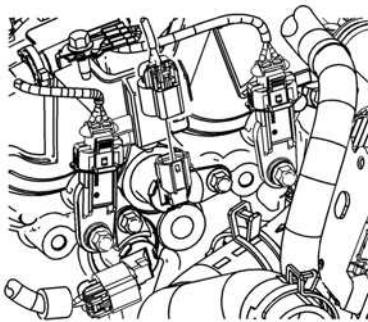
[Installation Procedure](#)

1. Inspect the CMP actuator valve seal for damage. Replace the seal if necessary.



2. Install the CMP actuator valve.
- Caution:** Refer to Fastener Caution.
3. Install the CMP actuator valve bolt and tighten to **10 Y (89 lb in)**.

Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 1 (Right Side) Intake



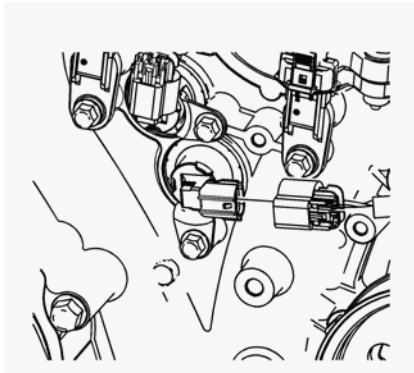
4. Connect the CMP actuator valve electrical connector.

2013 Chevrolet Colorado

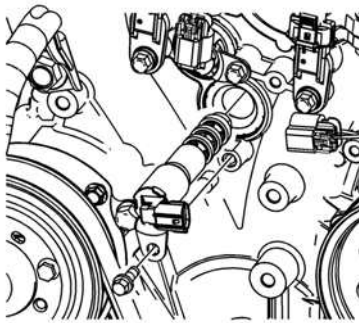
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

[Removal Procedure](#)

1. Turn the ignition OFF.
2. Remove the intake manifold cover. Refer to Intake Manifold Cover Replacement



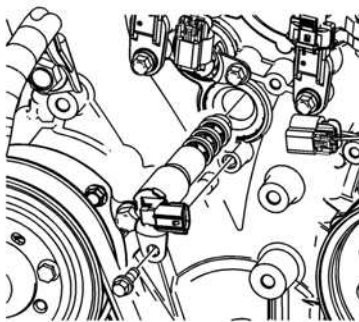
3. Remove the camshaft position (CMP) actuator valve electrical connector.



4. Remove the CMP actuator valve bolt.
5. Remove the CMP actuator valve.
6. Inspect the CMP actuator valve seal for damage and replace as necessary.

[Installation Procedure](#)

1. Inspect the CMP actuator valve seal for damage. Replace the seal if necessary.

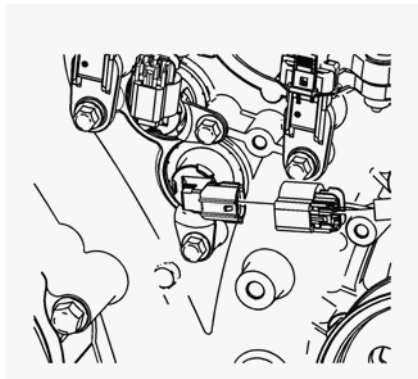


2. Install the CMP actuator valve.

Caution: Refer to Fastener Caution.

3. Install the CMP actuator valve bolt and tighten to **10 Y (89 lb in)**.

Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 2 (Left Side) Exhaust



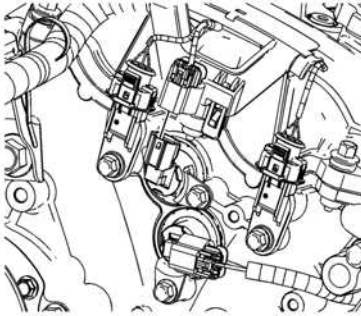
4. Install the CMP actuator valve electrical connector.
5. Install the intake manifold cover. Refer to Intake Manifold Cover Replacement

2013 Chevrolet Colorado

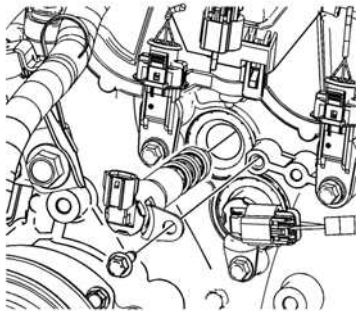
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

[Removal Procedure](#)

1. Turn the ignition OFF.
2. Remove the intake manifold cover. Refer to Intake Manifold Cover Replacement



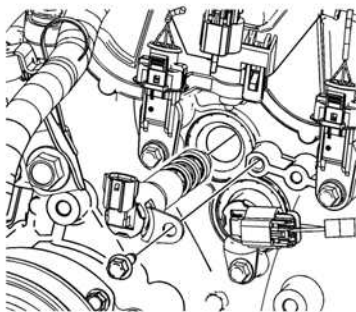
3. Remove the camshaft position (CMP) actuator valve electrical connector.



4. Remove the CMP actuator valve bolt.
5. Remove the CMP actuator valve.
6. Inspect the CMP actuator valve seal for damage and replace as necessary.

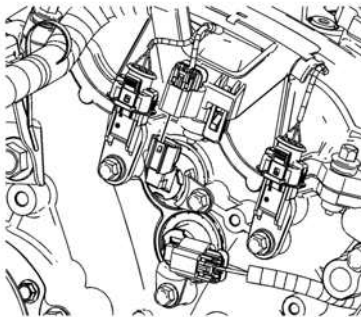
[Installation Procedure](#)

1. Inspect the CMP actuator valve seal for damage. Replace the seal if necessary.



2. Install the CMP actuator valve.
Caution: Refer to Fastener Caution.
3. Install the CMP actuator valve bolt and tighten to **10 Y (89 lb in)**.

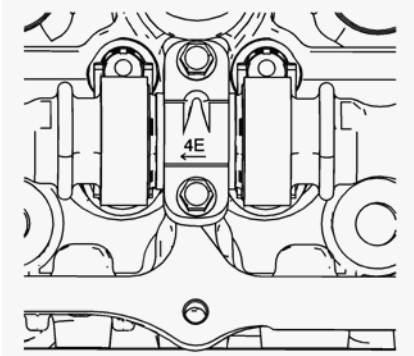
Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 2 (Left Side) Intake



4. Install the CMP actuator valve electrical connector.
5. Install the intake manifold cover. Refer to Intake Manifold Cover Replacement

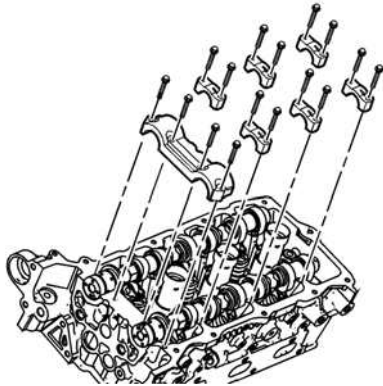
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

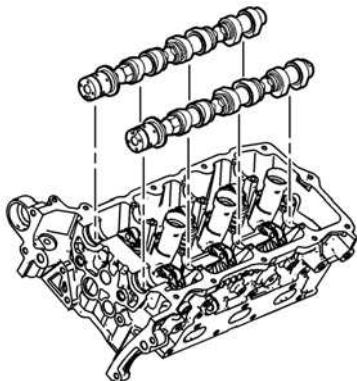


1. Observe the markings on the bearing caps. Each bearing cap is marked in order to identify its location. The markings have the following meanings:

- The raised feature must always be oriented toward the center of the cylinder head.
- The I indicates the intake camshaft.
- The E indicates the exhaust camshaft.
- The number indicates the journal position from the front of the engine.



- Remove the camshaft bearing cap bolts.
- Remove the camshaft bearing caps.

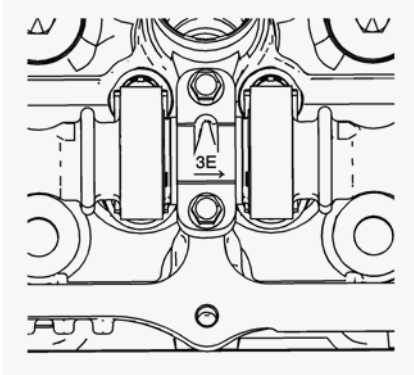


Important: Mark the camshafts upon removal to ensure installation is in the correct position.

- Remove the camshafts.
- Replace the camshaft bearing caps and bolts.

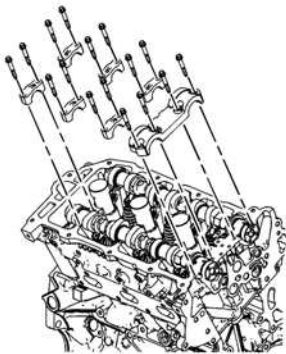
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

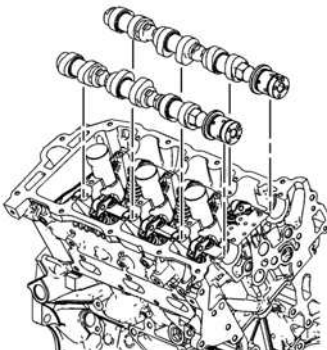


1. Observe the markings on the bearing caps. Each bearing cap is marked in order to identify its location. The markings have the following meanings:

- The raised feature must always be oriented toward the center of the cylinder head.
- The I indicates the intake camshaft.
- The E indicates the exhaust camshaft.
- The number indicates the journal position from the front of the engine.



- Remove the camshaft bearing cap bolts.
- Remove the camshaft bearing caps.

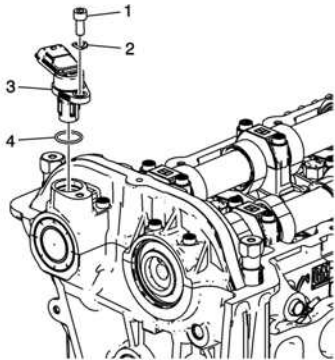


Important: Mark the camshafts upon removal to ensure installation is in the correct position.

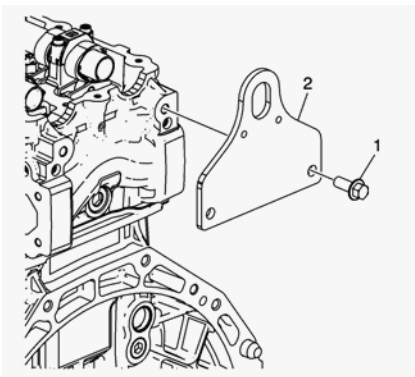
- Remove the camshafts.

2013 Chevrolet Colorado

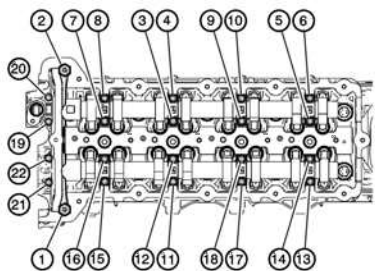
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



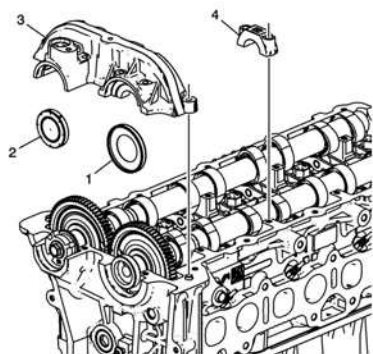
1. Remove the camshaft position sensor bolt (1), washer (2), and sensor (3).
2. Remove and discard the camshaft position sensor seal (4).



3. Remove the rear engine lift bracket (2) and bolts (1).

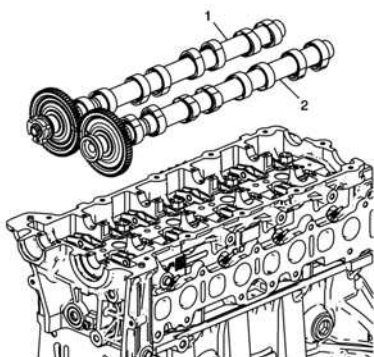


4. Remove the camshaft cap bolts in sequence.

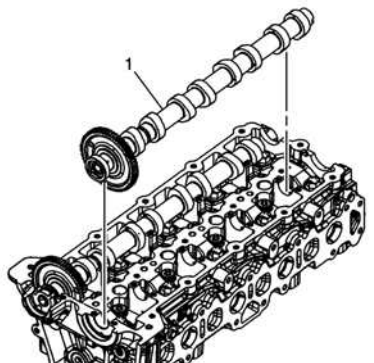


Note: Mark the camshaft caps before removal to ensure installation in their original location.

5. Remove the camshaft caps (3–4).
6. Remove the camshaft exhaust cap (2) and camshaft intake seal (1).



7. Remove the exhaust camshaft (1) and intake camshaft (2).



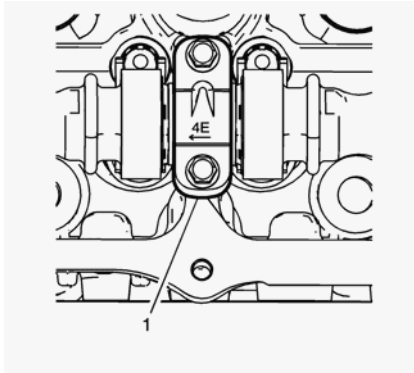
8. Remove the valve rocker arm and lifters (1) as an assembly.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

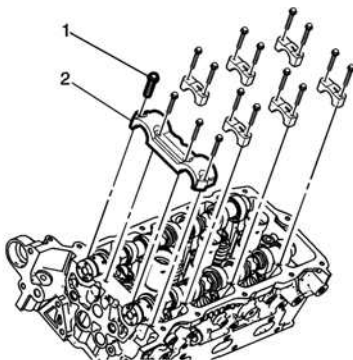
Removal Procedure

1. Remove the camshaft position actuators. Refer to Camshaft Position Actuator Replacement - Bank 2 and Camshaft Position Actuator Replacement - Bank 1.

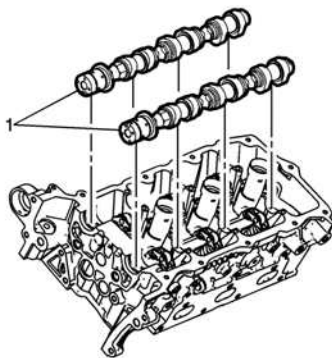


2. Observe the markings on the bearing caps (1). Each bearing cap is marked in order to identify its location. The markings have the following meanings:

- The raised feature must always be oriented toward the center of the cylinder head.
- The I indicates the intake camshaft.
- The E indicates the exhaust camshaft.
- The number indicates the journal position from the front of the engine.



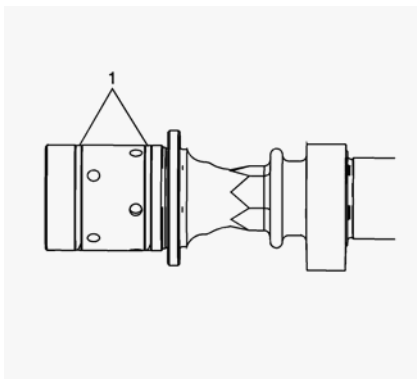
- Remove the camshaft bearing cap bolts (1).
- Remove the camshaft bearing caps (2).



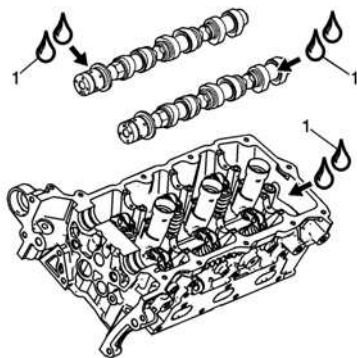
Note: Mark the camshafts upon removal to ensure installation is in the correct position.

- Remove the camshafts (1).

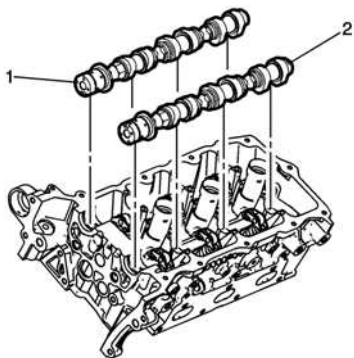
Installation Procedure



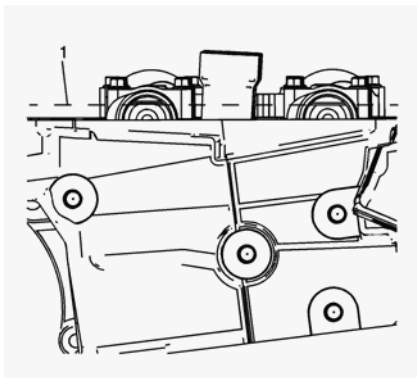
1. Ensure that the camshaft sealing rings (1) are in place in the camshaft grooves. Camshaft sealing rings must be in place below the surface of the camshaft journal in order to avoid being pinched between the cylinder head and the camshaft caps.



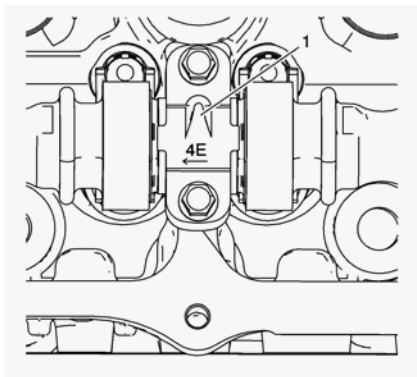
2. Apply a liberal amount of lubricant (1) to the camshaft journals and the left cylinder head camshaft carriers. Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.



3. Place the left intake (1) and left exhaust (2) camshafts in position in the left cylinder head.

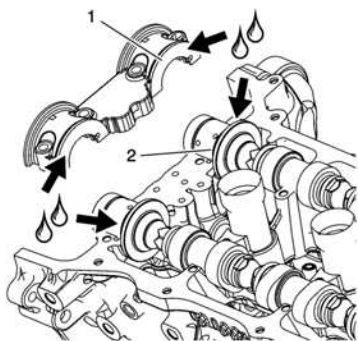


4. Position the camshaft lobes in a neutral position with the flats on the back of the camshafts up and parallel (1) with the left cylinder head camshaft cover rail.

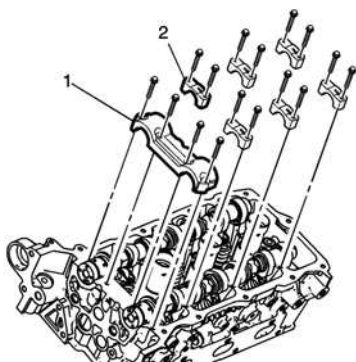


5. Observe the markings on the left cylinder head camshaft bearing caps. Each bearing cap is marked in order to identify its location. The markings have the following meanings:

- The raised feature (1) must always be oriented toward the center of the cylinder head.
- The I indicates the intake camshaft.
- The E indicates the exhaust camshaft.
- The number 2, 4, 6 indicates the cylinder position from the front of the engine.
- Apply a liberal amount of lubricant to the camshaft bearing caps. Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.

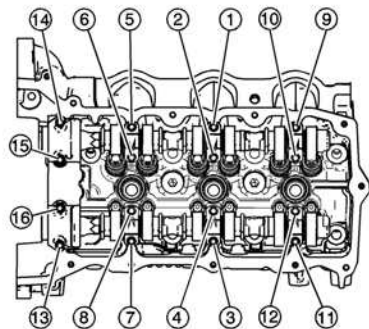


- Apply a liberal amount of lubricant to the camshaft bearing cap (1) and camshaft thrust surface (2). Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.



- Install the camshaft bearing thrust cap (1) in the first journal of the left cylinder head.
- Install the remaining bearing caps (2) with their orientation mark toward the center of the cylinder head.
- Hand start all the camshaft bearing cap bolts.

Camshaft Replacement - Left Side



Caution: Refer to Fastener Caution.

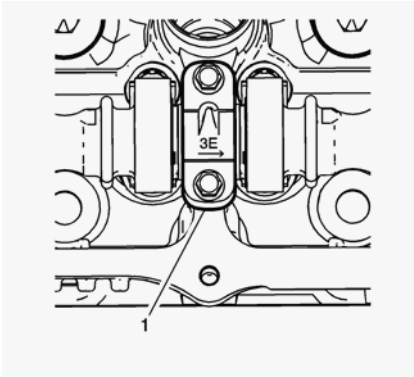
- Tighten the camshaft bearing cap bolts in the sequence shown and tighten to **10 Y (89 lb in)**.
- Loosen the center intake camshaft bearing cap bolts 1, 2 and the center exhaust camshaft bearing cap bolts 3, 4.
- Retighten the center camshaft bearing cap bolts 1, 2, 3, 4 and retighten the camshaft bearing cap bolts to **10 Y (89 lb in)**.
- Install the camshaft position actuators. Refer to Camshaft Position Actuator Replacement - Bank 2 and Camshaft Position Actuator Replacement - Bank 1.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

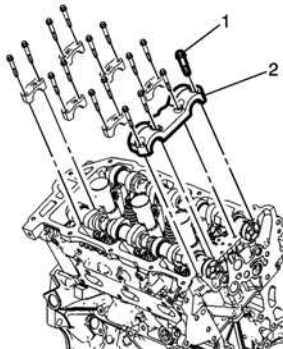
[Removal Procedure](#)

1. Remove the camshaft position actuators. Refer to Camshaft Position Actuator Replacement - Bank 1.

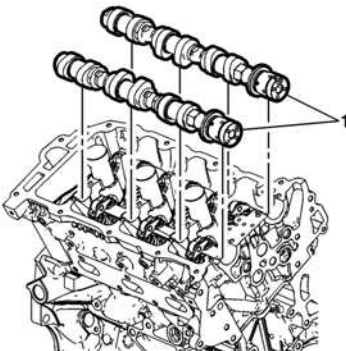


2. Observe the markings on the bearing caps (1). Each bearing cap is marked in order to identify its location. The markings have the following meanings:

- The raised feature must always be oriented toward the center of the cylinder head.
- The I indicates the intake camshaft.
- The E indicates the exhaust camshaft.
- The number indicates the journal position from the front of the engine.



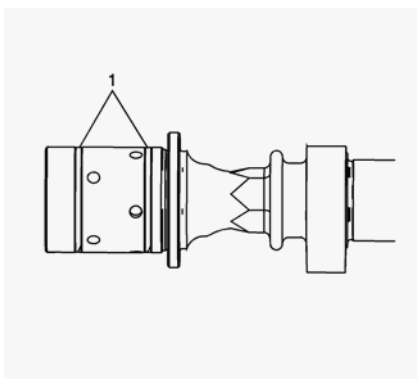
- Remove the camshaft bearing cap bolts (1).
- Remove the camshaft bearing caps (2).



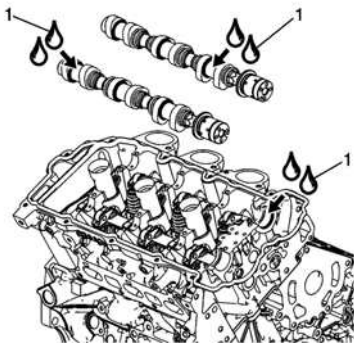
Important: Mark the camshafts upon removal to ensure installation is in the correct position.

- Remove the camshafts (1).

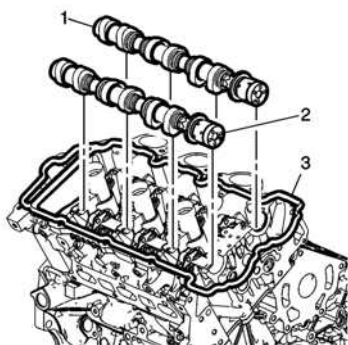
[Installation Procedure](#)



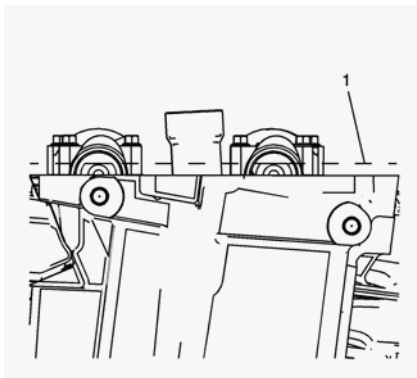
1. Ensure that the camshaft sealing rings (1) are in place in the camshaft grooves. Camshaft sealing rings must be in place below the surface of the camshaft journal in order to avoid being pinched between the cylinder head and the camshaft caps.



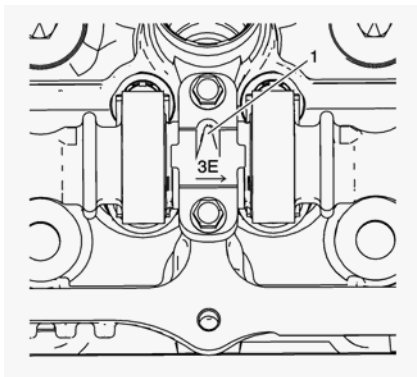
2. Apply a liberal amount of lubricant (1) to the camshaft journals and the right cylinder head camshaft carriers. Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.



3. Place the right intake (1) and right exhaust (2) camshafts in position in the right cylinder head (3).

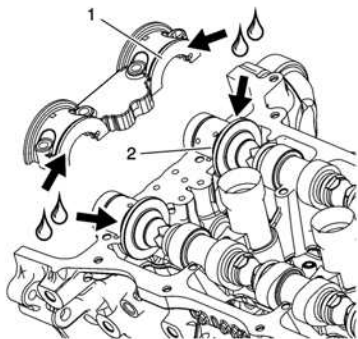


4. Position the camshaft lobes in a neutral position with the flats on the back of the camshafts up and parallel (1) with the right cylinder head camshaft cover rail.

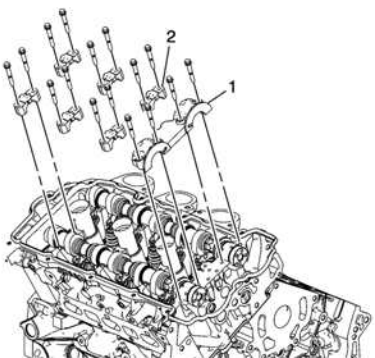


5. Observe the markings on the right cylinder head camshaft bearing caps. Each bearing cap is marked in order to identify its location. The markings have the following meanings:

- The raised feature (1) must always be oriented toward the center of the cylinder head.
- The I indicates the intake camshaft.
- The E indicates the exhaust camshaft.
- The number 1, 3, 5 indicates the cylinder position from the front of the engine.
- Apply a liberal amount of lubricant to the camshaft bearing caps. Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.

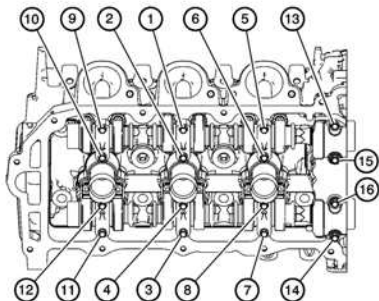


- Apply a liberal amount of lubricant to the camshaft bearing cap (1) and camshaft thrust surface (2). Refer to Adhesives, Fluids, Lubricants, and Sealers for recommended lubricant.



- Install the camshaft bearing thrust caps (1) in the first journal of the right cylinder head.
- Install the remaining bearing caps (2) with their orientation mark toward the center of the cylinder head.
- Hand start all the camshaft bearing cap bolts.

Camshaft Replacement - Right Side



Caution: Refer to Fastener Caution.

Caution: This vehicle is equipped with torque-to-yield or single use fasteners. Install a NEW torque-to-yield or single use fastener when installing this component. Failure to replace the torque-to-yield or single use fastener could cause damage to the vehicle or component.

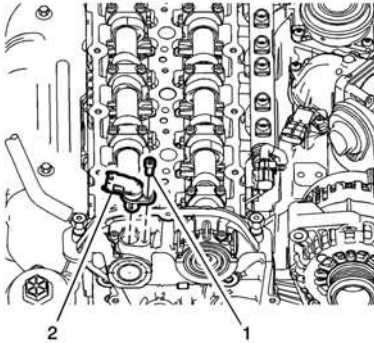
- Tighten the camshaft bearing cap bolts in the sequence shown and tighten to **10 Y (89 lb in)**.
- Loosen the center intake camshaft bearing cap bolts (1, 2) and the center exhaust camshaft bearing cap bolts (3, 4).
- Retighten the center camshaft bearing cap bolts (1, 2, 3, 4) and retighten the camshaft bearing cap bolts to **10 Y (89 lb in)**.
- Install the camshaft position actuators. Refer to Camshaft Position Actuator Replacement - Bank 1.

2013 Chevrolet Colorado

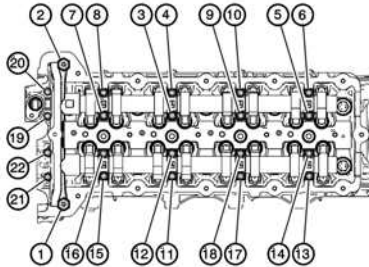
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

[Removal Procedure](#)

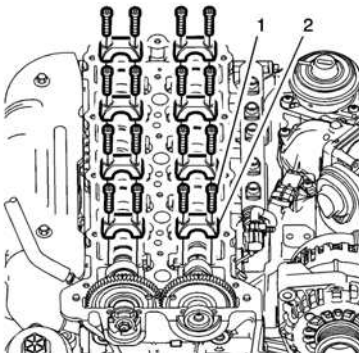
1. Remove the valve rocker arm cover. Refer to Valve Rocker Arm Cover Replacement.
2. Remove the camshaft gears. Refer to Camshaft Gear Replacement.



3. Remove the camshaft position sensor bolt (1) and sensor (2).

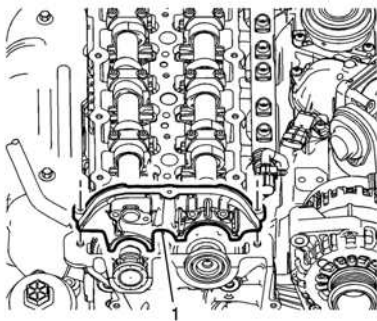


4. Remove the camshaft cap bolts in sequence.

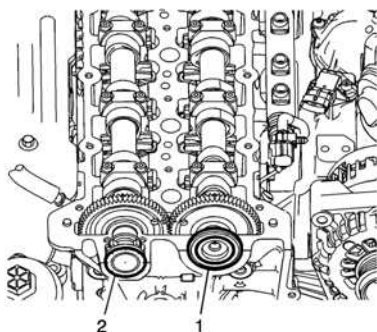


Note: Mark the camshaft caps before removal to ensure installation in their original location.

5. Remove the camshaft cap bolts (1) and caps (2).

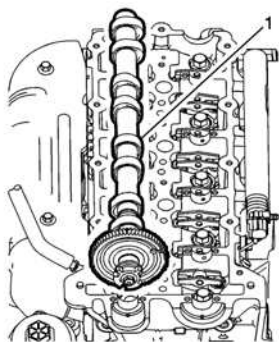


6. Remove the camshaft cap (1).

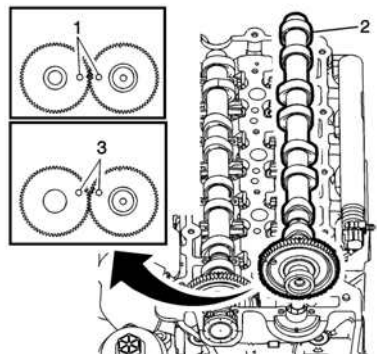


7. Remove the camshaft exhaust cap (2) and camshaft intake seal (1).
8. Remove the exhaust camshaft and intake camshaft .
9. For camshaft cleaning and inspection. Refer to Camshaft Cleaning and Inspection.

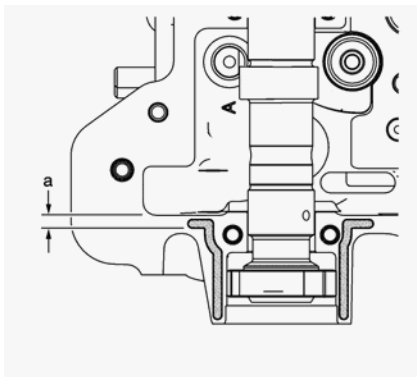
[Installation Procedure](#)



1. Install the exhaust camshaft (1).

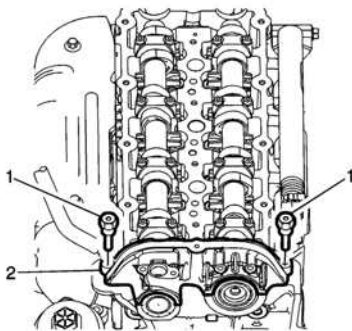


2. Install the intake camshaft (2) so that the timing marks on the camshaft sprockets are aligned (1). The final, relaxed alignment (3) for the camshaft sprockets will result during normal installation of the components.



Note:

- Ensure that all sealing material has been removed from the components, and the sealing surfaces are clean and free of contamination prior to applying the sealer.
 - Install and align the front cap within 20 minutes of applying the sealer.
 - Ensure the sealant does not drip into the intake or exhaust camshaft cap seats.
3. Apply a bead of sealant to the camshaft bearing front cap sealing surface. Refer to Adhesives, Fluids, Lubricants, and Sealers for the recommended sealant. Use a sponge to spread very carefully to the indicated areas.

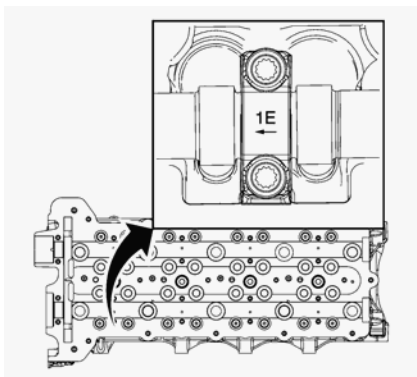


Note: It is critical during installation to ensure the bearing front cap and cylinder head alignment is correct and the mating surfaces are flush.

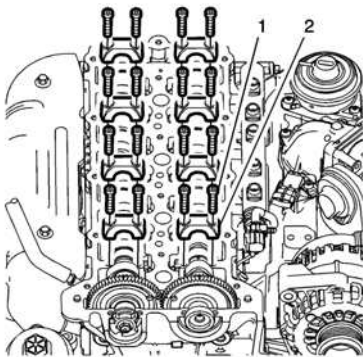
4. Inspect the intake and exhaust camshaft cap seats, and confirm that the seats are free of sealant.

Caution: Refer to Fastener Caution.

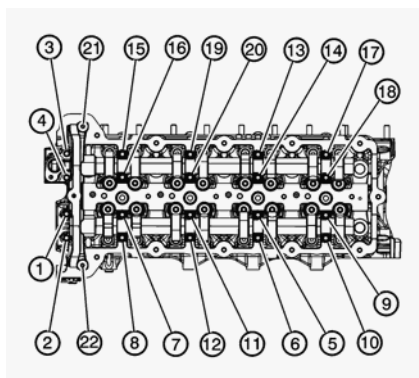
5. Install the camshaft bearing front cap (2). Tighten the cap bolts (1) to **11 Y (97 lb in)**.



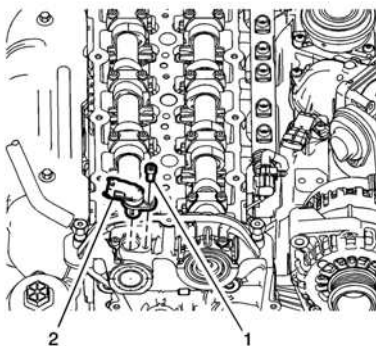
6. Match each camshaft cap to the correct location on the cylinder head. In the illustration, the camshaft cap is the first cylinder, indicated by the "1", on the intake side of the cylinder head, indicated by the "I". A camshaft cap on the exhaust side is indicated by an "E".



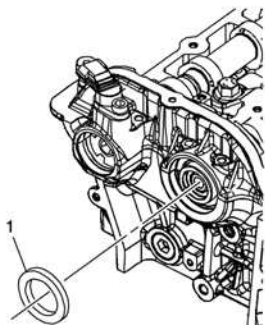
7. Install the camshaft caps (2) and bolts (1).



8. Tighten the cap bolts in sequence to **11 Y (97 lb in)**.



9. Install the camshaft position (CMP) sensor (2), and bolt (1). Tighten the bolt to **11 Y (97 lb in)**.



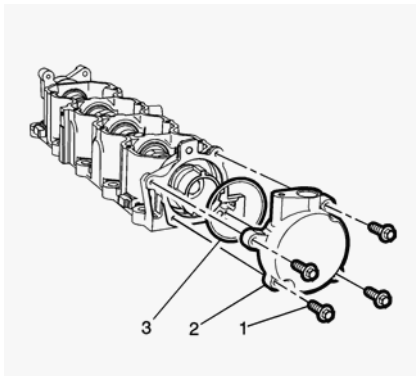
10. Install the intake camshaft oil seal (1).
11. Install the camshaft gear. Refer to Camshaft Gear Replacement.
12. Install the valve rocker arm cover. Refer to Valve Rocker Arm Cover Replacement.

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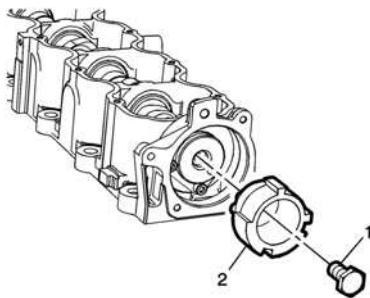
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Removal Procedure

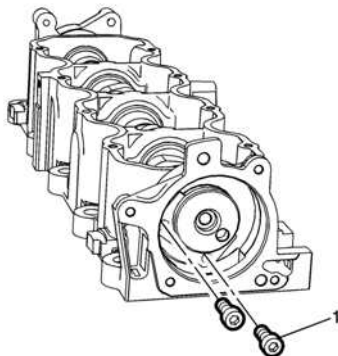
1. Remove the cylinder head. Refer to Cylinder Head Replacement.
2. Remove the camshaft sensor. Refer to Camshaft Position Sensor Replacement.



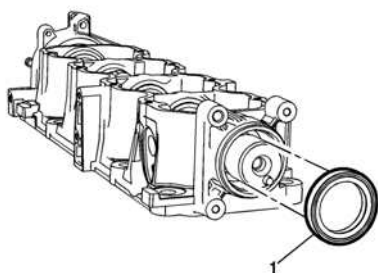
3. Remove the camshaft housing cover bolts (1).
4. Remove the camshaft housing (2).
5. Remove the camshaft housing gasket (3) and DISCARD.



6. Remove the camshaft position actuator bolt (1).
7. Remove the camshaft spacer (2).

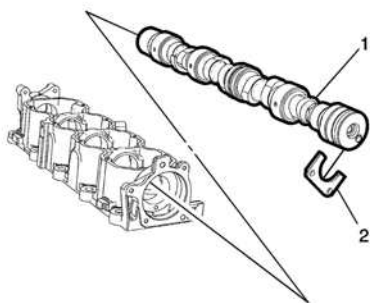


8. Remove the lock plate bolts (1).



Note: The camshaft seal **MUST** be replaced whenever the camshaft is removed.

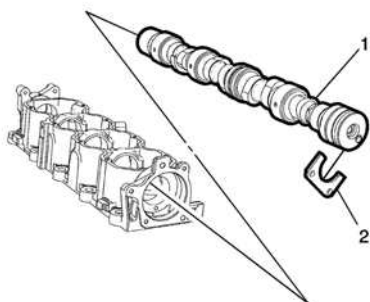
9. Remove the camshaft front oil seal (1). Refer to Camshaft Front Oil Seal Replacement.



Note: Mark the camshafts upon removal to ensure installation is in the correct position.

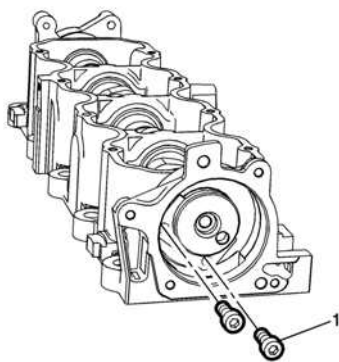
10. Remove the camshaft (1).
11. Remove the lock plate (2).
12. For camshaft cleaning and inspection. Refer to Camshaft Cleaning and Inspection.

Installation Procedure

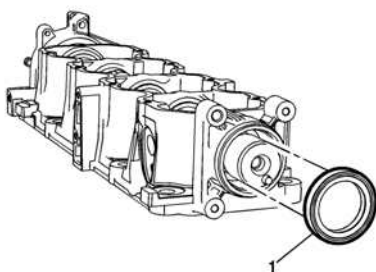


Note: If the camshaft is replaced, ensure to transfer the NEW marks over.

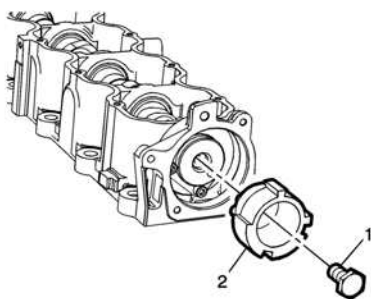
1. Install the locking plate (2).
2. Install the camshaft (1).



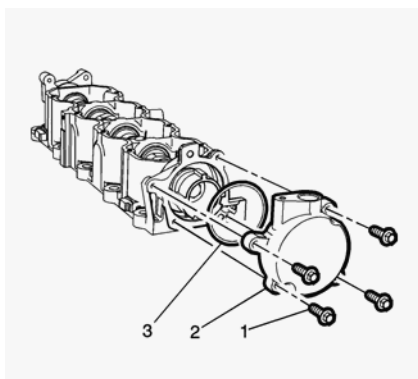
3. Install the locking plate bolts (1) and tighten to **10 Y (89 lb in)**.



4. Install a NEW camshaft front oil seal (1). Refer to Camshaft Front Oil Seal Replacement.



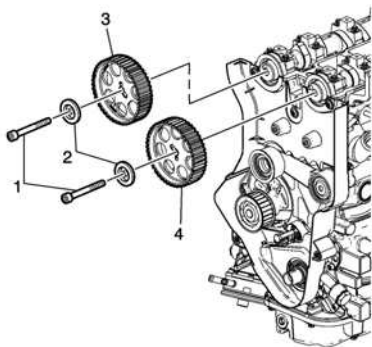
5. Install the camshaft spacer (2).
6. Install the camshaft position actuator bolts (1) and tighten to **22 Y (16 lb ft)**.



7. Install a NEW camshaft housing seal (3).
8. Install camshaft housing (2).
9. Install camshaft housing bolts (1) and tighten to **8 Y (71 lb in)**.
10. Install the camshaft sensor. Refer to Camshaft Position Sensor Replacement.
11. Install the cylinder head. Refer to Cylinder Head Replacement.

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Note: Verify orientation of the exhaust camshaft sprocket (3) and intake camshaft sprocket (4) prior to installation. Use care to properly align the sprockets with the locating pins on the camshafts.

1. Install the camshaft sprockets (3 and 4) onto the camshafts.

Caution: Refer to Fastener Caution.

Note: Use a wrench to hold the camshafts while tightening the camshaft sprocket bolts.

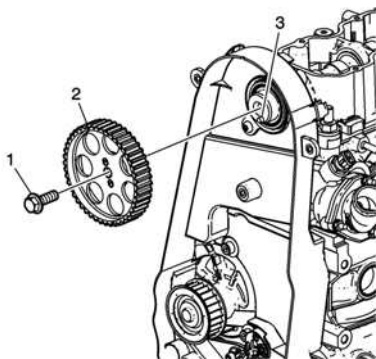
2. Install the camshaft sprocket bolts (1) and washers (2).
3. Tighten to **50.0 Y (37 lb ft)**

- Tighten the bolts an additional 60°
- Tighten the bolts and additional 15°

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Fuel Delivery: | Fuel:



Note: Use care to properly align the sprocket with the locating pin (3).

1. Using a proper tool to secure the camshaft, hold the camshaft tight while tightening the camshaft sprocket. Install the camshaft sprocket (2) onto the camshaft.

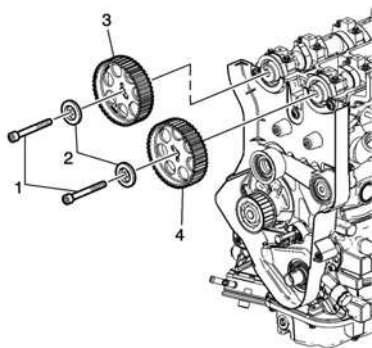
Caution: Refer to Fastener Caution.

2. Install the camshaft sprocket bolt (1).
3. Tighten to **45.0 Y (33 lb ft)**

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Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:

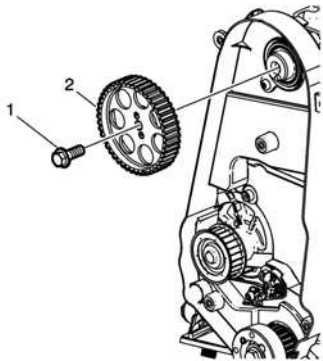


1. Using a wrench, hold the camshafts while loosening the camshaft sprocket bolts (1).
2. Remove the camshaft sprocket bolts (1) and washers (2).
3. Remove the camshaft sprockets (3 and 4).

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Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:



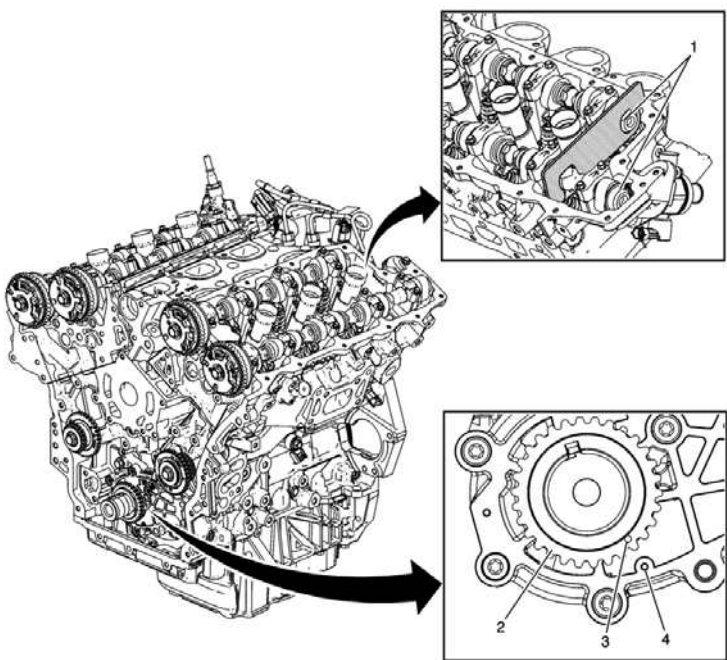
1. Using a proper tool to secure the camshaft, hold the camshaft while loosening the camshaft sprocket bolt (1).
2. Remove the camshaft sprocket bolt (1) and sprocket (2).

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Table 1:	Secondary Camshaft Intermediate Drive Chain Installation - Left Side - Step 1
Table 2:	Secondary Camshaft Intermediate Drive Chain Installation - Left Side - Step 2
Table 3:	Secondary Camshaft Drive Chain Guide and Shoe Installation - Left
Table 4:	Secondary Camshaft Drive Chain Tensioner Installation - Left Side
Table 5:	Primary Camshaft Intermediate Drive Chain Installation
Table 6:	Primary Timing Chain Guide Installation - Lower and Upper
Table 7:	Primary Camshaft Intermediate Drive Chain Tensioner Installation
Table 8:	Stage 1 Alignment Position to the Stage 2 Alignment Position
Table 9:	Secondary Camshaft Intermediate Drive Chain Installation - Right Side
Table 10:	Secondary Camshaft Drive Chain Guide and Shoe Installation - Right Side
Table 11:	Secondary Camshaft Drive Chain Tensioner Installation - Right Side

[Secondary Camshaft Intermediate Drive Chain Installation - Left Side - Step 1](#)



Secondary Camshaft Intermediate Drive Chain Installation - Left Side - Step 1

Callout

Component Name

Left Intake and Exhaust Camshaft

Procedure

1. Install the *EN-48383-1* retaining tool onto the rear of the left camshafts.
2. Ensure the *EN-48383-1* retaining tool is fully seated onto the camshafts.

Note:

1

- There should be no need to rotate the camshaft more than 10 degrees. Using the hex cast into the camshaft rotate the camshaft in order to install the *EN-48383* retaining tools .
- All camshafts must be locked in place before installation of any camshaft drive chains.

Special Tools

EN-48383 Camshaft Retaining Tools

For equivalent regional tools, refer to Special Tools.

Crankshaft Sprocket

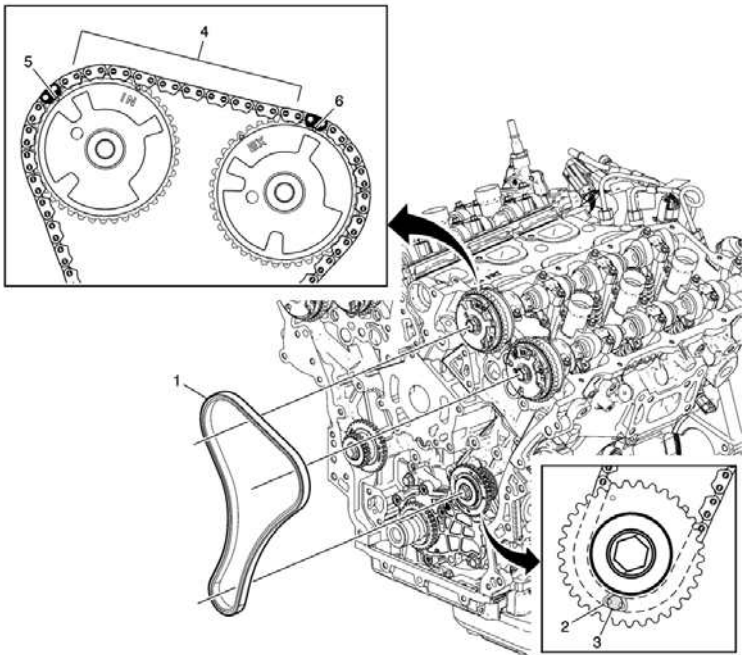
2

Note: Ensure the crankshaft is in the stage one timing position with the crankshaft sprocket timing mark (3) aligned to the stage one timing mark on the oil pump cover (4) using the *EN-48589* socket. Refer to Timing Chain Alignment Diagram.

Special Tools

Callout	Component Name
	EN-48589 Crankshaft Rotation Socket For equivalent regional tools, refer to Special Tools.
3	Crankshaft Sprocket Timing Mark
4	Stage One Timing Mark On The Oil Pump Cover

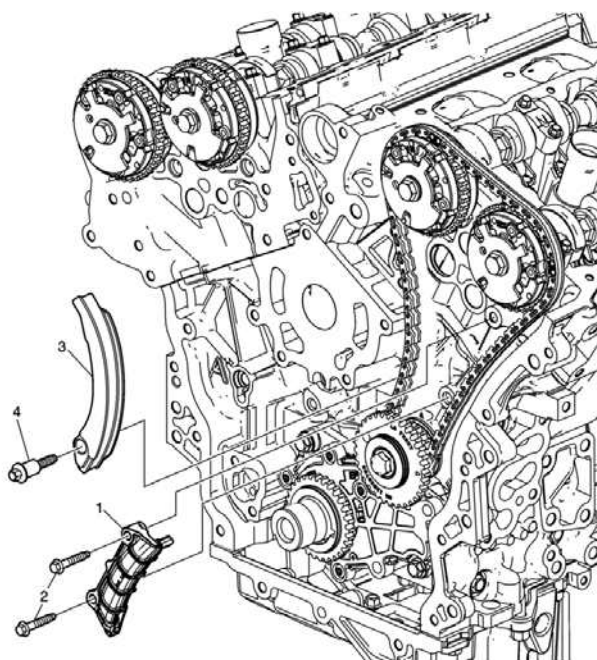
Secondary Camshaft Intermediate Drive Chain Installation - Left Side - Step 2



Secondary Camshaft Intermediate Drive Chain Installation - Left Side - Step 2

Callout	Component Name
	Left Secondary Camshaft Drive Chain
Procedure	
1	- Place the left secondary camshaft drive chain around the inner sprocket of the left camshaft intermediate drive chain idler with the timing camshaft drive chain link (2) aligned to the alignment access hole (3) made in the left camshaft intermediate drive chain idler outer sprocket. - Wrap the secondary camshaft drive chain around both left actuator drive sprockets. - Ensure there are 10 links (4) between the timing camshaft drive chain links for the camshaft position actuator sprockets. - Align the left intake camshaft position actuator sprocket alignment circle mark (5) with the timing camshaft drive chain link. - Align the left exhaust camshaft position actuator sprocket alignment circle mark (6) with the timing camshaft drive chain link.
2	Timing Camshaft Drive Chain
3	Alignment Access Hole
4	10 Links
5	Left Intake Camshaft Position Actuator Sprocket Alignment Circle Mark
6	Left Exhaust Camshaft Position Actuator Sprocket Alignment Circle Mark

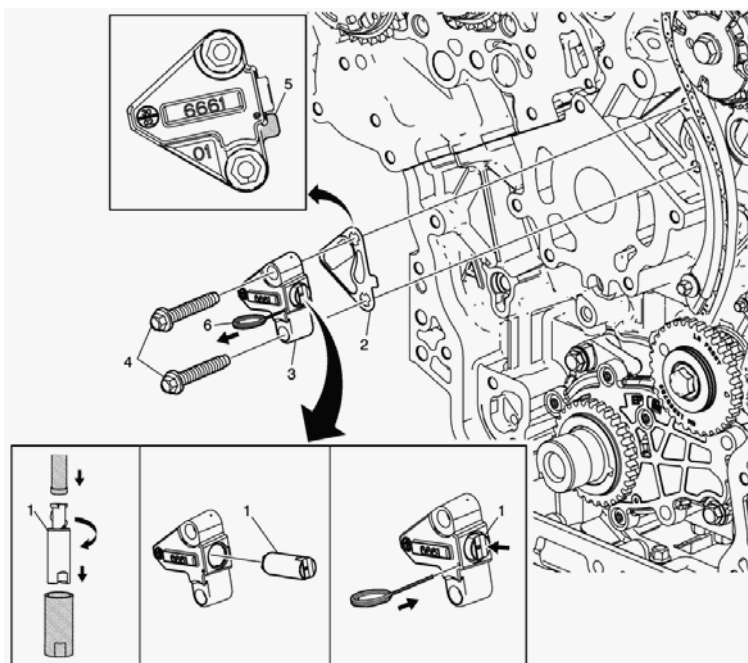
Secondary Camshaft Drive Chain Guide and Shoe Installation - Left



Secondary Camshaft Drive Chain Guide and Shoe Installation - Left

Callout	Component Name
1	Left Secondary Camshaft Drive Chain Guide
	Left Secondary Camshaft Drive Chain Guide Bolt
2	Caution: Refer to Fastener Caution. Tighten 25 Y (18 lb ft)
3	Left Secondary Camshaft Drive Chain Shoe
	Left Secondary Camshaft Drive Chain Shoe Bolt
4	Tighten 25 Y (18 lb ft)

[Secondary Camshaft Drive Chain Tensioner Installation - Left Side](#)



Secondary Camshaft Drive Chain Tensioner Installation - Left Side

Callout

Component Name

Left Secondary Camshaft Drive Chain Tensioner Plunger.

Procedure

1. Reset the left secondary camshaft drive chain tensioner plunger using *EN-45027* tensioner tool.
2. Install left secondary camshaft drive chain tensioner plunger into body.
3. Compress the plunger into the body and lock the left secondary camshaft drive chain tensioner by inserting the *EN-46112* tensioner retraction pins into the access hole in the side of the left secondary camshaft drive chain tensioner body.
4. Slowly release pressure on the left secondary camshaft drive chain tensioner. The left secondary camshaft drive chain tensioner should remain compressed.

Special Tools

- *EN-45027* Tensioner Tool
- *EN-46112* Tensioner Retraction Pins

For equivalent regional tools, refer to Special Tools.

Left Secondary Camshaft Drive Chain Tensioner Gasket

Note: Ensure the left secondary camshaft drive chain tensioner mounting surface on the left cylinder head does not have any burrs or defects that would degrade the sealing of the NEW left secondary camshaft drive chain tensioner gasket.

Left Secondary Camshaft Drive Chain Tensioner

Left Secondary Camshaft Drive Chain Tensioner Bolt

Procedure

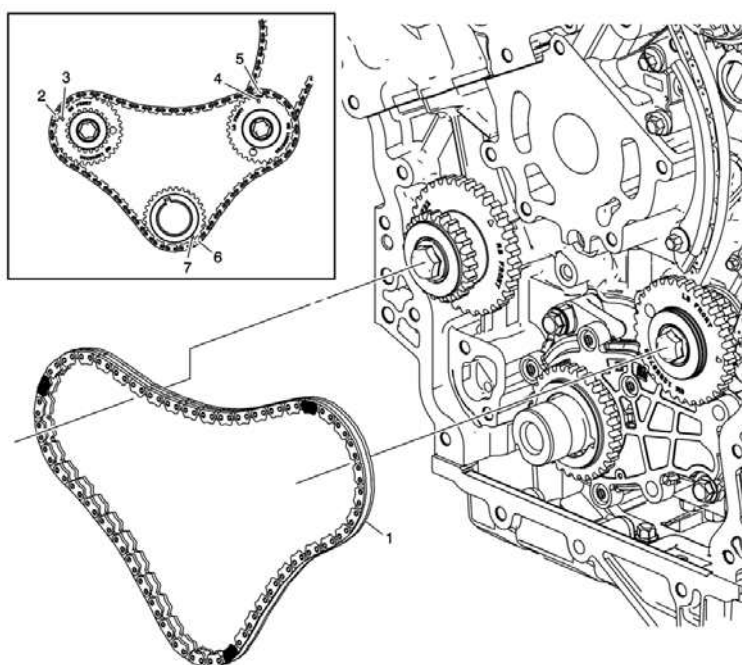
1. Place the chain tensioner into position and loosely install the bolts to the block.
2. Verify the proper placement of the drive chain tensioner gasket tab (5).
3. Tighten the drive chain tensioner bolts in two passes.
4. Release the drive chain tensioner by pulling out the *EN-46112* tensioner retraction pins pin (6) and unlocking the tensioner plunger.
5. Verify the left secondary camshaft drive chain timing mark alignments by referring to Timing Chain Alignment Diagram - Stage One.

Tighten

- First Pass 5 Y (44 lb in)
- Second Pass 25 Y (18 lb ft)

Drive Chain Tensioner Gasket Tab

EN-46112 Pin

[Primary Camshaft Intermediate Drive Chain Installation](#)


Primary Camshaft Intermediate Drive Chain Installation

Callout

Component Name

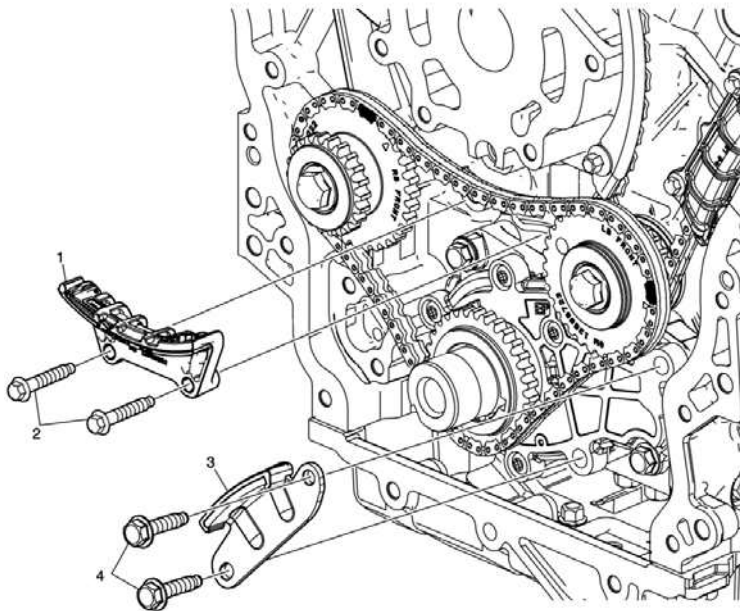
Callout	Component Name
---------	----------------

Primary Camshaft Drive Chain

Procedure

- | | |
|---|---|
| 1 | <ol style="list-style-type: none"> 1. Wrap the primary camshaft drive chain around the large sprockets of each camshaft intermediate drive chain idler and the crankshaft sprocket. 2. The left camshaft intermediate drive chain idler timing mark (2) will align with a timing camshaft drive chain link (3). 3. The right camshaft intermediate drive chain idler timing mark (4) will align with a timing camshaft drive chain link (5). 4. The crankshaft sprocket timing mark (7) will align with a timing camshaft drive chain link (6). |
| 2 | Left Camshaft Intermediate Drive Chain Idler Timing Mark |
| 3 | Timing Camshaft Drive Chain Link |
| 4 | Right Camshaft Intermediate Drive Chain Idler Timing Mark |
| 5 | Timing Camshaft Drive Chain Link |
| 6 | Timing Camshaft Drive Chain Link |
| 7 | Crankshaft Sprocket Timing Mark |

[Primary Timing Chain Guide Installation - Lower and Upper](#)

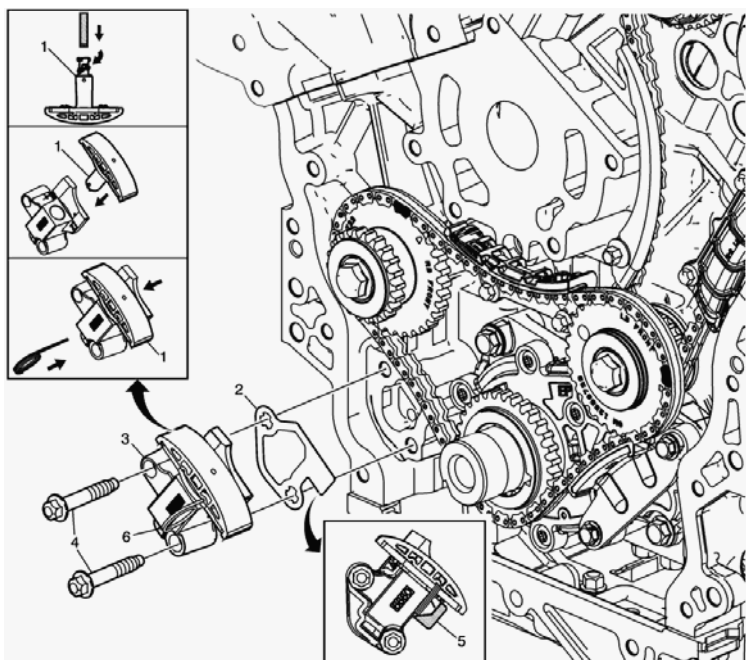


Primary Timing Chain Guide Installation - Lower and Upper

Callout	Component Name
---------	----------------

- | | |
|---|---|
| 1 | Primary Camshaft Drive Chain Lower Guide |
| | Primary Camshaft Drive Chain Lower Guide Bolt |
| 2 | Tighten
25 Y (18 lb ft) |
| 3 | Upper Primary Camshaft Drive Chain Guide. |
| | Upper Primary Camshaft Drive Chain Guide Bolt |
| 4 | Tighten
25 Y (18 lb ft) |

[Primary Camshaft Intermediate Drive Chain Tensioner Installation](#)



Primary Camshaft Intermediate Drive Chain Tensioner Installation

Callout

Component Name

Primary Camshaft Drive Chain Tensioner Plunger.

Procedure

1. Reset the primary camshaft drive chain tensioner plunger using *EN-45027* tensioner tool.
2. Install primary camshaft drive chain tensioner plunger into body.
3. Compress the plunger into the body and lock the primary camshaft drive chain tensioner by inserting the *EN-46112* tensioner retraction pins into the access hole in the side of the primary camshaft drive chain tensioner body.
4. Slowly release pressure on the primary camshaft drive chain tensioner. The primary camshaft drive chain tensioner should remain compressed.

Special Tools

- *EN-45027* Tensioner Tool
- *EN-46112* Tensioner Retraction Pins

For equivalent regional tools, refer to Special Tools.

Primary Camshaft Drive Chain Tensioner Gasket

2. **Note:** Ensure the primary camshaft drive chain tensioner mounting surface on the engine block does not have any burrs or defects that would degrade the sealing of the NEW primary camshaft drive chain tensioner gasket.

3. Primary Camshaft Drive Chain Tensioner

Primary Camshaft Drive Chain Tensioner Bolt

Procedure

1. Place the drive chain tensioner into position and loosely install the bolts to the block.
2. Verify the proper placement of the drive chain tensioner gasket tab (5).
3. Tighten the drive chain tensioner bolts in two passes.
4. Release the drive chain tensioner by pulling out the *EN-46112* pin (6) and unlocking the tensioner plunger.
5. Verify the primary and left secondary camshaft drive chain timing mark alignments by referring to Timing Chain Alignment Diagram - Stage One.

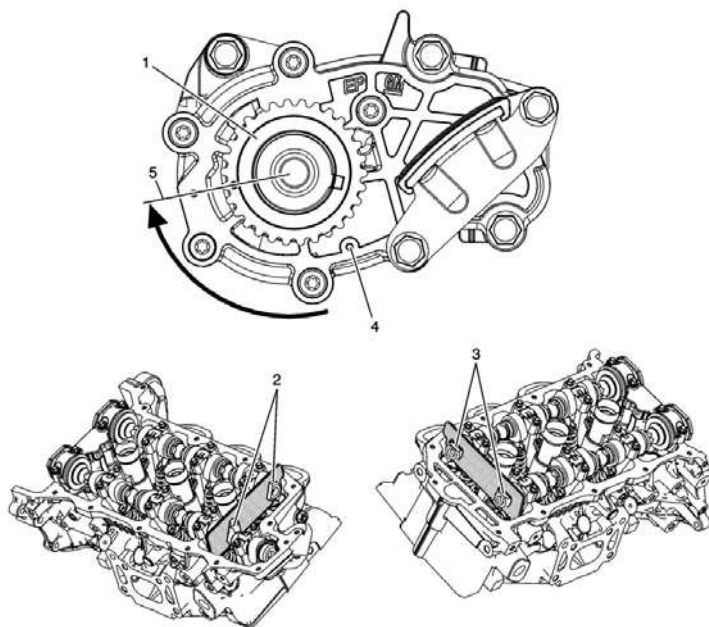
Tighten

- First Pass 5 Y (44 lb in)
- Second Pass 25 Y (18 lb ft)

5. Drive Chain Tensioner Gasket Tab

6. *EN-46112* Pin

[Stage 1 Alignment Position to the Stage 2 Alignment Position](#)



Stage 1 Alignment Position to the Stage 2 Alignment Position

Callout**Component Name****Preliminary Procedure**

Remove the EN 48383-1 from the rear of the left camshafts.

Crankshaft Sprocket

Procedure

1

Using the *EN-48589* crankshaft rotation socket, rotate the crankshaft and crankshaft sprocket from the stage one alignment position (4) to the stage two alignment position (5), 115 crankshaft degrees, in order to install the right secondary camshaft drive chain components.

Special Tools

EN-48589 Crankshaft Rotation Socket

For equivalent regional tools, refer to Special Tools.

Left Intake and Exhaust Camshaft

Procedure

1. Install the *EN-48383-2* retainer onto the rear of the left camshafts.
2. Ensure the *EN-48383-2* retainer is fully seated onto the camshafts.

Note:

2

- There should be no need to rotate the camshaft more than 10 degrees. Using the hex cast into the camshaft rotate the camshaft in order to install the *EN-48383-2* retainer .
- All camshafts must be locked in place before installation of any camshaft drive chains.

Special Tools

EN-48383 Crankshaft Rotation Tools

For equivalent regional tools, refer to Special Tools.

Right Intake and Exhaust Camshaft

Procedure

1. Install the *EN-48383-3* retainer onto the rear of the right camshafts.
2. Ensure the *EN-48383-3* retainer is fully seated onto the camshafts.

Note:

3

- There should be no need to rotate the camshaft more than 10 degrees. Using the hex cast into the camshaft rotate the camshaft in order to install the *EN-48383-3* retainer .
- All camshafts must be locked in place before installation of any camshaft drive chains.

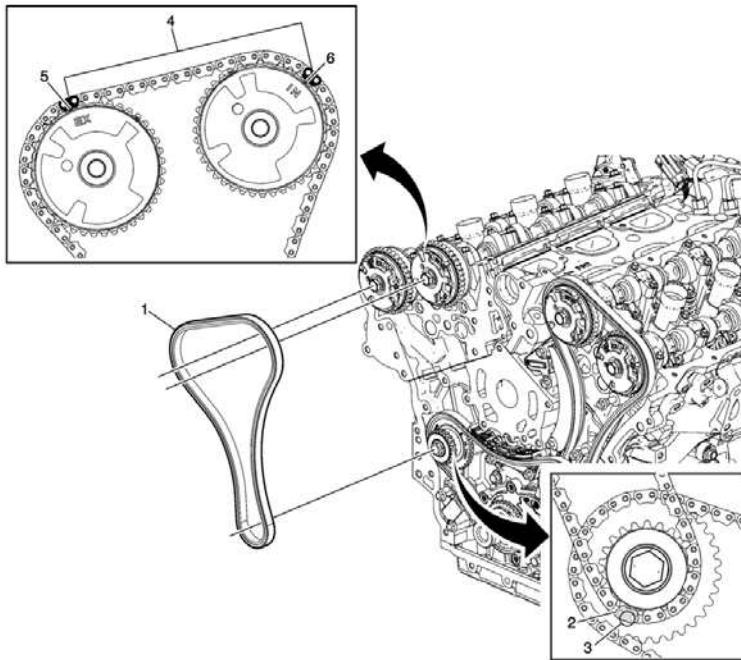
Special Tools

EN-48383 Crankshaft Rotation Tools

For equivalent regional tools, refer to Special Tools.

Callout	Component Name
4	Stage One Alignment Position
5	Stage Two Alignment Position

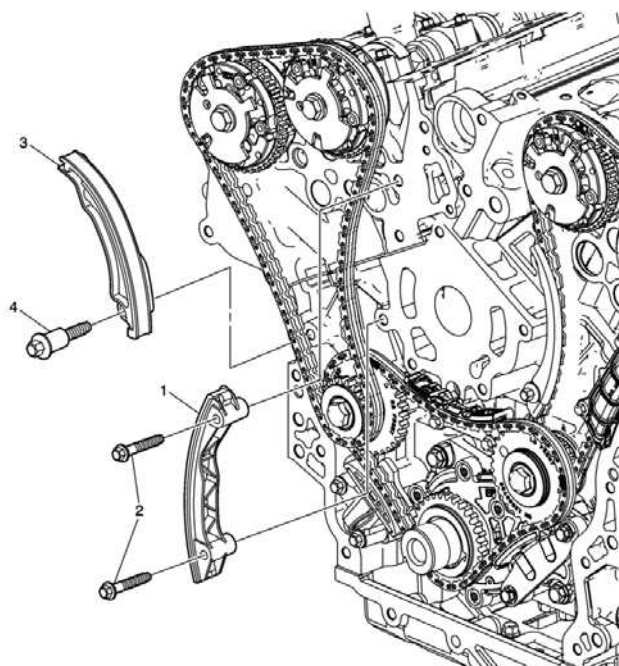
[Secondary Camshaft Intermediate Drive Chain Installation - Right Side](#)



Secondary Camshaft Intermediate Drive Chain Installation - Right Side

Callout	Component Name
	Right Secondary Camshaft Intermediate Drive Chain
	Note: Ensure that the crankshaft is in the stage 2 timing drive assembly position.
	Procedure
1	- Place the secondary camshaft intermediate drive chain around the right camshaft intermediate drive chain idler outer sprocket, aligning the timing camshaft drive chain link (2) with the alignment access hole (3) made in the right camshaft intermediate drive chain idler inner sprocket. - Wrap the secondary camshaft intermediate drive chain around both right actuator drive sprockets. - Ensure there are 10 links (4) between the timing camshaft drive chain links for the camshaft position actuator sprockets. - Align the right intake camshaft position actuator sprocket alignment triangle mark (5) with the timing camshaft drive chain link. - Align the right exhaust camshaft position actuator sprocket alignment triangle mark (6) with the timing camshaft drive chain link. - There will be 22 links between the right camshaft intermediate drive chain idler timing camshaft drive chain link and each right camshaft position actuator sprocket timing camshaft drive chain link.
2	Timing Camshaft Drive Chain Link
3	Alignment Access Hole
4	10 Links
5	Right Intake Camshaft Position Actuator Sprocket Alignment Triangle Mark
6	Right Exhaust Camshaft Position Actuator Sprocket Alignment Triangle Mark

[Secondary Camshaft Drive Chain Guide and Shoe Installation - Right Side](#)



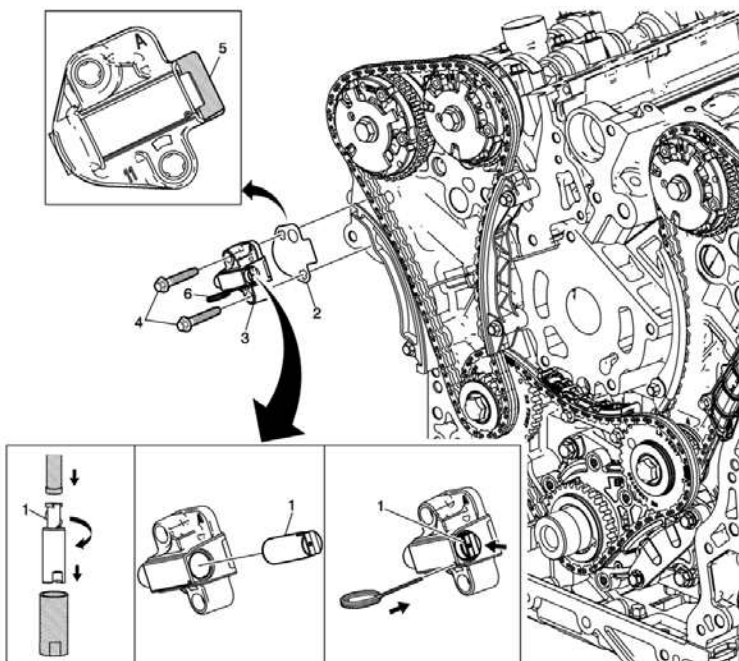
Secondary Camshaft Drive Chain Guide and Shoe Installation - Right Side

Callout

Component Name

- | | |
|---|---|
| 1 | Right Secondary Camshaft Drive Chain Guide |
| | Right Secondary Camshaft Drive Chain Guide Bolt |
| 2 | Tighten
25 Y (18 lb ft) |
| 3 | Right Secondary Camshaft Drive Chain Shoe |
| | Right Secondary Camshaft Drive Chain Shoe Bolt |
| 4 | Tighten
25 Y (18 lb ft) |

[Secondary Camshaft Drive Chain Tensioner Installation - Right Side](#)



Secondary Camshaft Drive Chain Tensioner Installation - Right Side

Callout	Component Name
	Right Secondary Camshaft Drive Chain Tensioner Plunger
	Procedure
1	- Reset the right secondary camshaft drive chain tensioner plunger using <i>EN-45027</i> tensioner tool. - Install right secondary camshaft drive chain tensioner plunger into body. - Compress the plunger into the body and lock the right secondary camshaft drive chain tensioner by inserting the <i>EN-46112</i> tensioner retraction pins into the access hole in the side of the right secondary camshaft drive chain tensioner body. - Slowly release pressure on the right secondary camshaft drive chain tensioner. The right secondary camshaft drive chain tensioner should remain compressed.
	Special Tools
	<i>EN-45027</i> Tensioner Tool <i>EN-46112</i> Tensioner Retraction Pins For equivalent regional tools, refer to Special Tools.
2	Right Secondary Camshaft Drive Chain Tensioner Gasket
	Note: Ensure the right secondary camshaft drive chain tensioner mounting surface on the right cylinder head does not have any burrs or defects that would degrade the sealing of the NEW right secondary camshaft drive chain tensioner gasket.
3	Right Secondary Camshaft Drive Chain Tensioner
	Right Secondary Camshaft Drive Chain Tensioner Bolt
	Procedure
4	- Place the right secondary drive chain tensioner into position and loosely install the bolts to the block. - Verify the proper placement of the right secondary drive chain tensioner gasket tab (5). - Tighten the drive chain tensioner bolts in two passes. - Release the right secondary drive chain tensioner by pulling out the <i>EN-46112</i> pin (6) and unlocking the tensioner plunger. - Verify all primary and secondary camshaft drive chain timing mark alignments by referring to Timing Chain Alignment Diagram - Stage One.
	Tighten
	- First Pass 5 Y (44 lb in) - Second Pass 25 Y (18 lb ft)
5	Right Secondary Drive Chain Tensioner Gasket Tab
6	<i>EN-46112</i> Pin

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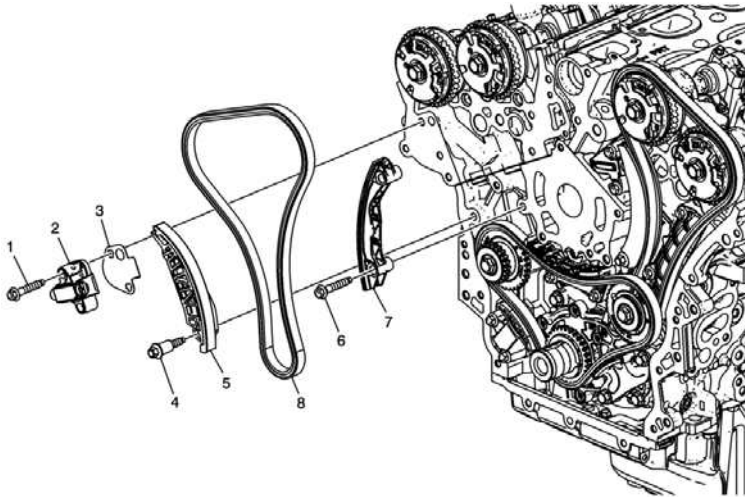
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Table 1: [Secondary Camshaft Drive Chain Components Removal - Right Side](#)

Table 2: [Primary Camshaft Drive Chain Components Removal](#)

Table 3: [Secondary Camshaft Drive Chain Components Removal - Left Side](#)

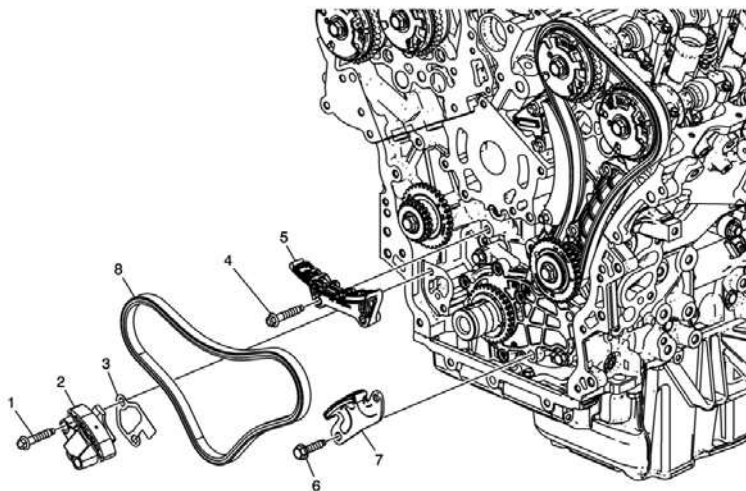
[Secondary Camshaft Drive Chain Components Removal - Right Side](#)



Secondary Camshaft Drive Chain Components Removal - Right Side

Callout	Component Name
1	Right Secondary Camshaft Drive Chain Tensioner Bolt
2	Right Secondary Camshaft Drive Chain Tensioner
3	Right Secondary Camshaft Drive Chain Tensioner Gasket Note: Discard the gasket.
4	Right Secondary Camshaft Drive Chain Shoe Bolt
5	Right Secondary Camshaft Drive Chain Shoe
6	Right Secondary Camshaft Drive Chain Guide Bolt
7	Right Secondary Camshaft Drive Chain Guide
8	Right Secondary Camshaft Drive Chain

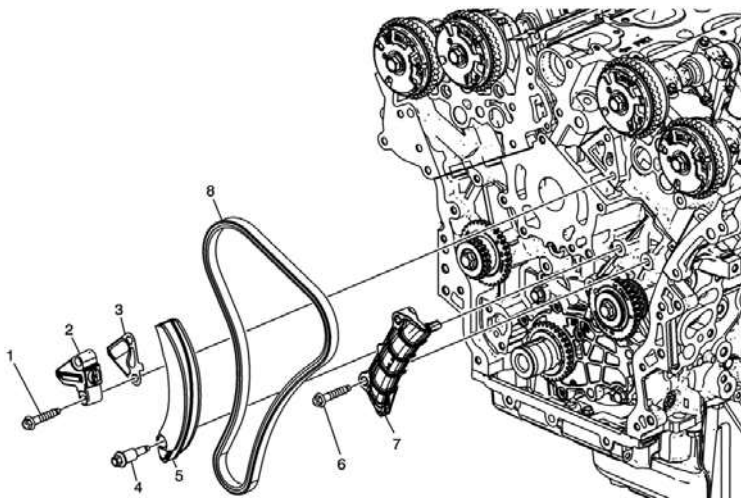
[Primary Camshaft Drive Chain Components Removal](#)



Primary Camshaft Drive Chain Components Removal

Callout	Component Name
1	Primary Camshaft Drive Chain Tensioner Bolt
2	Primary Camshaft Drive Chain Tensioner
3	Primary Camshaft Drive Chain Tensioner Gasket
	Note: Discard the gasket.
4	Primary Camshaft Drive Chain Upper Guide Bolt
5	Primary Camshaft Drive Chain Upper Guide
6	Primary Camshaft Drive Chain Lower Guide Bolt
7	Primary Camshaft Drive Chain Lower Guide
8	Primary Camshaft Drive Chain

[Secondary Camshaft Drive Chain Components Removal - Left Side](#)



Secondary Camshaft Drive Chain Components Removal - Left Side

Callout	Component Name
1	Left Secondary Camshaft Drive Chain Tensioner Bolt
2	Left Secondary Camshaft Drive Chain Tensioner
3	Left Secondary Camshaft Drive Chain Tensioner Gasket
	Note: Discard the gasket.
4	Left Secondary Camshaft Drive Chain Shoe Bolt

Camshaft Timing Chain Components Removal

Callout

Component Name

- | | |
|---|--|
| 5 | Left Secondary Camshaft Drive Chain Shoe |
| 6 | Left Secondary Camshaft Drive Chain Guide Bolt |
| 7 | Left Secondary Camshaft Drive Chain Guide |
| 8 | Left Secondary Camshaft Drive Chain |

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

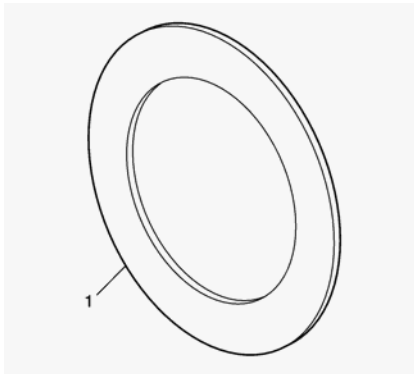
[Cleaning Procedure](#)

1. Clean all the following components with solvent:

- Crankshaft sprocket
 - Primary timing drive chain
 - Primary timing drive chain shoe
 - Primary timing drive chain guides
 - Primary timing drive chain tensioner
 - Secondary timing drive chains
 - Secondary timing drive chain shoes
 - Secondary timing drive chain guides
 - Secondary timing drive chain tensioners
 - Timing component fastening bolts
 - Clean each camshaft position actuator's exterior with solvent.
- Warning:** Refer to Safety Glasses Warning.
- Dry the timing components with compressed air.

[Visual Inspection](#)

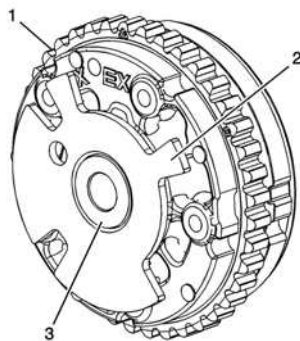
Camshaft Thrust Washers



Note: Some 2009 applications may not be equipped with camshaft thrust washers.

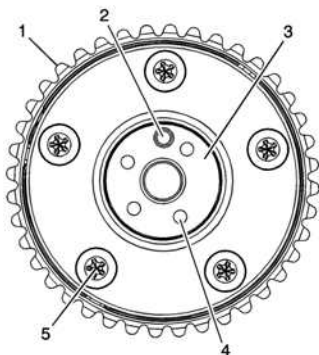
1. Inspect the camshaft thrust washers for deep scoring or uneven wear.
2. Replace as necessary.

Camshaft Position Actuators



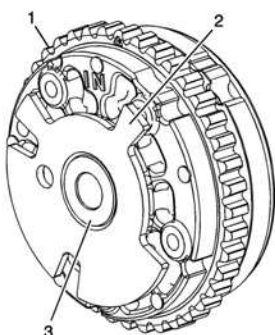
1. Inspect the front of the exhaust camshaft position actuators for the following:

- Sprocket damage (1)
- Reluctor/sensor wheel damage (2)
- Camshaft position actuator bolt seating/sealing inner hub flange damage (3)



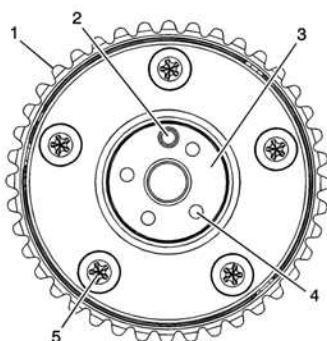
- Inspect the back of the exhaust camshaft position actuators for the following:

- Sprocket damage (1)
- Camshaft locating pin damage (2)
- Camshaft seating/sealing inner hub flange damage (3)
- Blockage to the oil passages (4)
- Loose or missing housing bolts (5)



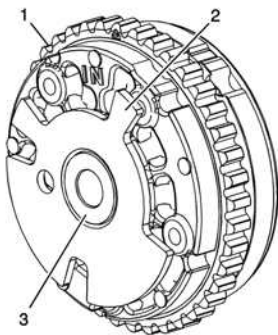
- Inspect the front of the left intake camshaft position actuators for the following:

- Sprocket damage (1)
- Reluctor/sensor wheel damage (2)
- Camshaft position actuator oil control valve bolt seating/sealing inner hub flange damage (3)

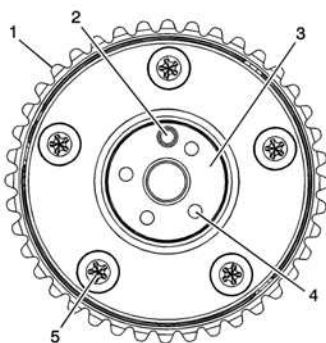


- Inspect the back of the left intake camshaft position actuators for the following:

- Sprocket damage (1)
- Camshaft locating pin damage (2)
- Camshaft seating/sealing inner hub flange damage (3)
- Blockage to the oil passages (4)
- Loose or missing housing bolts (5)

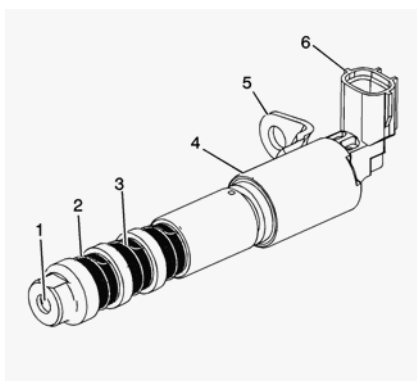


- Inspect the front of the right intake camshaft position actuators for the following:
 - Sprocket damage (1)
 - Reluctor/sensor wheel damage (2)
 - Camshaft position actuator oil control valve bolt seating/sealing inner hub flange damage (3)



- Inspect the back of the right intake camshaft position actuators for the following:
 - Sprocket damage (1)
 - Camshaft locating pin damage (2)
 - Camshaft seating/sealing inner hub flange damage (3)
 - Blockage to the oil passages (4)
 - Loose or missing housing bolts (5)
- Replace a damaged camshaft position actuator.

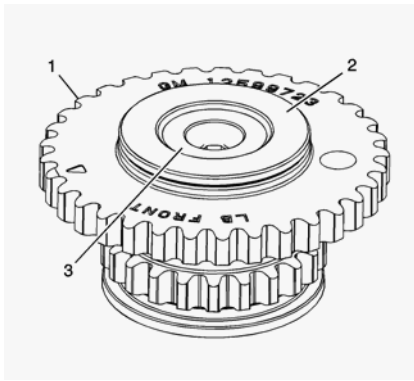
Camshaft Position Actuator Oil Control Valves



1. Inspect the camshaft position actuator oil control valves for the following:

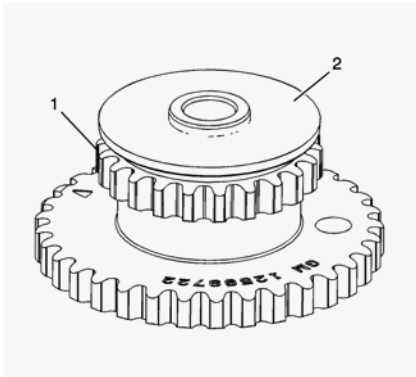
- Blockage to the oil passage (1)
- Missing or damaged oil screen clip (2)
- Blockage or damage to the oil screen (3)
- Damage to the sealing surface for the camshaft position actuator oil control valve solenoid oil seal (4)
- Damage to the bracket (5)
- Damage to the wiring harness connection and/or terminals (6)
- Replace a damaged camshaft position actuator oil control valve.

Left Intermediate Sprocket with Primary and Secondary Inverted Tooth (IT) Chain



1. Inspect the front of the left intermediate sprocket for the following:

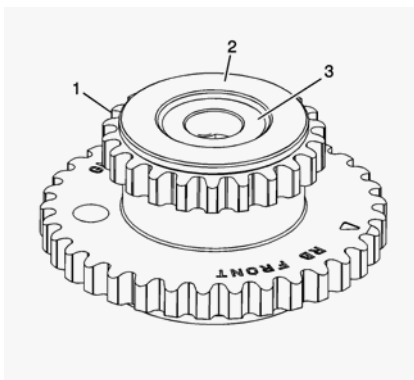
- Damage to the primary camshaft drive chain sprocket (1)
- Damage to the hub bearing (2)—Ensure the hub bearing spins freely. If the hub bearing wobbles, is noisy, or feels rough when rotated, replace the intermediate sprocket.
- Damage to the bolt flange seating/sealing surface (3)



• Inspect the back of the left intermediate sprocket for the following:

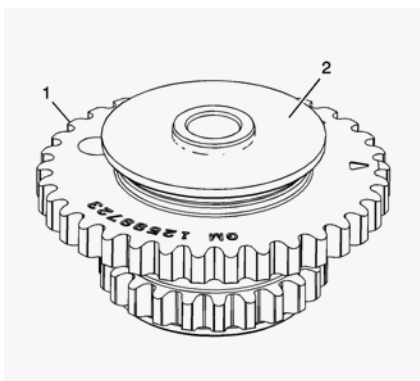
- Damage to the left secondary camshaft drive chain sprocket (1)
- Damage to the bearing hub-to-engine block sealing surface (2)
- Replace a damaged left intermediate sprocket.

Right Intermediate Sprocket with Primary and Secondary Inverted Tooth (IT) Chain



1. Inspect the front of the right intermediate sprocket for the following:

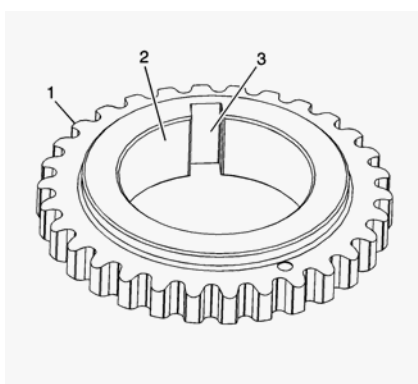
- Damage to the right secondary camshaft drive chain sprocket (1)
- Damage to the hub bearing (2)—Ensure the hub bearing spins freely. If the hub bearing wobbles, is noisy, or feels rough when rotated, replace the intermediate sprocket.
- Damage to the bolt flange seating/sealing surface (3)



- Inspect the back of the right intermediate sprocket for the following:

- Damage to the primary camshaft drive chain sprocket (1)
- Damage to the bearing hub-to-engine block sealing surface (2)
- Replace a damaged right intermediate sprocket.

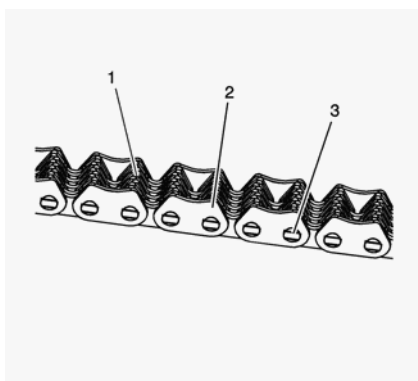
Crankshaft Sprocket with Second Version Primary Inverted Tooth (IT) Chain



1. Inspect the crankshaft sprocket for the following:

- Sprocket damage (1)
- Bore damage (2)
- Keyway damage (3)
- Replace a damaged crankshaft sprocket.

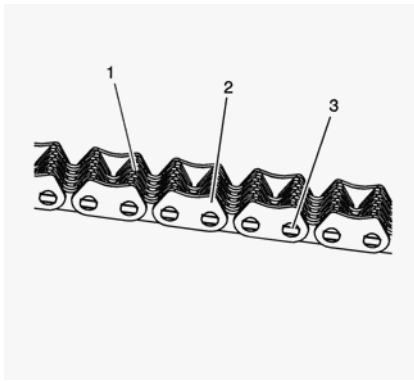
Secondary Timing Chains with Inverted Tooth (IT) Chain



1. Inspect the secondary timing chain for the following:

- Binding or worn links (1)
- Loose links (2)
- Loose pins (3)
- Replace a damaged secondary timing chain.

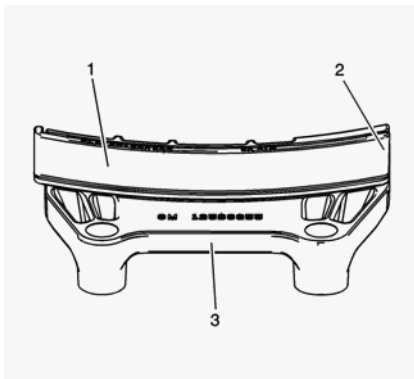
Primary Timing Chain with Inverted Tooth (IT) Chain



1. Inspect the primary timing chain for the following:

- Binding or worn links (1)
- Loose links (2)
- Loose pins (3)
- Replace a damaged primary timing chain.

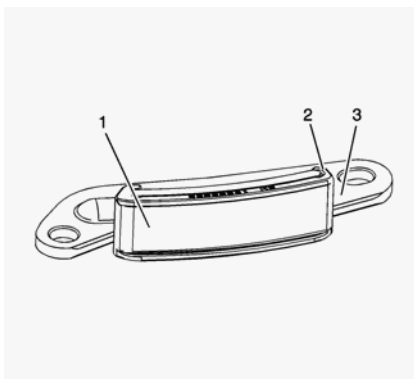
Primary Timing Chain Upper Guide



1. Inspect the primary timing chain upper guide for the following:

- Worn guide surface (1)
- Cracked or broken guide surface (2)
- Cracked or damaged guide base (3)
- Replace a damaged primary timing chain upper guide.

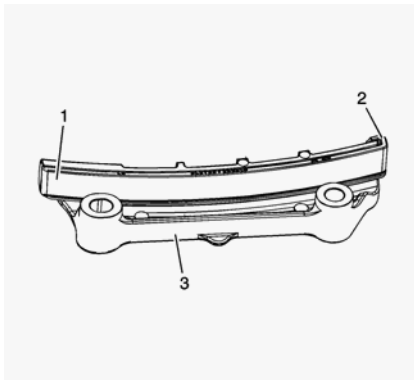
Primary Timing Chain Lower Guide



1. Inspect the primary timing chain lower guide for the following:

- Worn guide surface (1)
- Cracked or broken guide surface (2)
- Cracked or damaged guide base (3)
- Replace a damaged primary timing chain lower guide.

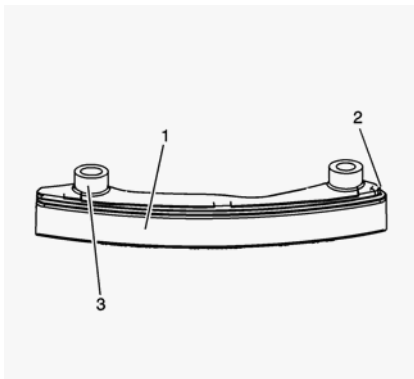
Left Secondary Timing Chain Guide



1. Inspect the left secondary timing chain guides for the following:

- Worn guide surface (1)
- Cracked or broken guide surface (2)
- Cracked or damaged guide base (3)
- Replace a damaged left secondary timing chain guide.

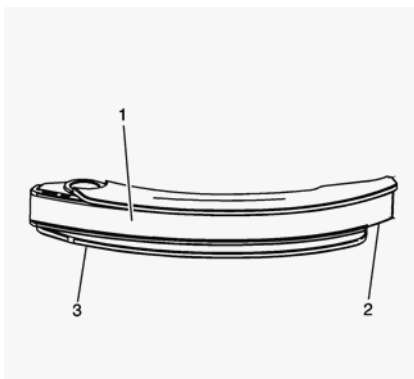
Right Secondary Timing Chain Guide



1. Inspect the right secondary timing chain guides for the following:

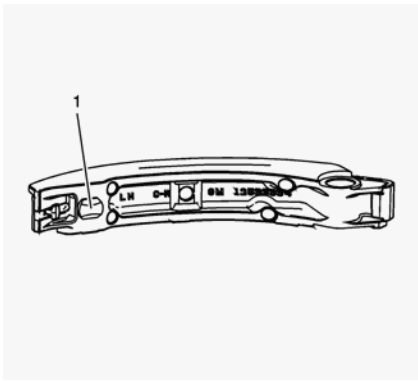
- Worn guide surface (1)
- Cracked or broken guide surface (2)
- Cracked or damaged guide base (3)
- Replace a damaged right secondary timing chain guide.

Left Secondary Timing Chain Shoe



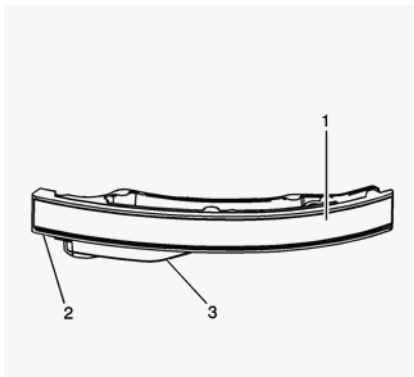
1. Inspect the front of the left secondary timing chain shoe for the following:

- Worn shoe surface (1)
- Cracked or broken shoe surface (2)
- Cracked or damaged shoe (3)



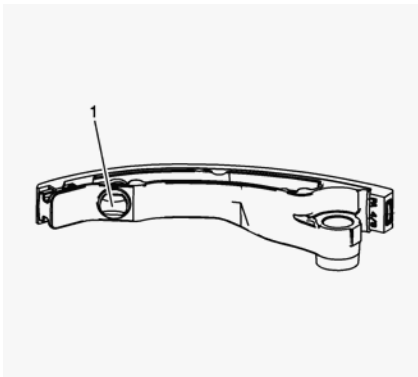
- Inspect the back of the left secondary timing chain shoe for a damaged, worn, or missing left secondary timing chain tensioner contact pad (1).
- Replace a damaged left secondary timing chain shoe.

Right Secondary Timing Chain Shoe



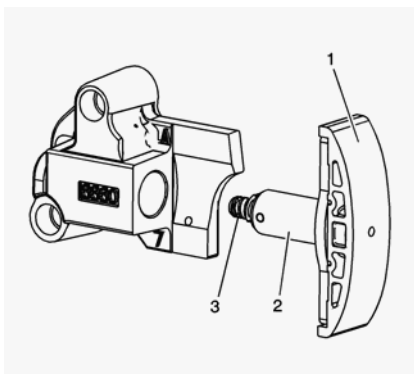
1. Inspect the front of the right secondary timing chain shoe for the following:

- Worn shoe surface (1)
- Cracked or broken shoe surface (2)
- Cracked or damaged shoe (3)



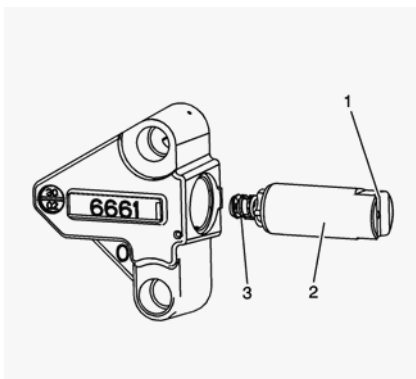
- Inspect the back of the right secondary timing chain shoe for a damaged, worn, or missing right secondary timing chain tensioner contact pad (1).
- Replace a damaged right secondary timing chain shoe.

Primary Timing Chain Tensioner



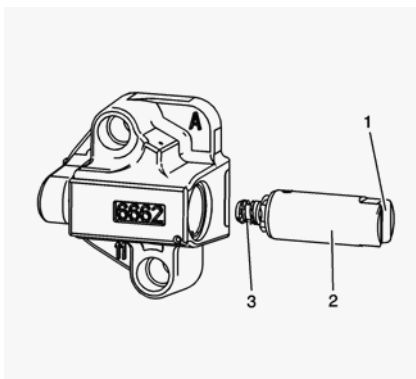
1. Inspect the primary timing chain tensioner for worn primary timing chain tensioner shoe surface (1).
2. Inspect the primary timing chain tensioner for locked or binding timing chain tensioner. Reset the plunger (3) and ensure the plunger moves freely (2) in and out of the body of the tensioner. Refer to Primary Camshaft Intermediate Drive Chain Tensioner Installation.
3. Replace a damaged primary timing chain tensioner.

Left Secondary Timing Chain Tensioner



1. Inspect the left secondary timing chain tensioner for damaged plunger-to-shoe contact surface (1).
2. Inspect the left secondary timing chain tensioner for locked or binding timing chain tensioner. Reset the plunger (3) and ensure the plunger moves freely (2) in and out of the body of the tensioner. Refer to Secondary Timing Chain Tensioner Installation - Left Side.
3. Replace a damaged left secondary timing chain tensioner.

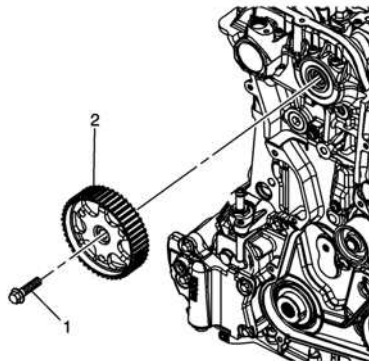
Right Secondary Timing Chain Tensioner



1. Inspect the right secondary timing chain tensioner for damaged plunger-to-shoe contact surface (1).
2. Inspect the right secondary timing chain tensioner for locked or binding timing chain tensioner. Reset the plunger (3) and ensure the plunger moves freely (2) in and out of the body of the tensioner. Refer to Secondary Timing Chain Tensioner Installation - Right Side.
3. Replace a damaged right secondary timing chain tensioner.

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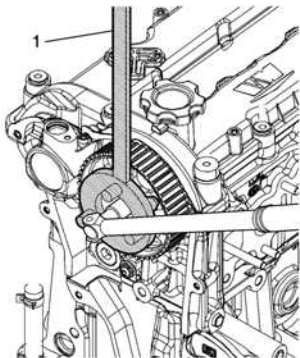
1. Install the camshaft timing pulley (2) and bolt (1).
2. Tighten, but do not torque, bolt. Refer to Timing Belt Installation for final torque specification.

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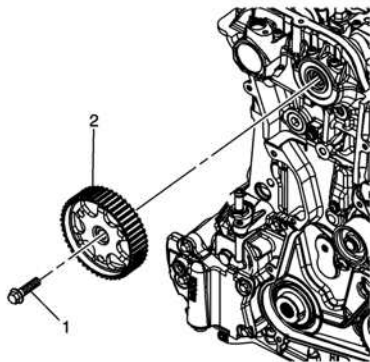
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Special Tools

EN-50025 Pulley Holding Wrench



1. Hold the camshaft drive pulley with the EN-50025 wrench (1) and loosen the retaining bolt.



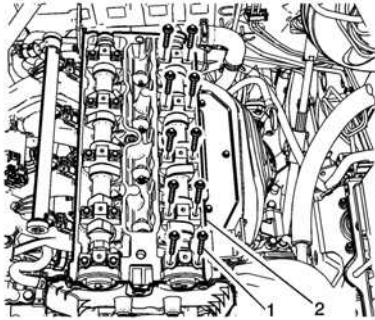
2. Remove the camshaft drive pulley bolt (1) and pulley (2).

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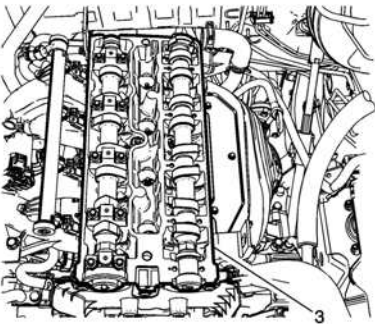
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

[Removal Procedure](#)

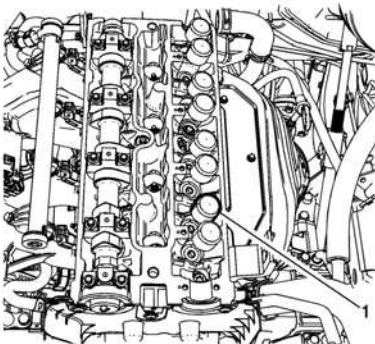
1. Remove the camshaft gear. Refer to Camshaft Gear Replacement.



2. Remove the camshaft bearing cap bolts (1).
3. Remove the camshaft bearing caps (2).
4. Mark the position of camshaft prior removal.

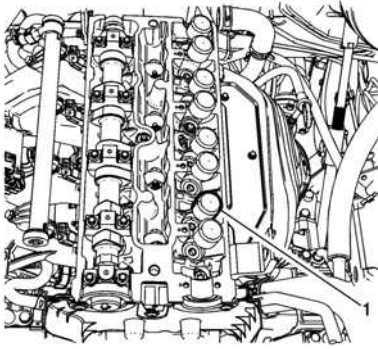


5. Remove the exhaust camshaft (3).
6. Discard the intake camshaft front o-ring seal.



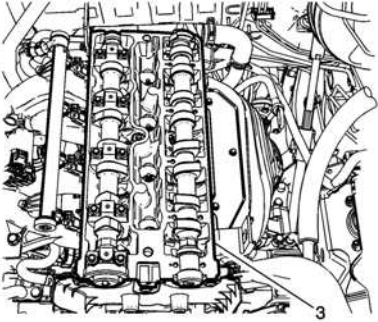
7. Remove the valve lifters (1) from the cylinder head. If the lifters are to be reused, keep in order so they can be reinstalled in the same position.
8. For cleaning and inspection. Refer to Camshaft Cleaning and Inspection.

[Installation Procedure](#)



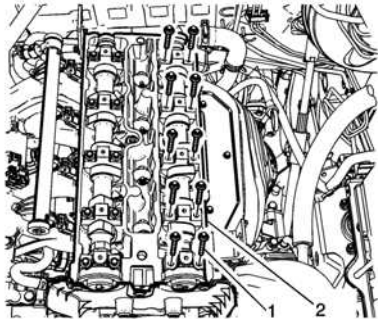
Note:

- Do not stroke/cycle the stationary hydraulic lash adjuster plunger without oil in the lower pressure chamber.
 - Do not allow the stationary hydraulic lash adjuster to tip over, plunger down, after the oil fill.
1. Install the valve lifters (1) into their bores in the cylinder head. Lubricate the valve lifters. Refer to Adhesives, Fluids, Lubricants, and Sealers



Note: Ensure that the camshaft sealing rings are in place in the camshaft grooves. Camshaft sealing rings must be in place below the surface of the camshaft journal in order to avoid being pinched between the cylinder head and the camshaft caps.

2. Lubricate the camshaft and camshaft bearing caps with engine oil.
3. Install the intake camshaft front o-ring seal.
4. Install the exhaust camshaft (3).



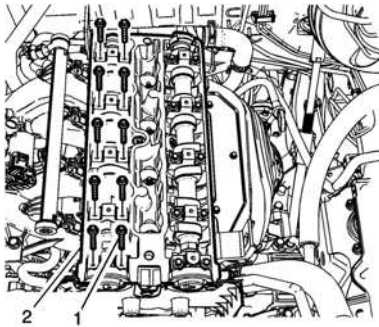
5. Make sure that the intake camshaft is aligned with the temporary mark.
6. Install the camshaft bearing caps (2).
7. Install the camshaft bearing cap and tighten the fastener (1) and tighten to **9Y (80 lb in)**.
8. Install the camshaft cover. Refer to Camshaft Cover Replacement.
9. Install the camshaft gear. Refer to Camshaft Gear Replacement.

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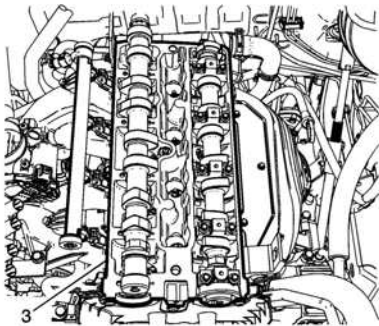
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

[Removal Procedure](#)

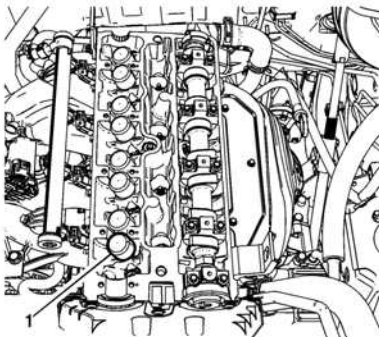
1. Remove the camshaft gear. Refer to Camshaft Gear Replacement.



2. Remove the camshaft bearing cap bolts (1).
3. Remove the camshaft bearing caps (2).
4. Mark the position of camshaft prior removal.

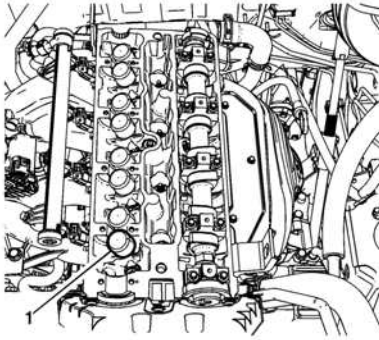


5. Remove the intake camshaft (3).
6. Discard the intake camshaft front O-ring seal.



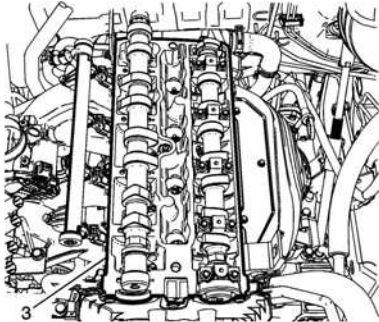
7. Remove the valve lifters (1) from the cylinder head. If the lifters are to be reused, keep in order so they can be reinstalled in the same position.
8. For cleaning and inspection. Refer to Camshaft Cleaning and Inspection.

[Installation Procedure](#)



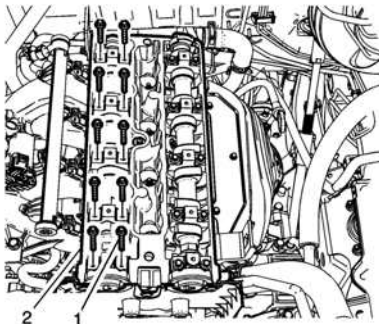
Note:

- Do not stroke/cycle the stationary hydraulic lash adjuster plunger without oil in the lower pressure chamber.
 - Do not allow the stationary hydraulic lash adjuster to tip over, plunger down, after the oil fill.
1. Install the valve lifters (1) into their bores in the cylinder head. Lubricate the valve lifters. Refer to Adhesives, Fluids, Lubricants, and Sealers



Note: Ensure that the camshaft sealing rings are in place in the camshaft grooves. Camshaft sealing rings must be in place below the surface of the camshaft journal in order to avoid being pinched between the cylinder head and the camshaft caps.

2. Lubricate the camshaft and camshaft bearing caps with engine oil.
3. Install the intake camshaft front O-ring seal.
4. Install the intake camshaft



5. Make sure that the intake camshaft is aligned with the temporary mark.
6. Install the camshaft bearing caps (2).
7. Install the camshaft bearing cap and tighten the fastener (1) and tighten to **9Y (80 lb in)**.
8. Install the camshaft cover. Refer to Camshaft Cover Replacement.
9. Install the camshaft gear. Refer to Camshaft Gear Replacement.

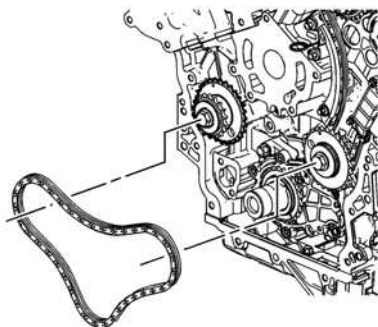
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:

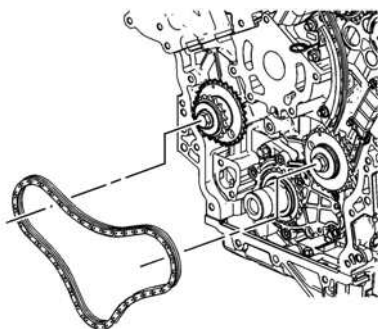
[Removal Procedure](#)

1. Remove the engine front cover. Refer to Engine Front Cover Replacement.
2. Remove the right bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Removal - Right Side.
3. Remove the right bank secondary camshaft drive chain shoe. Refer to Secondary Camshaft Drive Chain Shoe Removal - Right Side.
4. Remove the right bank secondary camshaft drive chain guide. Refer to Secondary Timing Chain Guide Removal - Right Side.
5. Remove the right bank secondary camshaft drive chain. Refer to Secondary Camshaft Intermediate Drive Chain Removal - Right Side.
6. Remove the primary camshaft drive chain tensioner. Refer to Primary Camshaft Intermediate Drive Chain Tensioner Removal.
7. Remove the primary camshaft drive chain upper guide. Primary Timing Chain Guide Removal - Upper.



8. Remove the primary camshaft timing chain. Refer to Secondary Camshaft Intermediate Drive Chain Removal - Right Side.

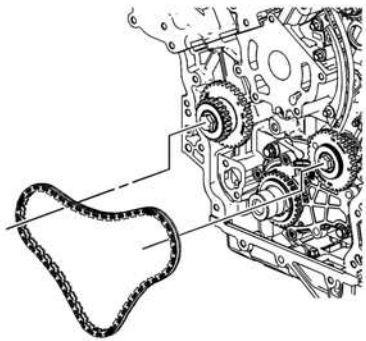
[Installation Procedure](#)



1. Install the primary camshaft timing chain. Refer to Primary Camshaft Intermediate Drive Chain Installation.
2. Install the primary upper camshaft drive chain guide. Refer to Primary Timing Chain Guide Installation - Upper.
3. Install the primary camshaft drive chain tensioner. Refer to Primary Camshaft Intermediate Drive Chain Tensioner Installation.
4. Install the right bank secondary camshaft drive chain. Refer to Secondary Camshaft Intermediate Drive Chain Installation - Right Side.
5. Install the right bank secondary camshaft drive chain guide. Refer to Secondary Timing Chain Guide Installation - Right Side.
6. Install the right bank secondary camshaft drive chain shoe. Refer to Secondary Camshaft Drive Chain Shoe Installation - Right Side.
7. Install the right bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Installation - Right Side.
8. Install the engine front cover. Refer to Engine Front Cover Replacement.

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Submodel: | Engine Type: | Liters:
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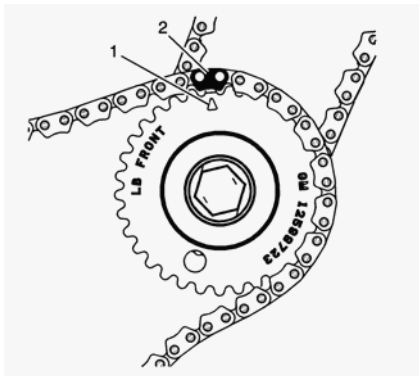


Note: Ensure that the crankshaft is in the stage one timing drive assembly position.

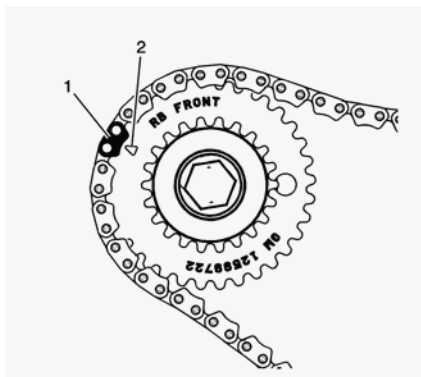
1. Install the primary camshaft drive chain.



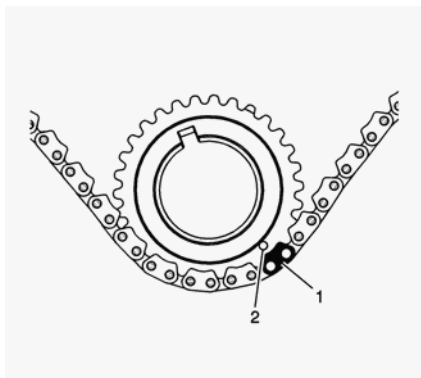
2. Wrap the primary camshaft drive chain around the large sprockets of each camshaft intermediate drive chain idler and the crankshaft sprocket.



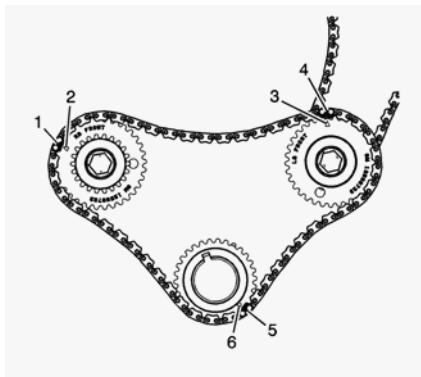
3. The left camshaft intermediate drive chain idler timing mark (1) will align with a timing camshaft drive chain link (2).



4. The right camshaft intermediate drive chain idler timing mark (2) will align with a timing camshaft drive chain link (1).



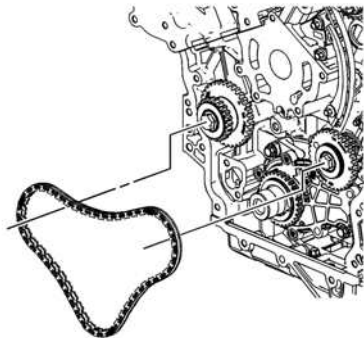
5. The crankshaft sprocket timing mark (2) will align with a timing camshaft drive chain link (1).



6. Ensure all the timing marks (2, 3, 6) are properly aligned with the timing camshaft drive chain links (1, 4, 5).

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
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Remove the primary camshaft drive chain.

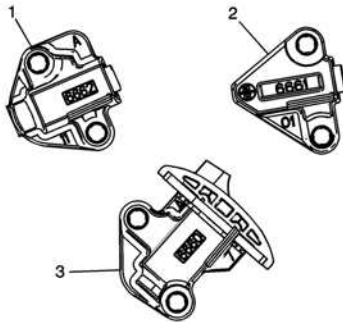
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

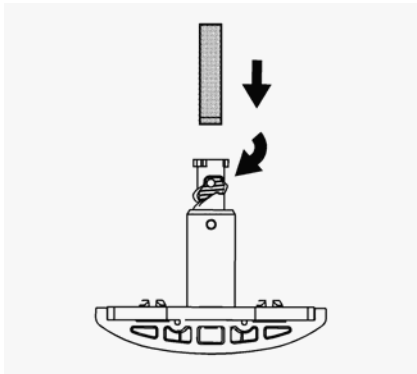
Special Tools

- EN 45027 Tensioner Tool
- EN 46112 Tensioner Retraction Pins
- EN 48383 Camshaft Retaining Tools
- EN 48589 Crankshaft Rotation Socket

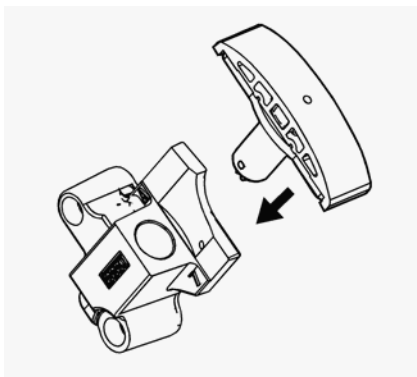
For equivalent regional tools, refer to Special Tools.



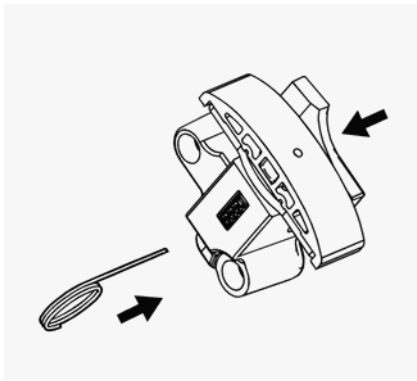
1. Ensure that the primary camshaft drive chain tensioner (3) is being installed.



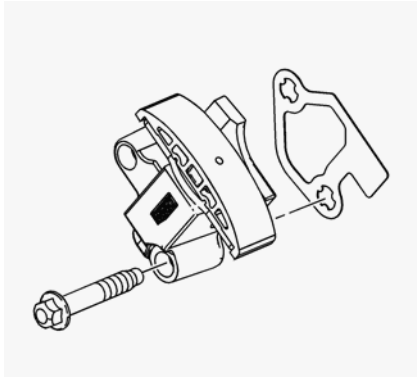
2. Using the EN 45027 tool, reset the primary camshaft drive chain tensioner plunger.



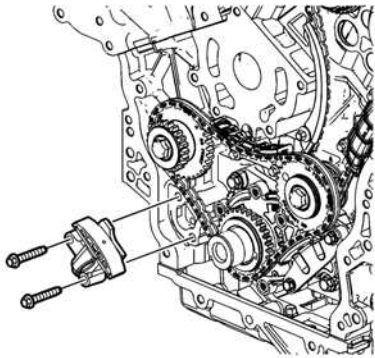
3. Install the plunger into the primary camshaft drive chain tensioner body.



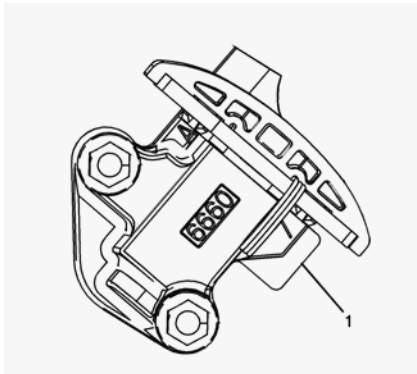
4. Compress the plunger into the body and lock the primary camshaft drive chain tensioner by inserting the EN 46112 pins into the access hole in the side of the primary camshaft drive chain tensioner body.
5. Slowly release pressure on the primary camshaft drive chain tensioner. The primary camshaft drive chain tensioner should remain compressed.



6. Install a NEW primary camshaft drive chain tensioner gasket to the primary camshaft drive chain tensioner.
7. Install the primary camshaft drive chain tensioner bolts through the primary camshaft drive chain tensioner and gasket.
8. Ensure the primary camshaft drive chain tensioner mounting surface on the engine block does not have any burrs or defects that would degrade the sealing of the NEW primary camshaft drive chain tensioner gasket.



9. Place the primary camshaft drive chain tensioner into position and loosely install the bolts to the block.



Caution: Refer to Fastener Caution.

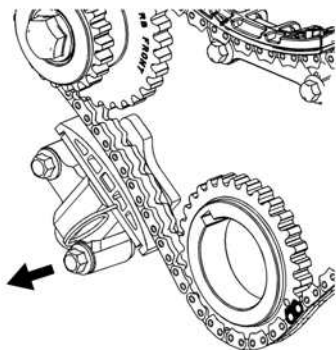
10. Verify the proper placement of the primary camshaft drive chain tensioner gasket tab (1).

1. First Pass

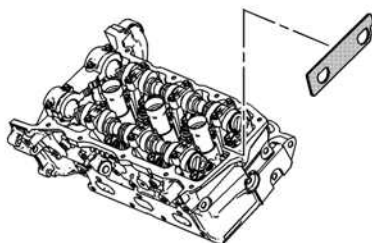
Tighten the primary camshaft drive chain tensioner bolts to **5 Y (44 lb in)**.

2. Final Pass

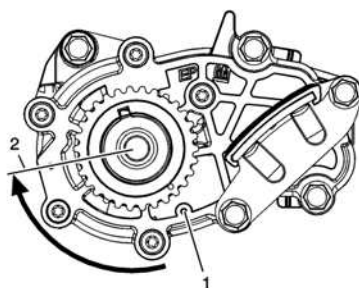
Tighten the primary camshaft drive chain tensioner bolts to **23 Y (17 lb ft)**.



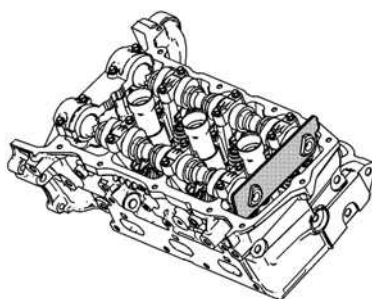
11. Release the primary camshaft drive chain tensioner by pulling out the *EN 46112* pins and unlocking the tensioner plunger.
12. Verify the primary and left secondary camshaft drive chain timing mark alignments. Refer to Timing Chain Alignment Diagram.



13. Remove the *EN 48383-1* from the rear of the left camshafts.

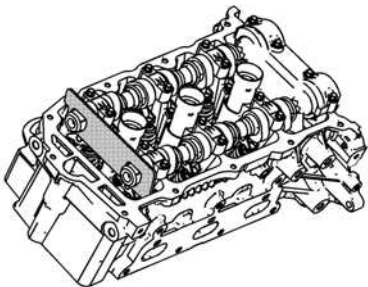


14. Using the *EN 48589* socket , rotate the crankshaft and crankshaft sprocket from the stage 1 alignment position (1) to the stage 2 alignment position (2), 115 crankshaft degrees, in order to install the right secondary camshaft drive chain components.



15. Install the *EN 48383-2* onto the rear of the left camshafts.

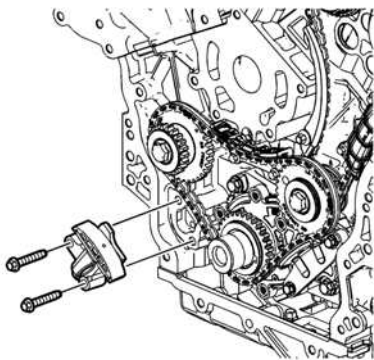
Primary Camshaft Intermediate Drive Chain Tensioner Installation (LY7/LP1)



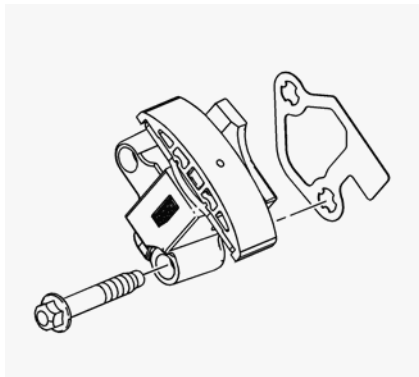
16. Install the EN 48383-3 onto the rear of the right camshafts.

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Submodel: | Engine Type: | Liters:
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1. Remove the primary camshaft drive chain tensioner bolts.
2. Remove the primary camshaft drive chain tensioner.

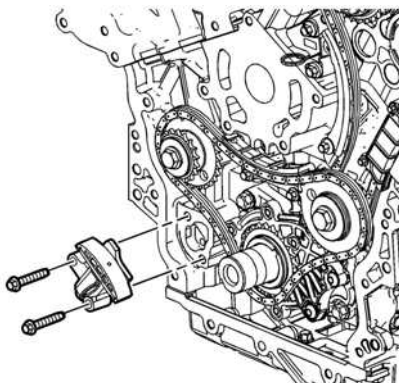


3. Remove and discard the primary camshaft drive chain tensioner gasket.
4. Inspect the primary camshaft drive chain tensioner mounting surface on the engine block for burrs or any defects that would degrade the sealing of the NEW primary camshaft drive chain tensioner gasket.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

[Removal Procedure](#)

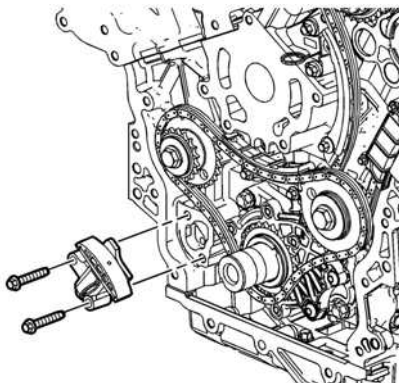


1. Remove the engine front cover. Refer to Engine Front Cover Replacement.

Important: If the entire camshaft timing system is not in Stage 2, Timing Chain Alignment Diagram, mark the timing chain and sprockets in order to ensure proper reassembly.

2. Remove the primary camshaft drive chain tensioner. Refer to Primary Camshaft Intermediate Drive Chain Tensioner Removal.

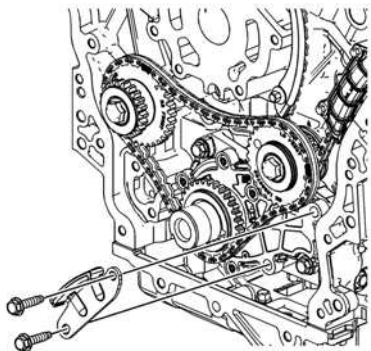
[Installation Procedure](#)



1. Install the primary camshaft drive chain tensioner. Refer to Primary Camshaft Intermediate Drive Chain Tensioner Installation.
2. Install the engine front cover. Refer to Engine Front Cover Replacement.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



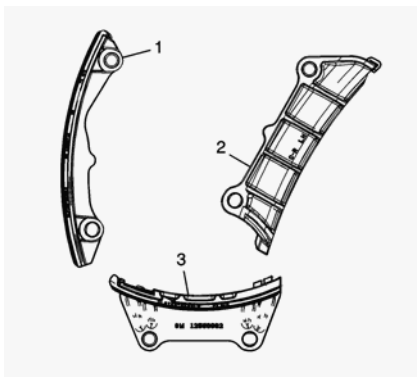
1. Position the primary camshaft drive chain lower guide to the oil pump.

Caution: Refer to Fastener Caution.

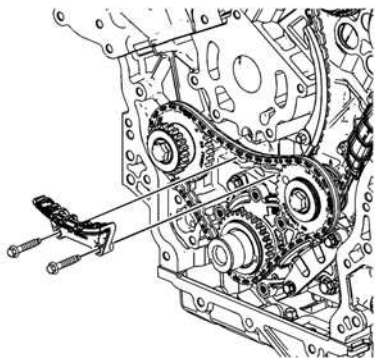
2. Install the primary camshaft drive chain lower guide bolts and tighten to **25 Y (18 lb ft)**.

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Fuel Delivery: | Fuel:



1. Ensure the upper primary camshaft drive chain guide (3) is being installed.



2. Install the upper primary camshaft drive chain guides.

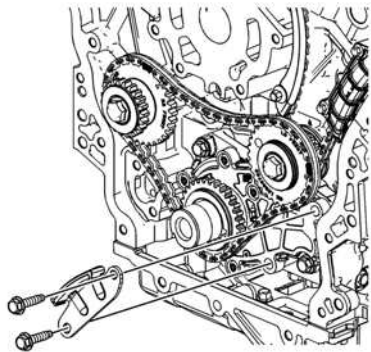
Caution: Refer to Fastener Caution.

3. Install the upper primary camshaft drive chain guide bolts and tighten to **25 Y (18 lb ft)**.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:

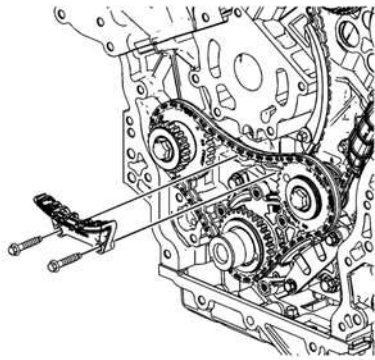


1. Remove the primary camshaft drive chain lower guide bolts.
2. Remove the primary camshaft drive chain lower guide.

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Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:



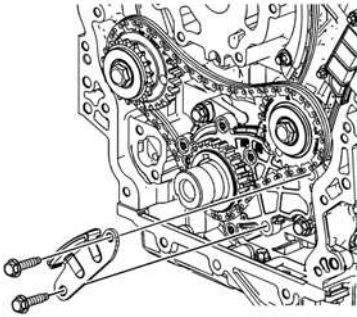
1. Remove the primary camshaft drive chain upper guide bolts.
2. Remove the primary camshaft drive chain upper guides.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

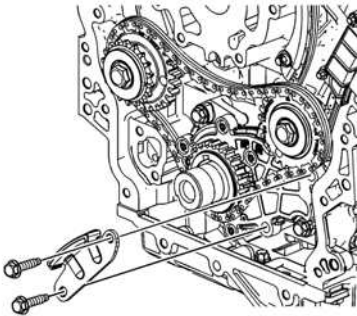
[Removal Procedure](#)

1. Remove the primary camshaft drive chain tensioner. Refer to Primary Camshaft Intermediate Drive Chain Tensioner Replacement.



2. Remove the primary camshaft drive chain lower guide bolts.
3. Remove the primary camshaft drive chain lower guide.

[Installation Procedure](#)



1. Position the primary camshaft drive chain lower guide to the oil pump.

Caution: Refer to Fastener Caution.

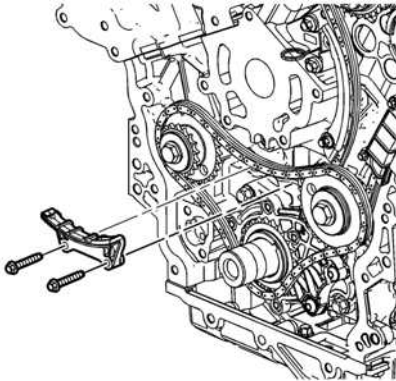
2. Install the primary camshaft drive chain lower guide bolts and tighten to **23 Y (17 lb ft)**.
3. Install the primary camshaft drive chain tensioner. Refer to Primary Camshaft Intermediate Drive Chain Tensioner Replacement.

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Submodel: | Engine Type: | Liters:

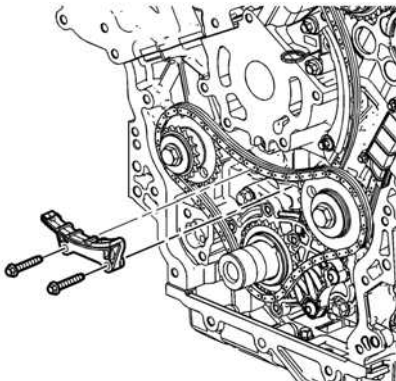
Fuel Delivery: | Fuel:

[Removal Procedure](#)



1. Remove the engine front cover. Refer to Engine Front Cover Replacement.
2. Remove the primary camshaft drive chain tensioner. Refer to Primary Camshaft Intermediate Drive Chain Tensioner Removal.
3. Remove the primary upper camshaft drive chain guide. Refer to Primary Timing Chain Guide Removal - Upper.

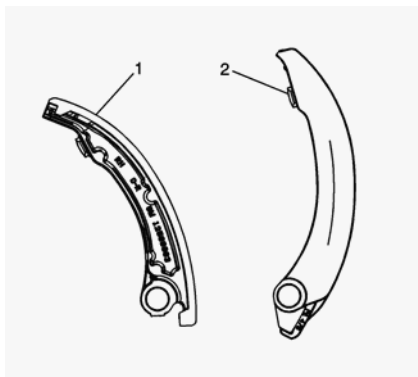
[Installation Procedure](#)



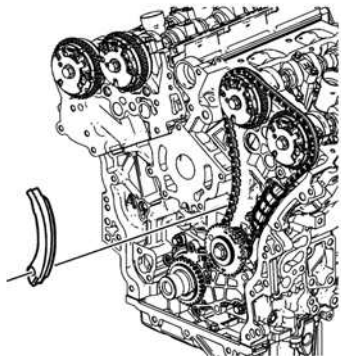
1. Install the primary upper camshaft drive chain guide. Refer to Primary Timing Chain Guide Installation - Upper.
2. Install the primary camshaft drive chain tensioner. Refer to Primary Camshaft Intermediate Drive Chain Tensioner Installation.
3. Install the engine front cover. Refer to Engine Front Cover Replacement.

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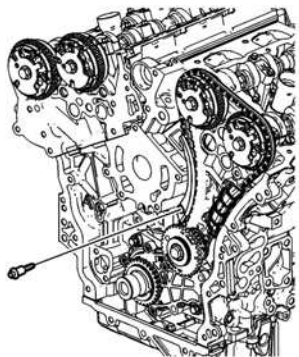
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



1. Ensure that the left secondary camshaft drive chain shoe (2) is being installed.



2. Position the left secondary camshaft drive chain shoe.

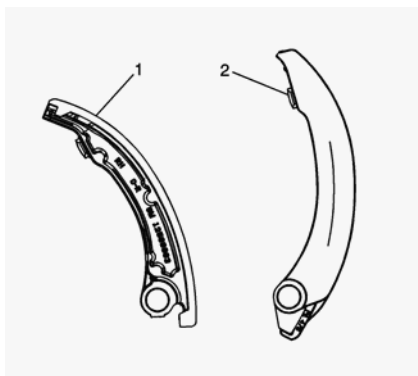


Caution: Refer to Fastener Caution.

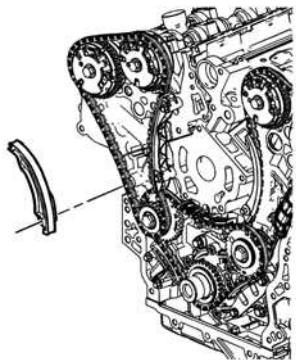
3. Install the secondary camshaft drive chain shoe bolt and tighten to **25 Y (18 lb ft)**.

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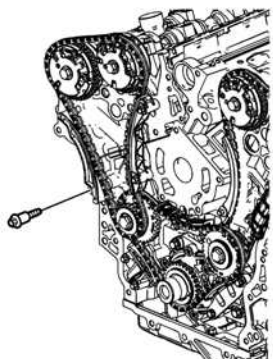
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



1. Ensure that the right secondary camshaft drive chain shoe (1) is being installed.



2. Position the right secondary camshaft drive chain shoe.

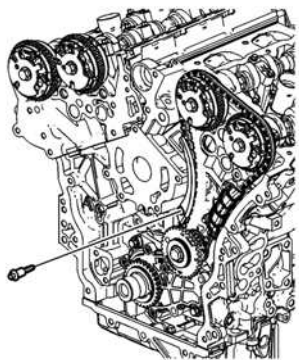


Caution: Refer to Fastener Caution.

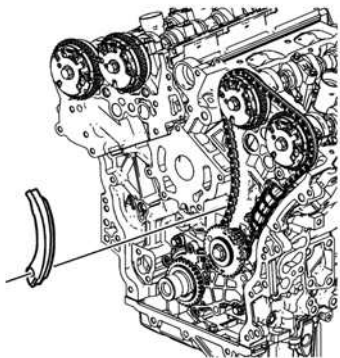
3. Install the secondary camshaft drive chain shoe bolt and tighten to **25 Y (18 lb ft)**.

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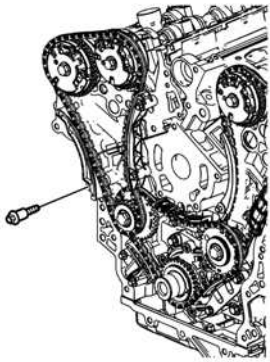
1. Remove the left secondary camshaft drive chain shoe bolt.



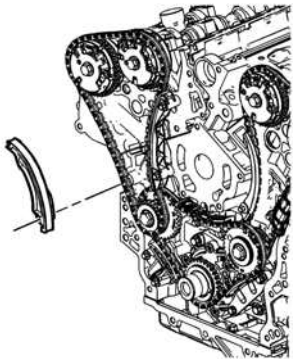
2. Remove the left secondary camshaft drive chain shoe.

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Submodel: | Engine Type: | Liters:
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1. Remove the right secondary camshaft drive chain shoe bolt.



2. Remove the right secondary camshaft drive chain shoe.

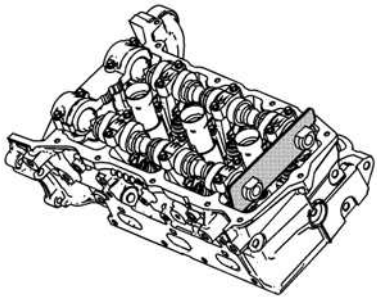
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Special Tools

- EN 48383 Camshaft Retaining Tools
- EN 48589 Crankshaft Rotation Socket

For equivalent regional tools, refer to Special Tools.

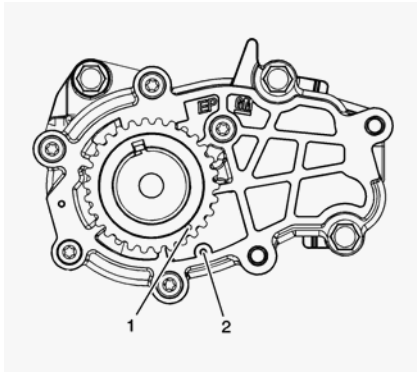


Important: There should be no need to rotate the camshaft more than 10 degrees. Using the hex cast into the camshaft rotate the camshaft in order to install the EN 48383 tools .

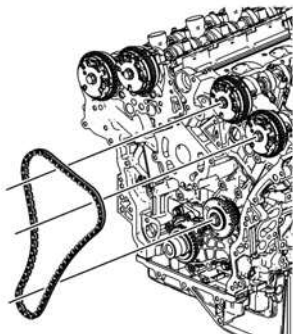
1. Install the EN 48383-1 onto the rear of the left camshafts.

Important: All camshafts must be locked in place before installation of any camshaft drive chains.

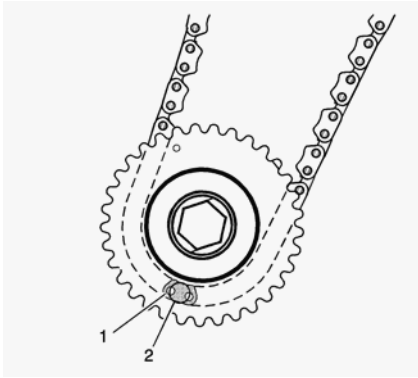
2. Ensure that the EN 48383-1 is fully seated onto the camshafts.



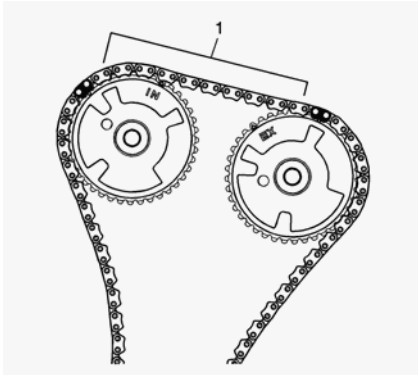
3. Ensure the crankshaft is in the stage one timing position with the crankshaft sprocket timing mark (1) aligned to the stage one timing mark on the oil pump cover (2) using the EN 48589 socket . Refer to Timing Chain Alignment Diagram.



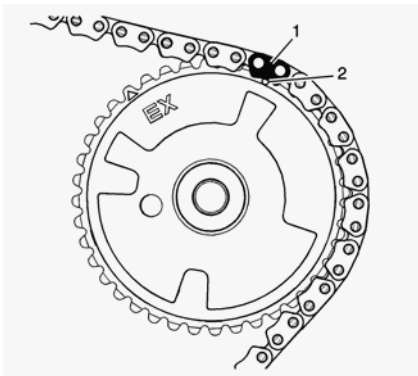
4. Install the left secondary camshaft drive chain.



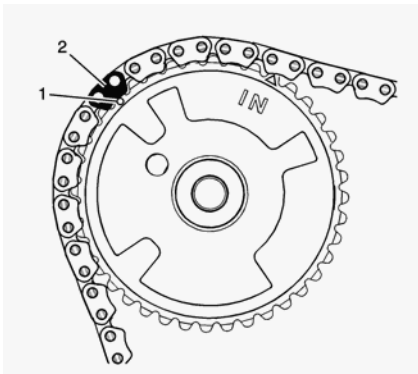
5. Place the left secondary camshaft drive chain around the inner sprocket of the left camshaft intermediate drive chain idler with the timing camshaft drive chain link (1) aligned to the alignment access hole (2) made in the left camshaft intermediate drive chain idler outer sprocket.



6. Wrap the secondary camshaft drive chain around both left actuator drive sprockets.
7. Ensure there are 10 links (1) between the timing camshaft drive chain links for the camshaft position actuator sprockets.



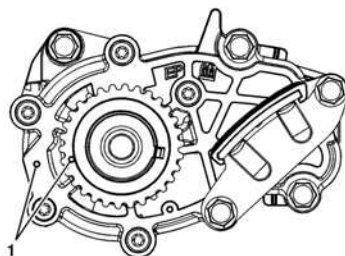
8. Align the left exhaust camshaft position actuator sprocket alignment circle mark (2) with the timing camshaft drive chain link (1).



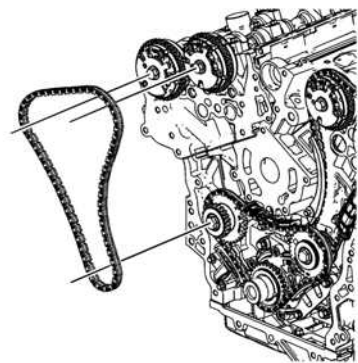
9. Align the left intake camshaft position actuator sprocket alignment circle mark (1) with the timing camshaft drive chain link (2).

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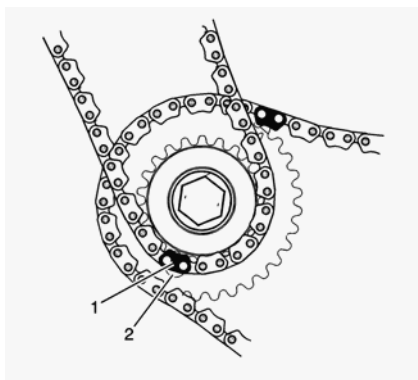
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



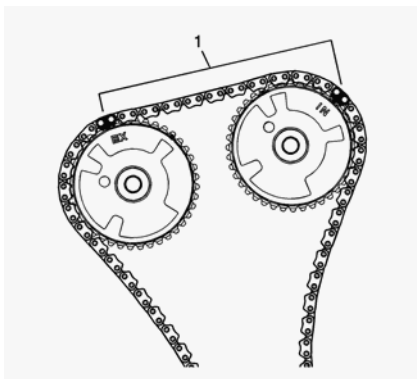
1. Ensure that the crankshaft is in the stage 2 timing drive assembly position (1).



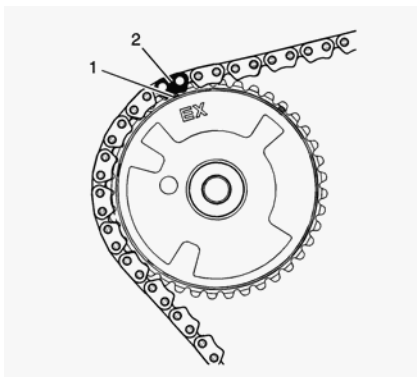
2. Install the right secondary camshaft drive chain.



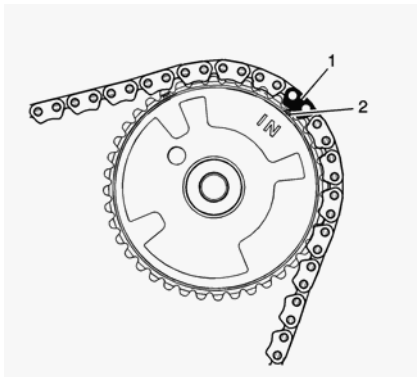
3. Place the secondary camshaft drive chain around the right camshaft intermediate drive chain idler outer sprocket, aligning the timing camshaft drive chain link (1) with the alignment access hole (2) made in the right camshaft intermediate drive chain idler inner sprocket.



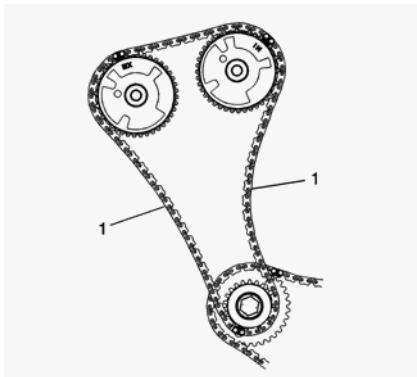
4. Wrap the secondary camshaft drive chain around both right actuator drive sprockets.
5. Ensure there are 10 links (1) between the timing camshaft drive chain links for the camshaft position actuator sprockets.



6. Align the right exhaust camshaft position actuator sprocket alignment triangle mark (1) with the timing camshaft drive chain link (2).



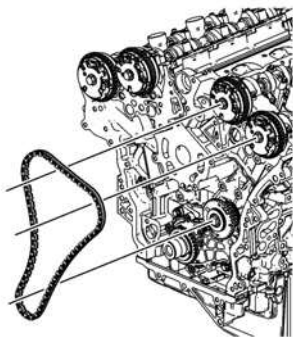
7. Align the right intake camshaft position actuator sprocket alignment triangle mark (2) with the timing camshaft drive chain link (1).



8. There will be 22 links (1) between the right camshaft intermediate drive chain idler timing camshaft drive chain link and each right camshaft position actuator sprocket timing camshaft drive chain link.

2013 Chevrolet Colorado

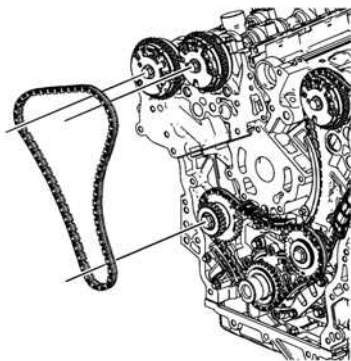
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



Remove the left secondary camshaft drive chain from the left camshaft position actuators and the left camshaft intermediate drive chain idler sprocket.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



Remove the right secondary camshaft drive chain from the right camshaft position actuators and the right camshaft intermediate drive chain idler sprocket.

2013 Chevrolet Colorado

Submodel: | **Engine Type:** | **Liters:**
Fuel Delivery: | **Fuel:**

Removal Procedure

1. Remove the engine front cover. Refer to Engine Front Cover Replacement.
2. Remove the camshaft timing chain components. Refer to Camshaft Timing Chain Components Removal.
3. Clean and inspect all of the camshaft timing drive components. Refer to Camshaft Timing Drive Components Cleaning and Inspection. Replace components as necessary.

Installation Procedure

1. Install the camshaft timing chain components. Refer to Camshaft Timing Chain Components Installation.
2. Install the engine front cover. Refer to Engine Front Cover Replacement.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

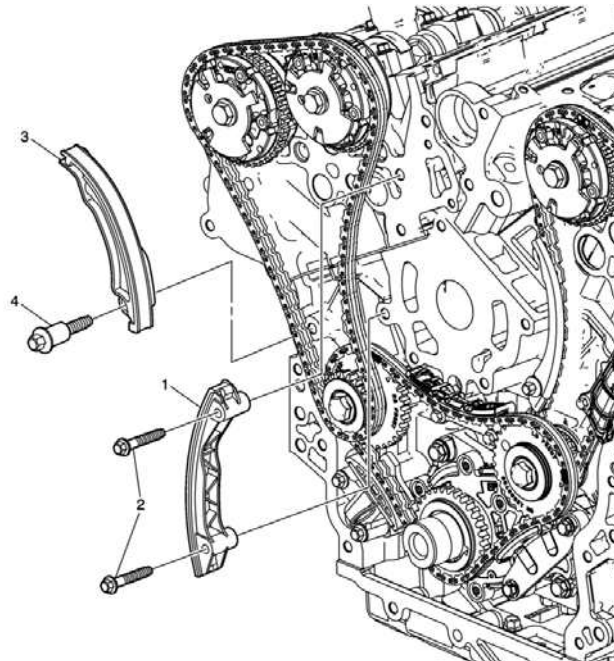
Fuel Delivery: | Fuel:

[Removal Procedure](#)

1. Remove the engine front cover. Refer to Engine Front Cover Replacement.
2. Remove the right secondary camshaft drive chain components. Refer to Camshaft Timing Chain Components Removal.
3. Clean and inspect all of the camshaft timing drive components. Refer to Camshaft Timing Drive Components Cleaning and Inspection. Replace components as necessary.

[Installation Procedure](#)

1. Ensure the stage 1 camshaft timing is correct. Refer to Camshaft Timing Chain Components Installation.
2. Install the right bank secondary camshaft drive chain guide. Refer to Camshaft Timing Chain Components Installation.



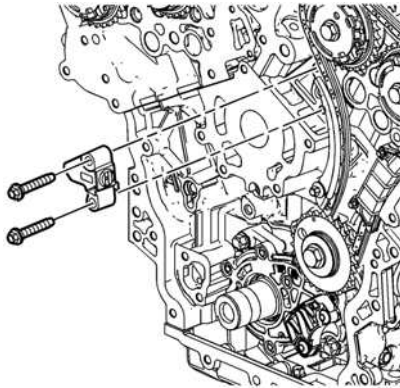
3. Install the right side secondary camshaft drive chain guide (1) and shoe (3). Tighten bolts (2 and 4) to 25 Y (18 lb ft).
4. Install the right side secondary camshaft drive chain tensioner. Refer to Camshaft Timing Chain Components Installation.
5. Install the engine front cover. Refer to Engine Front Cover Replacement.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

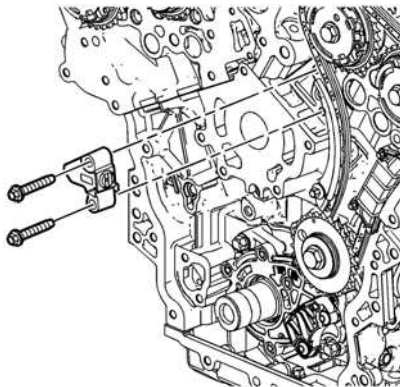
[Removal Procedure](#)

1. Remove the engine front cover. Refer to Engine Front Cover Replacement.



2. Remove the left bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Removal - Left Side.

[Installation Procedure](#)



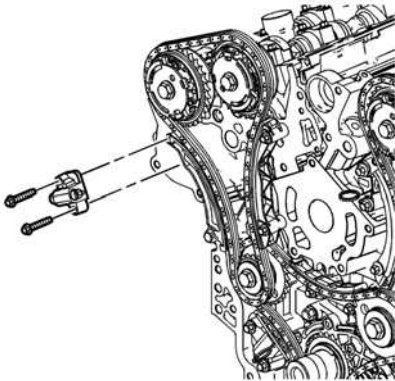
1. Install the left bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Installation - Left Side.
2. Install the engine front cover. Refer to Engine Front Cover Replacement.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

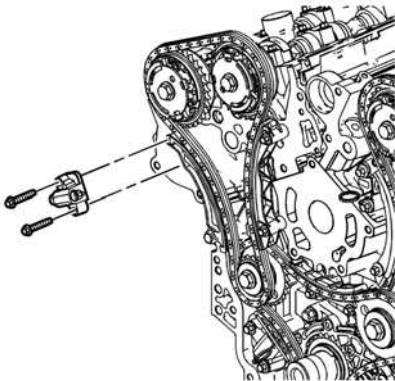
[Removal Procedure](#)

1. Remove the engine front cover. Refer to Engine Front Cover Replacement.



2. Remove the right bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Removal - Right Side.

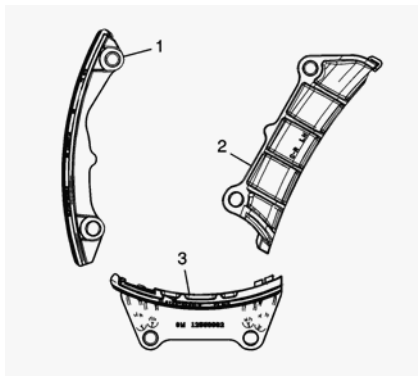
[Installation Procedure](#)



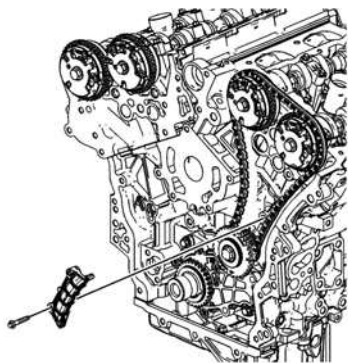
1. Install the right bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Installation - Right Side.
2. Install the engine front cover. Refer to Engine Front Cover Replacement.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



1. Ensure that the left secondary camshaft drive chain guide (2) is being installed.



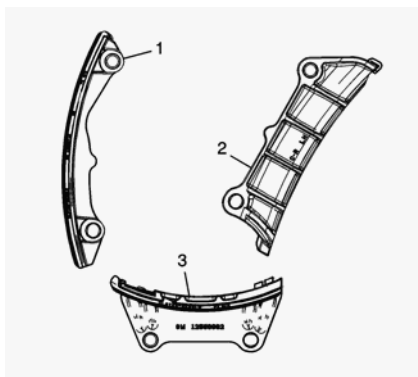
2. Position the left secondary camshaft drive chain guide.

Caution: Refer to Fastener Caution.

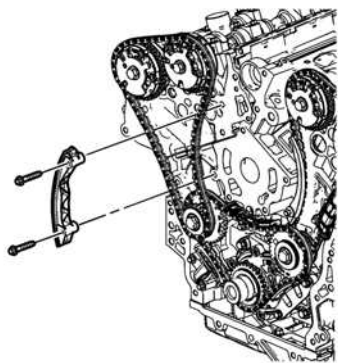
3. Install the secondary camshaft drive chain guide bolts and tighten to **25 Y (18 lb ft)**.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



1. Ensure that the right secondary camshaft drive chain guide (1) is being installed.



2. Position the right secondary camshaft drive chain guide.

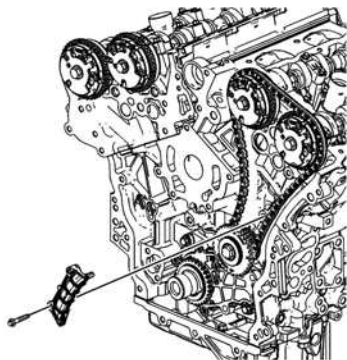
Caution: Refer to Fastener Caution.

3. Install the secondary camshaft drive chain guide bolts and tighten to **25 Y (18 lb ft)**.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:

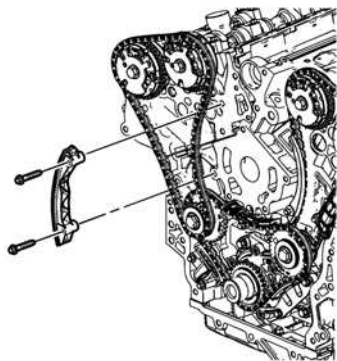


1. Remove the left secondary camshaft drive chain guide bolts.
2. Remove the left secondary camshaft drive chain guide.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:



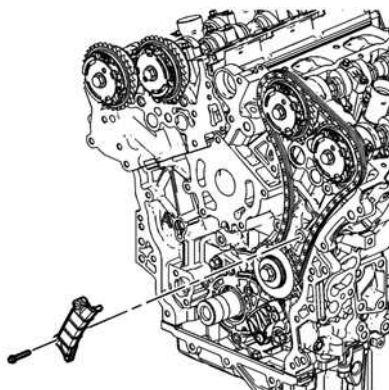
1. Remove the right secondary camshaft drive chain guide bolts.
2. Remove the right secondary camshaft drive chain guide.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

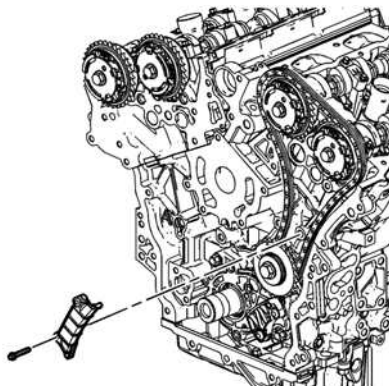
[Removal Procedure](#)

1. Remove the engine front cover. Refer to Engine Front Cover Replacement.
2. Remove the left bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Removal - Left Side.



3. Remove the left bank secondary camshaft drive chain guide. Refer to Secondary Timing Chain Guide Removal - Left Side.

[Installation Procedure](#)



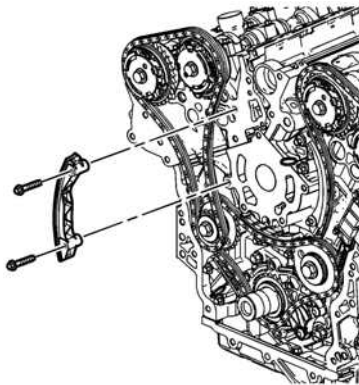
1. Install the left bank secondary camshaft drive chain guide. Refer to Secondary Timing Chain Guide Installation - Left Side.
2. Install the left bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Installation - Left Side.
3. Install the engine front cover. Refer to Engine Front Cover Replacement.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

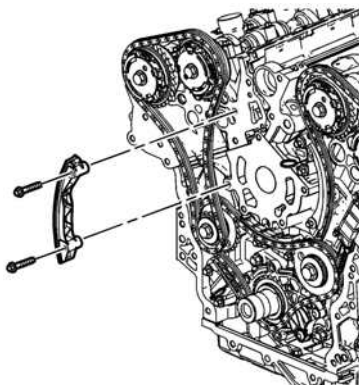
[Removal Procedure](#)

1. Remove the engine front cover. Refer to Engine Front Cover Replacement.
2. Remove the right bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Removal - Right Side.



3. Remove the right bank secondary camshaft drive chain guide. Refer to Secondary Timing Chain Guide Removal - Right Side.

[Installation Procedure](#)



1. Install the right bank secondary camshaft drive chain guide. Refer to Secondary Timing Chain Guide Installation - Right Side.
2. Install the right bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Installation - Right Side.
3. Install the engine front cover. Refer to Engine Front Cover Replacement.

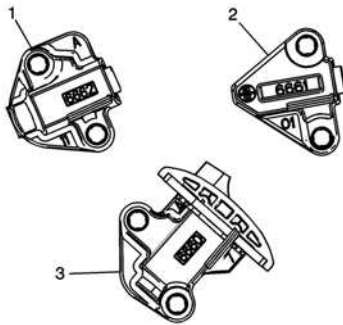
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

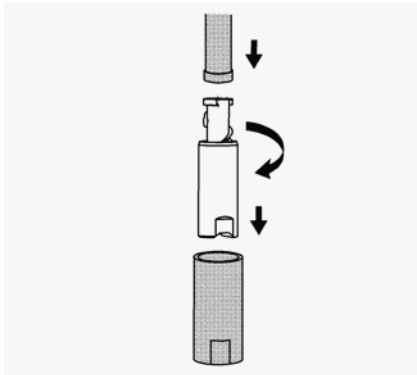
Special Tools

- EN 45027 Tensioner Tool
- EN 46112 Tensioner Retraction Pins

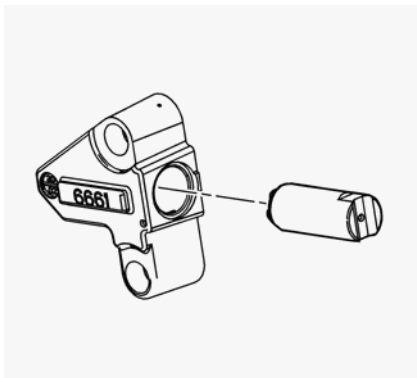
For equivalent regional tools, refer to Special Tools.



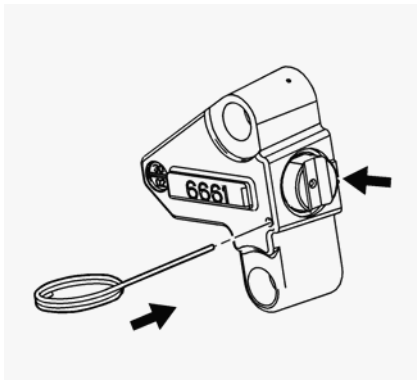
1. Ensure that the left secondary camshaft drive chain tensioner (2) is being installed.



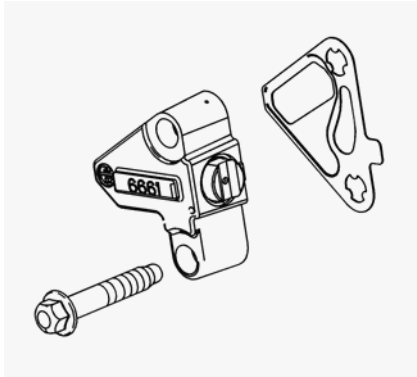
2. Using the EN 45027 tool, reset the left secondary camshaft drive chain tensioner plunger.



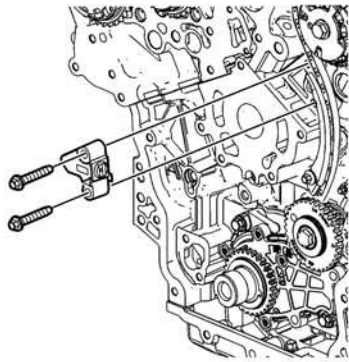
3. Install the plunger into the left secondary camshaft drive chain tensioner body.



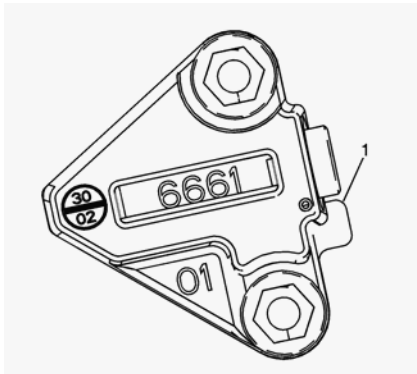
4. Compress the plunger into the body and lock the left secondary camshaft drive chain tensioner by inserting the *EN-46112* pins into the access hole in the side of the left secondary camshaft drive chain tensioner body.
5. Slowly release pressure on the left secondary camshaft drive chain tensioner. The left secondary camshaft drive chain tensioner should remain compressed.



6. Install a NEW left secondary camshaft drive chain tensioner gasket to the left secondary camshaft drive chain tensioner.
7. Install the left secondary camshaft drive chain tensioner bolts through the left secondary camshaft drive chain tensioner and gasket.
8. Ensure the left secondary camshaft drive chain tensioner mounting surface on the left cylinder head does not have any burrs or defects that would degrade the sealing of the NEW left secondary camshaft drive chain tensioner gasket.



9. Place the left secondary camshaft drive chain tensioner into position and loosely install the bolts to the block.



Caution: Refer to Fastener Caution.

10. Verify the proper placement of the left secondary camshaft drive chain tensioner gasket tab (1).

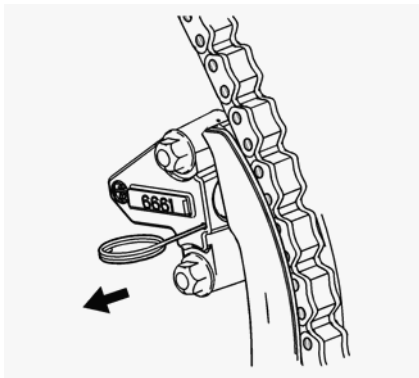
1. First Pass

Tighten the left secondary camshaft drive chain tensioner bolts to **5 Y (44 lb in)**.

Secondary Timing Chain Tensioner Installation - Left Side

2. Final Pass

Tighten the left secondary camshaft drive chain tensioner bolts to **25 Y (18 lb ft)**.



11. Release the left secondary camshaft drive chain tensioner by pulling out the *EN 46112* pins and unlocking the tensioner plunger.
12. Verify the left secondary camshaft drive chain timing mark alignments by referring to Timing Chain Alignment Diagram – Stage One.

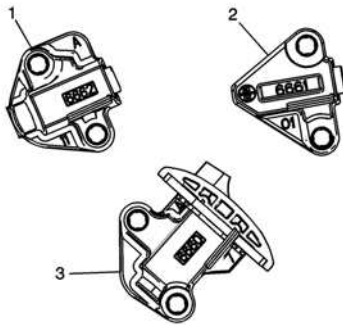
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

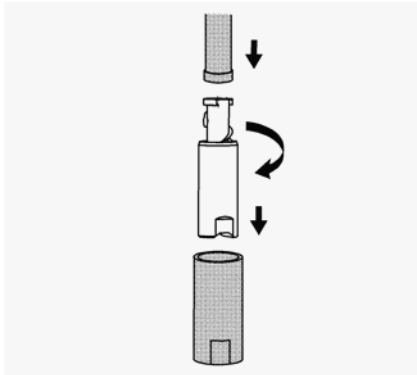
Special Tools

- EN 45027 Tensioner Tool
- EN 46112 Tensioner Retraction Pins

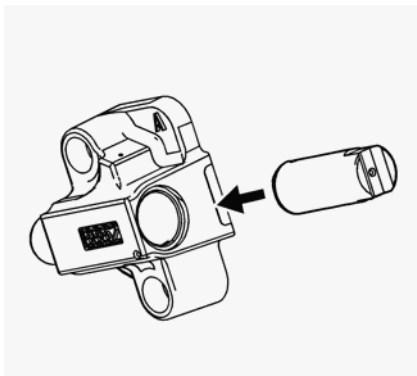
For equivalent regional tools, refer to Special Tools.



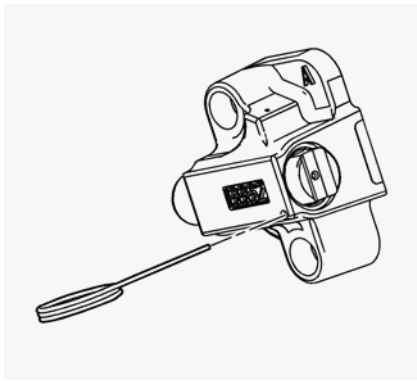
1. Ensure that the right secondary camshaft drive chain tensioner (1) is being installed.



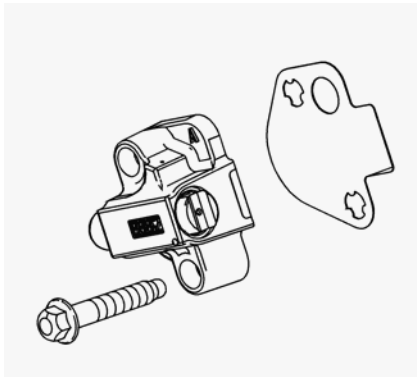
2. Using the EN 45027 tool , reset the right secondary camshaft drive chain tensioner plunger.



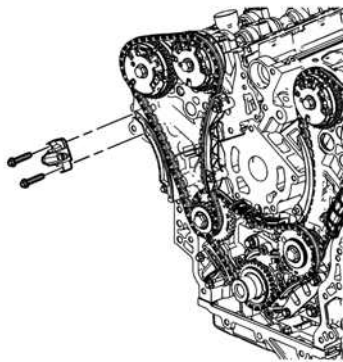
3. Install the plunger into the right secondary camshaft drive chain tensioner body.



4. Compress the plunger into the body and lock the right secondary camshaft drive chain tensioner by inserting the *EN 46112* pins into the access hole in the side of the right secondary camshaft drive chain tensioner body.
5. Slowly release pressure on the right secondary camshaft drive chain tensioner. The right secondary camshaft drive chain tensioner should remain compressed.



6. Install a **NEW** right secondary camshaft drive chain tensioner gasket to the right secondary camshaft drive chain tensioner.
7. Install the right secondary camshaft drive chain tensioner bolts through the right secondary camshaft drive chain tensioner and gasket.
8. Ensure the right secondary camshaft drive chain tensioner mounting surface on the right cylinder head does not have any burrs or defects that would degrade the sealing of the **NEW** right secondary camshaft drive chain tensioner gasket.



9. Place the right secondary camshaft drive chain tensioner into position and loosely install the bolts to the block.



Caution: Refer to Fastener Caution.

10. Verify the proper placement of the right secondary camshaft drive chain tensioner gasket tab (1).

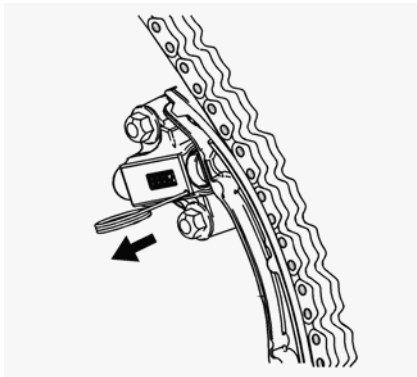
1. First Pass

Secondary Timing Chain Tensioner Installation - Right Side

Tighten the right secondary camshaft drive chain tensioner bolts to **5 Y (44 lb in)**.

2. Final Pass

Tighten the right secondary camshaft drive chain tensioner bolts to **25 Y (18 lb ft)**.



11. Release the right camshaft drive chain tensioner by pulling out the *EN 46112* pins and unlocking the tensioner plunger.

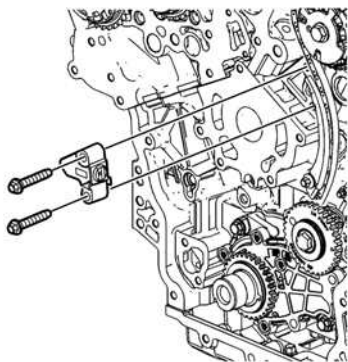
Caution: Ensure that all timing chain tensioners are completely released. A timing chain tensioner that is not properly released can lead to serious engine damage.

12. Verify all primary and secondary camshaft drive chain timing mark alignments. Refer to Timing Chain Alignment Diagram – Stage Two.

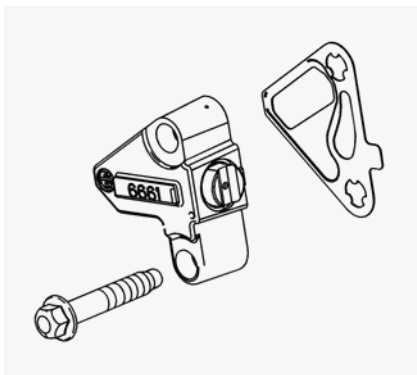
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:



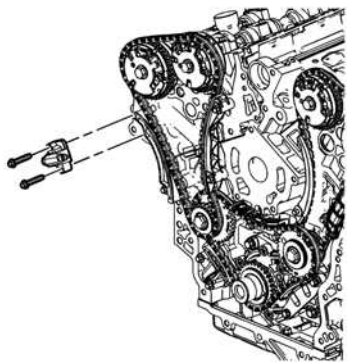
1. Remove the left secondary camshaft drive chain tensioner bolts.
2. Remove the left secondary camshaft drive chain tensioner.



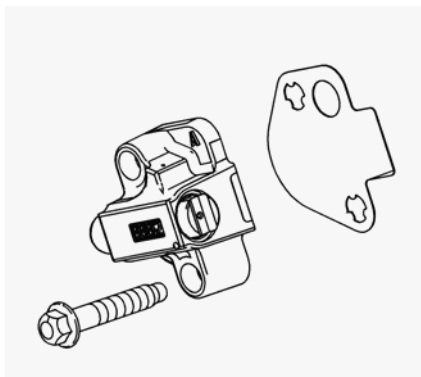
3. Remove and discard the left secondary camshaft drive chain tensioner gasket.
4. Inspect the left secondary camshaft drive chain tensioner mounting surface on the left cylinder head for burrs or any defects that would degrade the sealing of the NEW left secondary camshaft drive chain tensioner gasket.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



1. Remove the right secondary camshaft drive chain tensioner bolts.
2. Remove the right secondary camshaft drive chain tensioner.



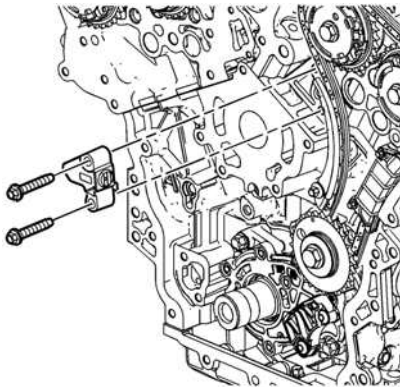
3. Remove and discard the right secondary camshaft drive chain tensioner gasket.
4. Inspect the right secondary camshaft drive chain tensioner mounting surface on the right cylinder head for burrs or any defects that would degrade the sealing of the NEW right secondary camshaft drive chain tensioner gasket.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

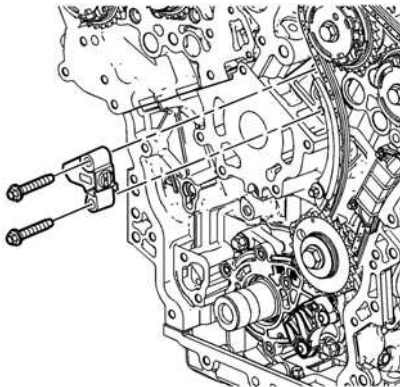
[Removal Procedure](#)

1. Remove the engine front cover. Refer to Engine Front Cover Replacement.



2. Remove the left bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Removal - Left Side.

[Installation Procedure](#)

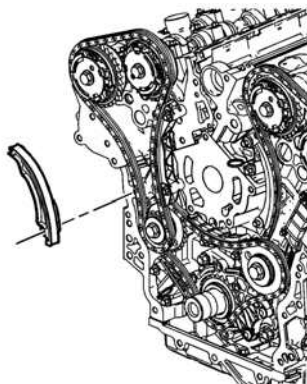


1. Install the left bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Installation - Left Side.
2. Install the engine front cover. Refer to Engine Front Cover Replacement.

2013 Chevrolet Colorado

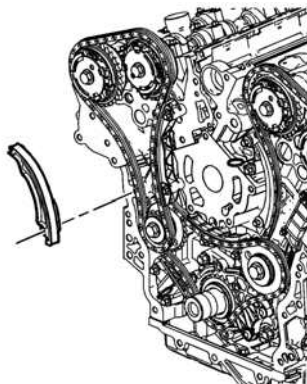
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

[Removal Procedure](#)



1. Remove the engine front cover. Refer to Engine Front Cover Replacement.
2. Remove the right bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Removal - Right Side.
3. Remove the right bank secondary camshaft drive chain shoe. Refer to Secondary Camshaft Drive Chain Shoe Removal - Right Side.

[Installation Procedure](#)



1. Install the right bank secondary camshaft drive chain shoe. Refer to Secondary Camshaft Drive Chain Shoe Installation - Right Side.
2. Install the right bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Installation - Right Side.
3. Install the engine front cover. Refer to Engine Front Cover Replacement.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

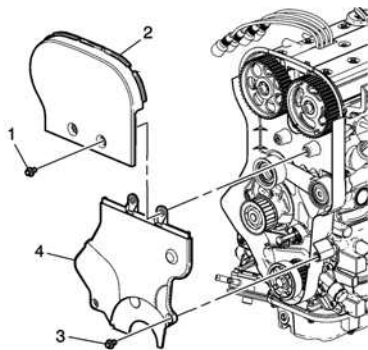
Note: Setting the camshaft timing is necessary whenever the camshaft drive system has been disturbed such that the relationship between any chain and sprocket has been lost. Even when only one sprocket is involved, multiple crankshaft rotations will not produce conditions where correct timing can be confirmed.

Follow the left bank secondary camshaft drive chain replacement procedures to reset the camshaft timing. Refer to Secondary Camshaft Intermediate Drive Chain Replacement - Left Side.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:



1. Install the lower front cover (4) and bolts (3).
2. Install the upper front cover (2) and bolts (1).

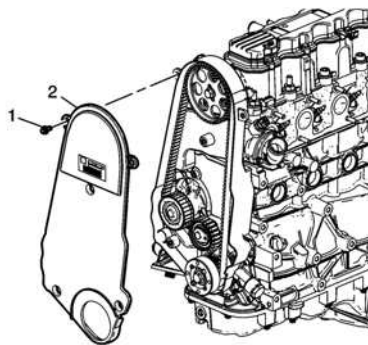
Caution: Refer to Fastener Caution.

3. Tighten the timing belt front cover bolts (1 and 3) to **6.0 Y (53 lb in)**.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:



1. Install the timing belt front cover (2) and bolts (1).

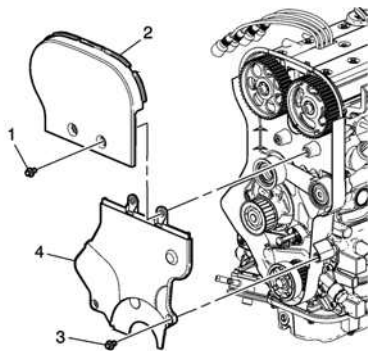
Caution: Refer to Fastener Caution.

2. Tighten the timing belt front cover bolts (1) to **6.0 Y (53 lb in)**.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:

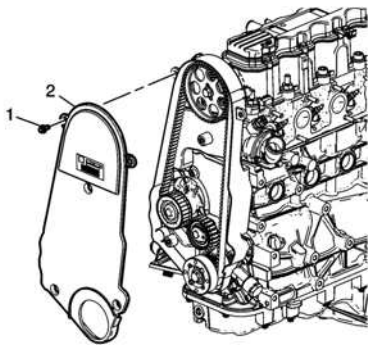


1. Remove the timing belt front cover bolts (1 and 3).
2. Remove the upper front cover (2).
3. Remove lower front cover (4).

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:

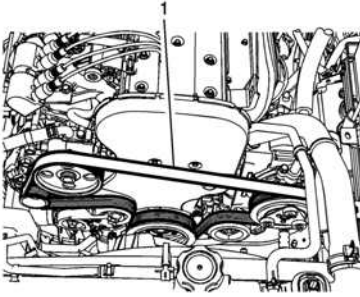


1. Remove the timing belt front cover bolts (1).
2. Remove the timing belt front cover (2).

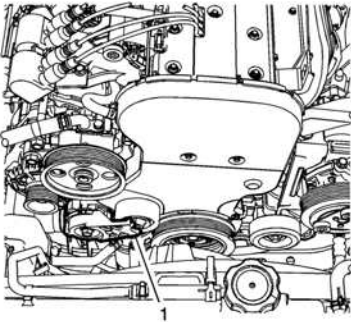
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

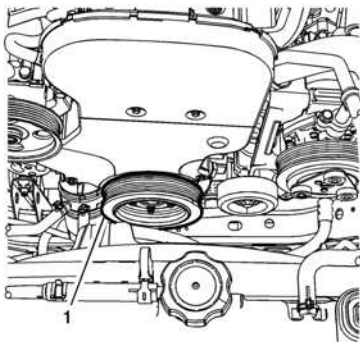
[Removal Procedure](#)



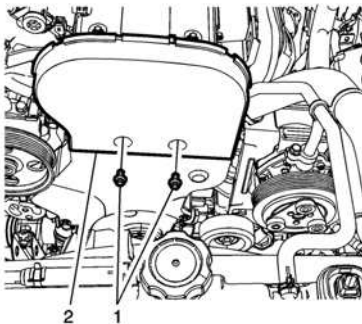
1. Remove the drive belt (1). Refer to Drive Belt Replacement.



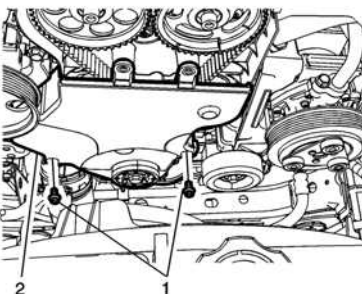
2. Remove the drive belt tensioner (1). Refer to Drive Belt Tensioner Replacement.



3. Remove the crankshaft pulley (1). Refer to Crankshaft Pulley Replacement.

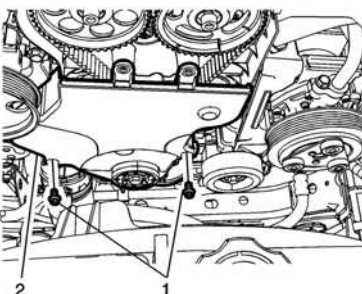


4. Remove the front upper timing cover fastener (1).
5. Remove the front upper timing cover (2)

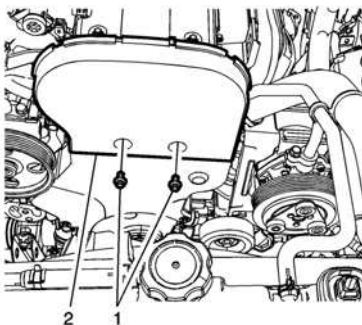


6. Remove the front lower timing cover fastener (1).
7. Remove the front lower timing cover (2).

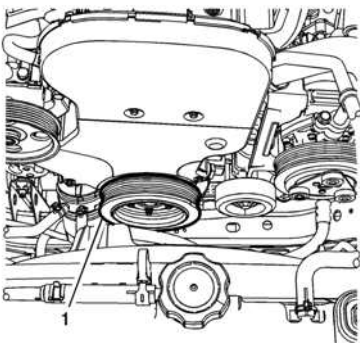
[Installation Procedure](#)



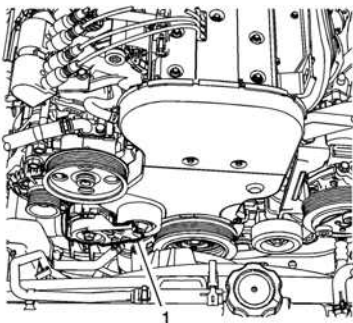
1. Install the front lower timing cover (2).
2. Install the front lower timing cover fastener (1) and tighten to **6Y (53 lb ft)**.



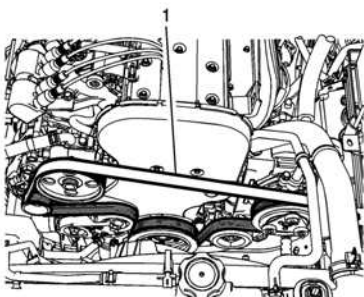
3. Install front upper timing cover (2).
4. Install front upper timing cover fastener (1) and tighten to **6 Y (53 lb ft)**.



5. Install the crank pulley (1). Refer to Crankshaft Pulley Replacement.



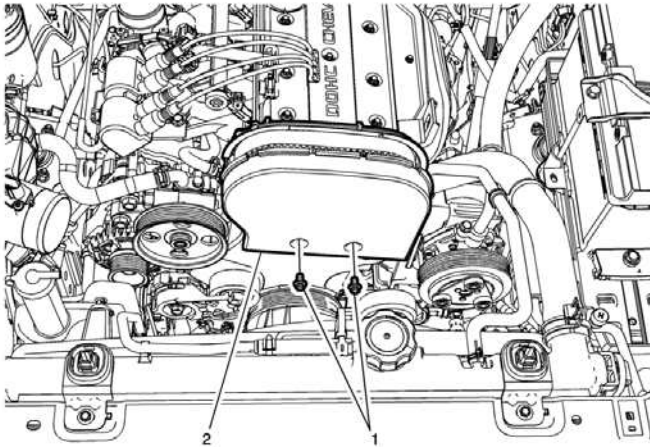
6. Install the drive belt tensioner (1). Refer to Drive Belt Tensioner Replacement



7. Install drive belt (1). Refer to Drive Belt Replacement.

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Timing Belt Front Cover Replacement

Callout

Component Name

Preliminary Procedure

Remove the drive belt. Refer to Drive Belt Replacement

Timing Belt Upper Front Cover Fastener (Qty:2)

Caution: Refer to Fastener Caution.

1

Tighten

6Y(53 lb in)

Timing Belt Upper Front Cover

2

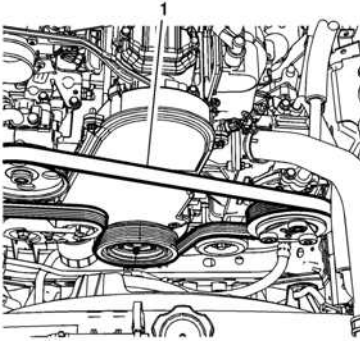
Procedure

Ensure to replace the timing belt upper front cover seal whenever removing the cover.

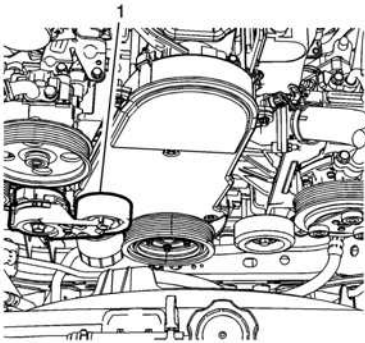
2013 Chevrolet Colorado

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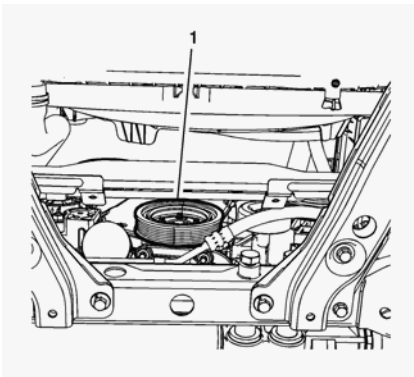
[Removal Procedure](#)



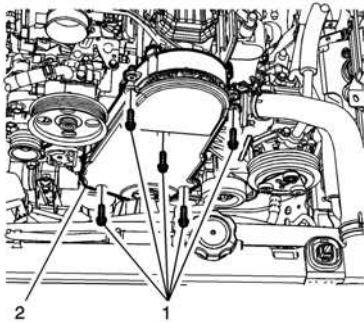
1. Remove the drive belt (1). Refer to Drive Belt Replacement.



2. Remove the drive belt tensioner (1). Refer to Drive Belt Tensioner Replacement.

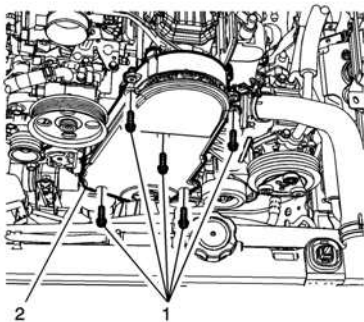


3. Remove the crankshaft pulley (1). Refer to Crankshaft Pulley Replacement.

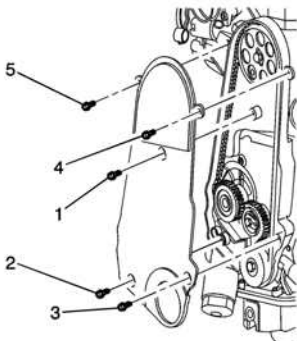


4. Remove the front timing cover fastener (1).
5. Remove the front lower timing cover (2).

[Installation Procedure](#)

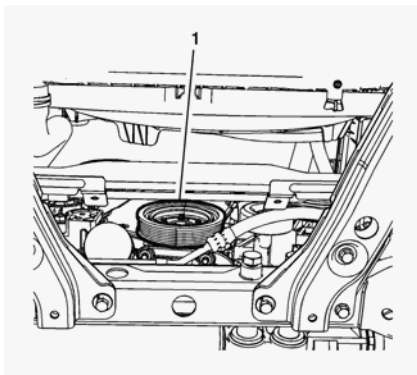


1. Install front timing cover (2).

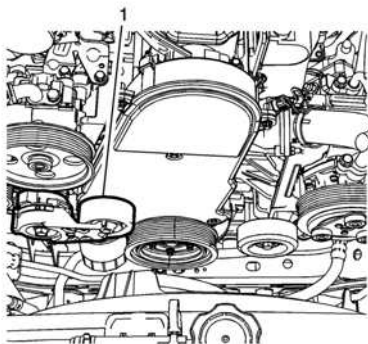


Caution: Refer to Fastener Caution.

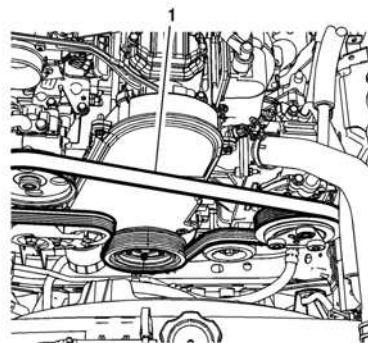
2. Install front timing cover fastener and tighten the bolts in sequence as shown above.



3. Install the crank pulley (1). Refer to Crankshaft Pulley Replacement.



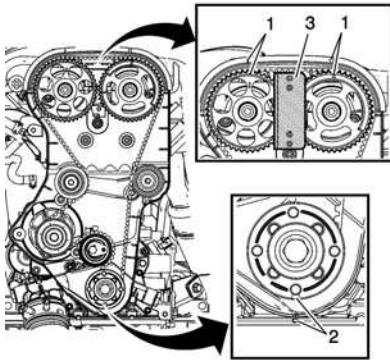
4. Install the drive belt tensioner (1). Refer to Drive Belt Tensioner Replacement.



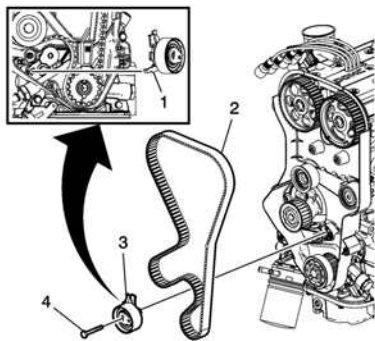
5. Install drive belt (1). Refer to Drive Belt Replacement.

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1. Align the camshaft sprocket timing marks (1). Install the EN-9806539 Holding Fixture (3).
2. Align the crankshaft sprocket timing marks (2).

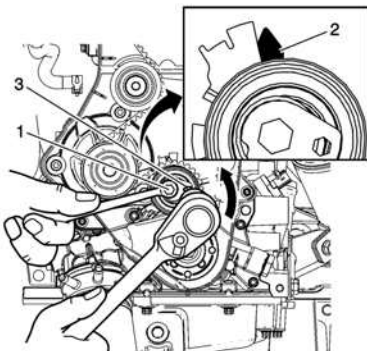


Note: Ensure the lock lug (1) on the tensioner is positioned into the oil pump housing depression correctly.

3. Install the timing belt tensioner (3) and bolt (4), do not tighten fully.

Note: Use care to not disturb the camshaft and crankshaft sprockets from the timing marks.

4. Install the timing belt (2).

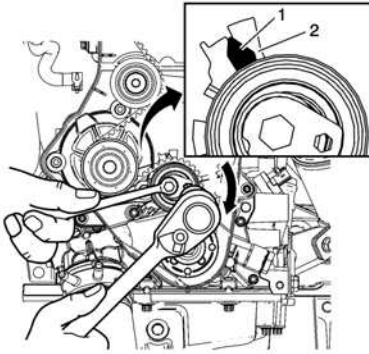


5. Hold the tensioner bolt (1) and apply tension to the belt by rotating the tensioner lever (3) counter clockwise until the tension timing needle is in the position shown (2).

Caution: Refer to Fastener Caution.

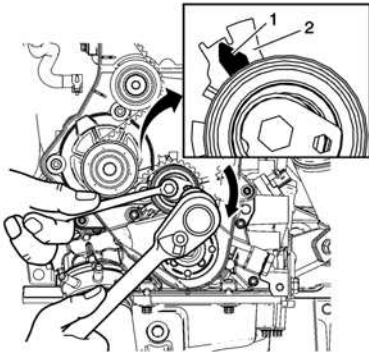
6. Tighten the tensioner bolt to **22 Y (16 lb ft)**.
7. Remove the EN-9806539 Holding Fixture.
8. Turn the crankshaft two rotations clockwise after installing the timing belt. This will take up the slack in the timing belt.
9. Confirm again that the camshaft and crankshaft sprocket timing marks are aligned properly.

Timing Belt Installation (LE6)



Note: For installation of a new timing belt, follow steps 9–12. For installation of a used timing belt, follow steps 13–16.

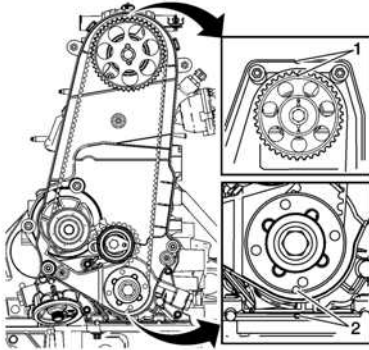
10. Loosen the tensioner bolt and release tension on the belt by rotating the tensioner lever clockwise until the tension timing needle (1) is in the position on the timing gauge (2) as shown.
11. Tighten the tensioner bolt to **22 Y (16 lb ft)**.
12. Turn the crankshaft two rotations clockwise after installing the timing belt.
13. Confirm again that the camshaft and crankshaft sprocket timing marks are aligned properly.



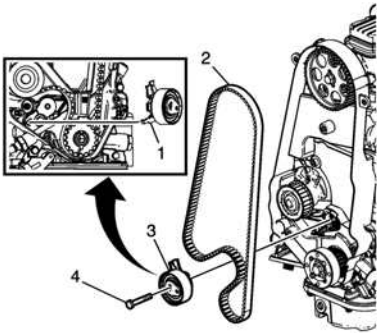
14. Loosen the tensioner bolt and release tension on the belt by rotating the tensioner lever clockwise until the tension timing needle (1) is in the position on the timing gauge (2) as shown.
15. Tighten the tensioner bolt to **22 Y (16 lb ft)**.
16. Turn the crankshaft two rotations clockwise after installing the timing belt.
17. Confirm again that the camshaft and crankshaft sprocket timing marks are aligned properly.

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1. Align the camshaft sprocket timing marks (1).
2. Align the crankshaft sprocket timing marks (2).

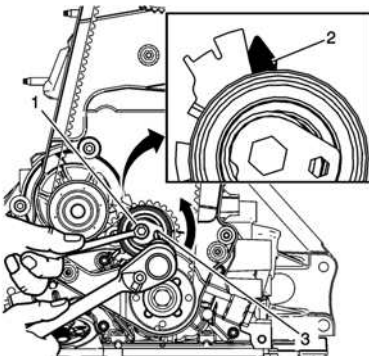


Note: Ensure the lock lug (1) on the tensioner is positioned into the oil pump housing depression correctly.

3. Install the timing belt tensioner (3) and bolt (4), do not tighten fully.

Note: Use care to not disturb the camshaft and crankshaft sprockets from the timing marks.

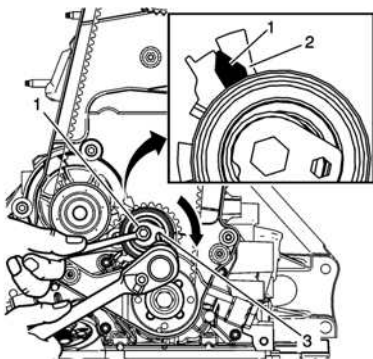
4. Install the timing belt (2).



5. Hold the tensioner bolt (1) and apply tension to the belt by rotating the tensioner lever (3) counter clockwise until the tension timing needle is in the position shown (2).

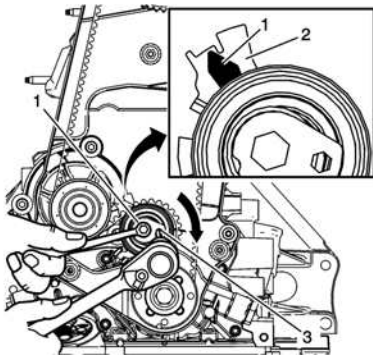
Caution: Refer to Fastener Caution.

6. Tighten the tensioner bolt to **22 Y (16 lb ft)**.
7. Turn the crankshaft two rotations clockwise after installing the timing belt. This will take up the slack in the timing belt.
8. Confirm again that the camshaft and crankshaft sprocket timing marks are aligned properly.



Note: For installation of a new timing belt, follow steps 9–12. For installation of a used timing belt, follow steps 13–16.

9. Loosen the tensioner bolt and release tension on the belt by rotating the tensioner lever clockwise until the tension timing needle (1) is in the position on the timing gauge (2) as shown.
10. Tighten the tensioner bolt to **22 Y (16 lb ft)**.
11. Turn the crankshaft two rotations clockwise after installing the timing belt.
12. Confirm again that the camshaft and crankshaft sprocket timing marks are aligned properly.



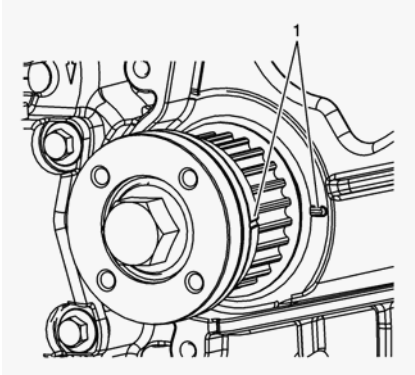
13. Loosen the tensioner bolt and release tension on the belt by rotating the tensioner lever clockwise until the tension timing needle (1) is in the position on the timing gauge (2) as shown.
14. Tighten the tensioner bolt to **22 Y (16 lb ft)**.
15. Turn the crankshaft two rotations clockwise after installing the timing belt.
16. Confirm again that the camshaft and crankshaft sprocket timing marks are aligned properly.

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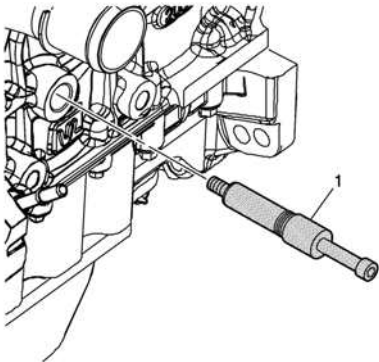
Submodel: | Engine Type: | Liters:
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Special Tools

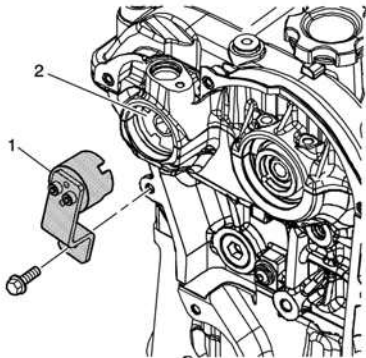
- EN-50025 Pulley Holding Wrench
- EN-50029 Camshaft Holding Tool
- EN-50030 Crankshaft Locking Tool



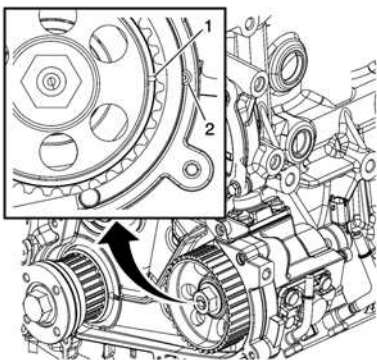
1. Ensure that the timing mark on the crankshaft timing pulley (1) is aligned at 90 degrees ATDC with the mark on the front cover (1).



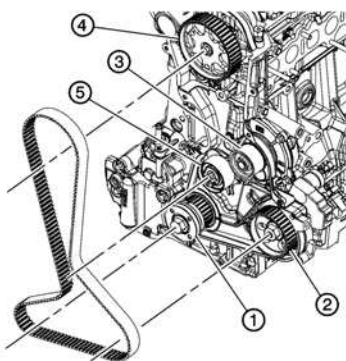
2. Install EN-50030 locking tool (1).



3. Install EN-50029 holding tool (1) on the exhaust camshaft.



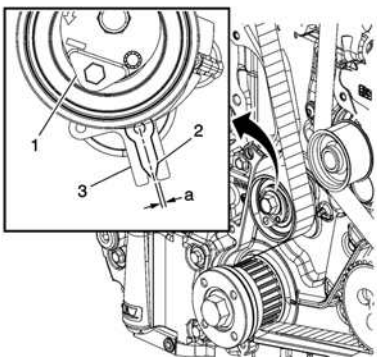
4. Align the fuel injection pump pulley timing notch (1) with the notch on the front cover (2).



Note: Relieve the tensioner in order to fit the belt over the pulleys.

5. Install the timing belt over the pulleys in the following order:

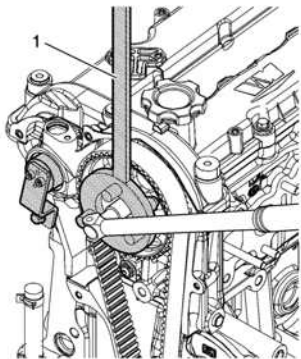
1. Crankshaft
2. Injector pump
3. Water pump
4. Camshaft
5. Tensioner



6. Move the tensioner pulley by rotating the plate (1) counterclockwise until the pointer (2) is positioned in the groove at the edge of the index (3), within 1 mm, dimension (a).

Caution: Refer to Fastener Caution.

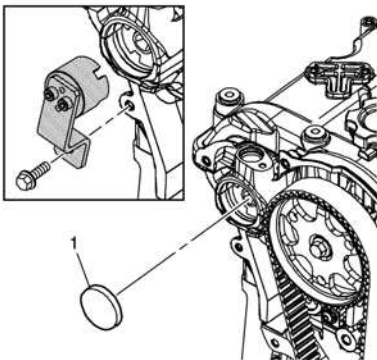
7. Tighten the timing belt tensioner to **28 Y (21 lb ft)**.



Note: *EN-50029* holding tool is not designed for tightening applications. Always use *EN-50025* wrench when tightening the pulley bolt.

8. Hold the camshaft timing pulley with the *EN-50025* wrench (1) and tighten the retaining bolt.

1. Tighten the bolt a first pass to **20 Y (15 lb ft)**.
2. Tighten the bolt a final pass an additional **60 degrees**.



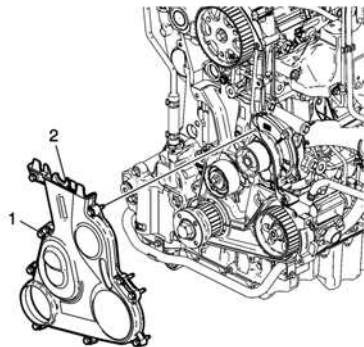
Note: Ensure the plug is fully seated in the bore.

9. Remove the *EN-50029* holding tool and install the NEW camshaft plug (1).

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Note: The bolts in the lower front cover are captured and cannot be removed.

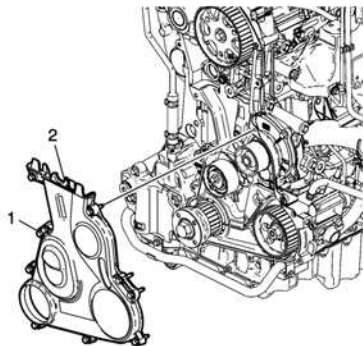
1. Install the timing belt lower front cover (2).

Caution: Refer to Fastener Caution.

2. Tighten the timing belt lower front cover bolts (1) to **8 Y (71 lb in)**.

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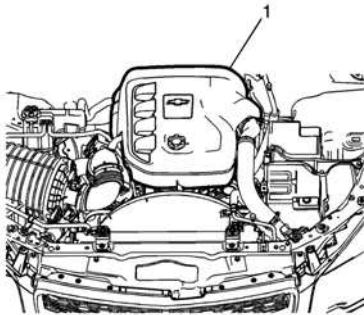
Note: The bolts in the lower front cover are captured and cannot be removed.

1. Loosen the lower front cover bolts (1).
2. Remove the lower front cover (2).

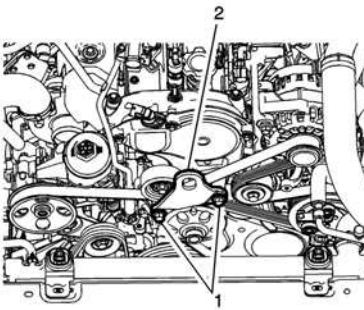
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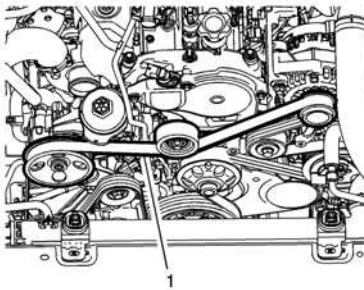
[Removal Procedure](#)



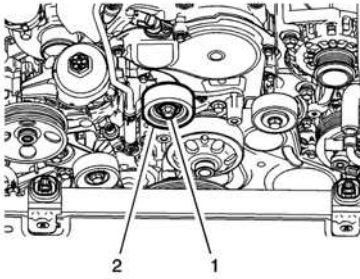
1. Remove the intake manifold cover (1). Refer to Intake Manifold Cover Replacement.
2. Remove the engine coolant fan shroud. Refer to Engine Coolant Fan Shroud Replacement.



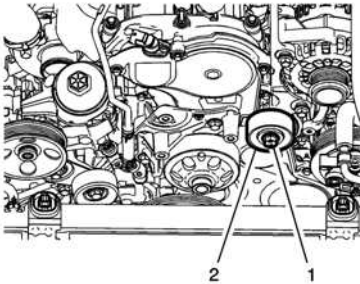
3. Remove the engine lift bracket front (2). Refer to Engine Lift Front Bracket Replacement.



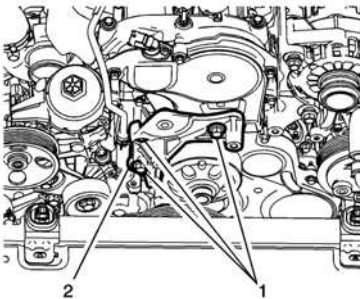
4. Remove the drive belt (1). Refer to Drive Belt Replacement.



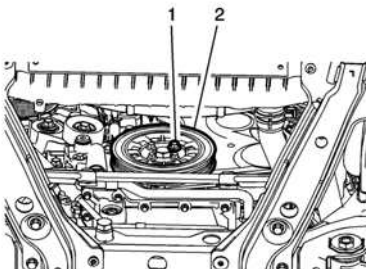
5. Remove the drive belt idler pulley fastener (1).
6. Remove the drive belt idler pulley (2).



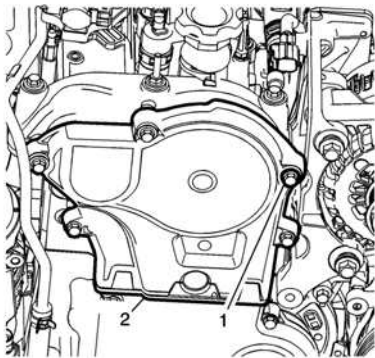
7. Remove the drive belt idler pulley fastener (1).
8. Remove the drive belt idler pulley (2).



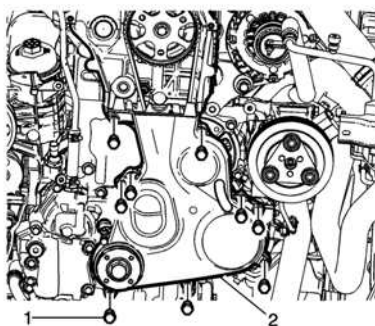
9. Remove the engine coolant fan bracket fastener (1).
10. Remove the engine coolant fan bracket (2). Refer to Engine Coolant Fan Bracket Replacement.



11. Remove the crankshaft pulley fastener (1).
12. Remove the Crankshaft Pulley (2). Refer to Crankshaft Pulley Replacement.



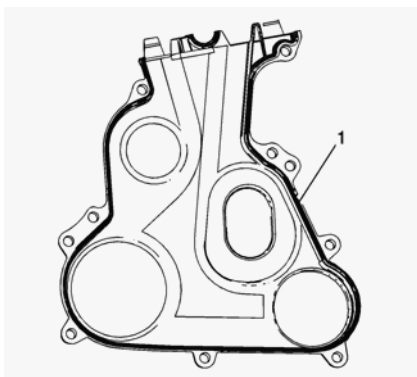
13. Remove the timing belt upper cover fastener (1).
14. Remove the timing belt upper cover (2).



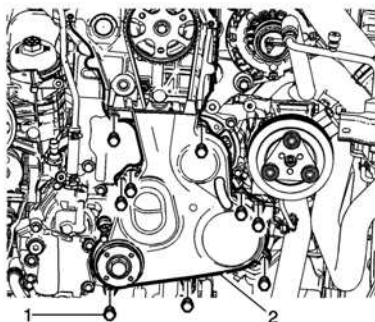
Note: The bolts in the lower front cover are captured and cannot be removed.

15. Remove the timing belt lower cover fastener (1).
16. Remove the timing belt lower cover (2).
17. Remove the timing belt lower cover seal and DISCARD.

[Installation Procedure](#)

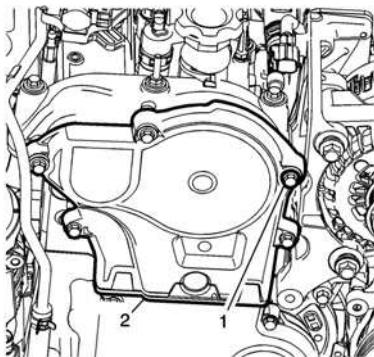


1. Install NEW lower timing belt cover seal (1).

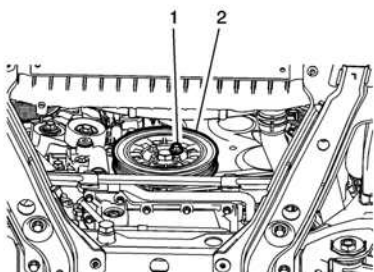


Caution: Refer to Fastener Caution.

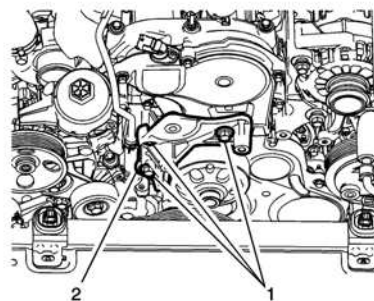
2. Install the lower timing belt cover (2) and tighten the timing belt lower front cover bolts (1) to 8 Y (71 lb in).



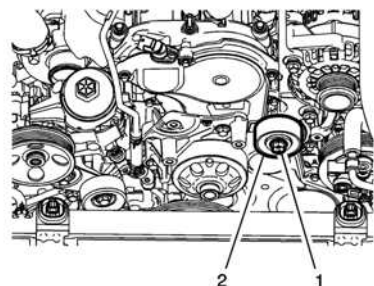
3. Install the upper front timing belt cover (2) and tighten the timing belt upper front cover bolts (1) to **8 Y (71 lb in)**.



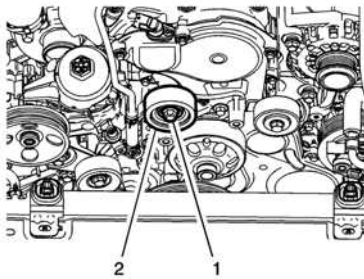
4. Install the crankshaft pulley (2) and install the crankshaft pulley fastener (1) and tighten to **100 Y (74 lb ft)**.



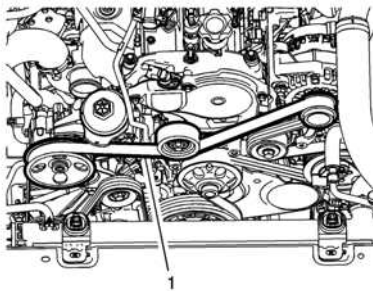
5. Install the engine coolant fan bracket (2).
6. Install the engine coolant fan bracket fastener (1). Refer to Engine Coolant Fan Bracket Replacement.



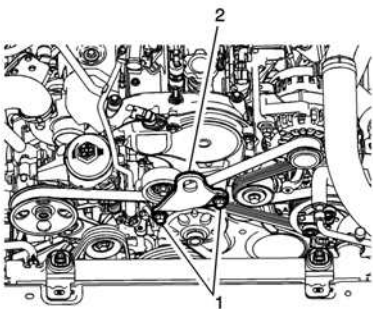
7. Install drive belt idler pulley (2) and fastener (1) and tighten to **50 Y (37 lb ft)**.



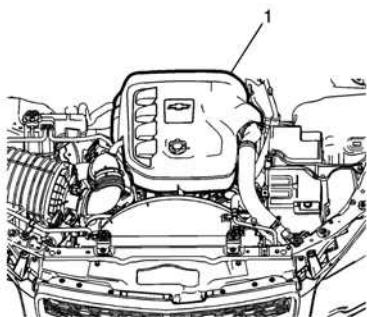
8. Install drive belt idler pulley (2) and fastener (1) and tighten to **50 Y (37 lb ft)**.



9. Install drive belt. Refer to Drive Belt Replacement.



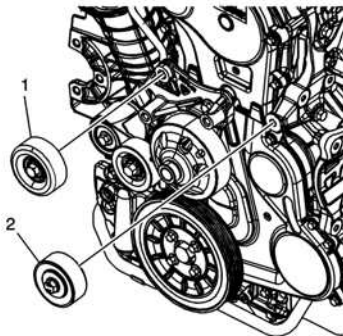
10. Install the engine lift front bracket (2).
11. Install the engine lift front bracket fastener (1) and tighten to **68 Y (50 lb ft)**.
12. Install the engine coolant fan shroud. Refer to Engine Coolant Fan Shroud Replacement.



13. Install the intake manifold cover (1). Refer to Intake Manifold Cover Replacement.

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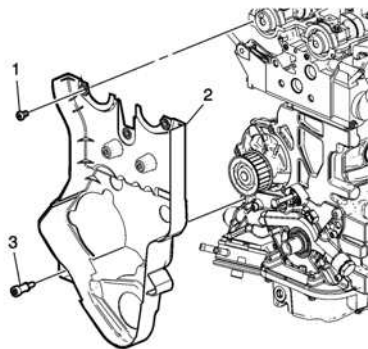


Clean and inspect the timing belt pulleys (1 and 2).

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1. Install the timing belt rear cover (2).

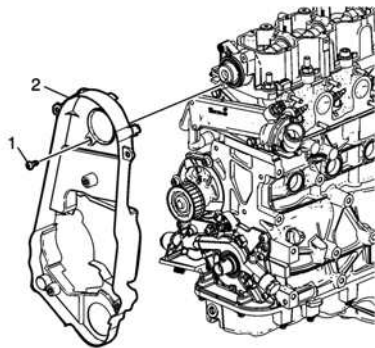
Caution: Refer to Fastener Caution.

2. Install the timing belt rear cover bolts (1 and 3).
3. Tighten timing belt rear cover bolts (1) to **6.0 Y (53 lb in)**.
4. Tighten timing belt rear cover bolts (3) to **8.0 Y (70 lb in)**.

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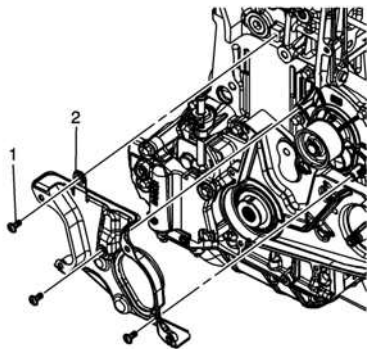
1. Install the timing belt rear cover (2).

Caution: Refer to Fastener Caution.

2. Install the timing belt rear cover bolts (1).
3. Tighten timing belt rear cover bolts (1) to **6.0 Y (53 lb in)**.

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1. Install the timing belt rear cover (2).

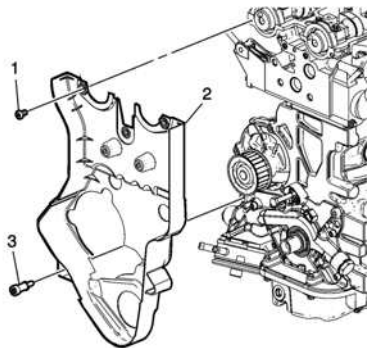
Caution: Refer to Fastener Caution.

2. Install the inner timing belt cover bolts (1) and tighten to **11 Y (97 lb in)**.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:

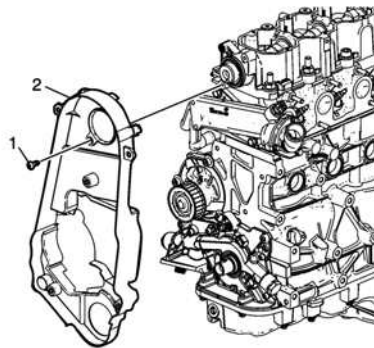


1. Remove the timing belt rear cover bolts (1 and 3).
2. Remove the timing belt rear cover (2).

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

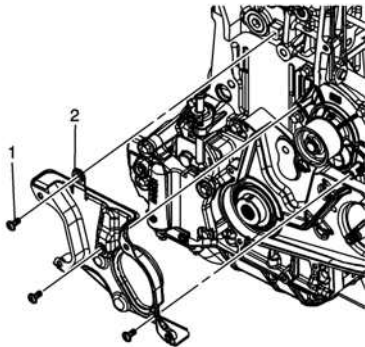
Fuel Delivery: | Fuel:



1. Remove the timing belt rear cover bolts (1).
2. Remove the timing belt rear cover (2).

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



Remove the timing belt rear cover bolts (1) and remove the cover (2).

2013 Chevrolet Colorado

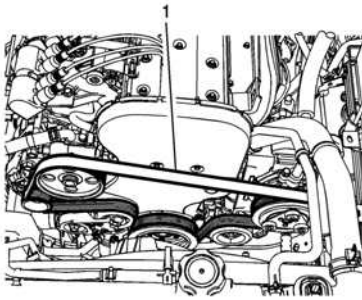
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Special Tools

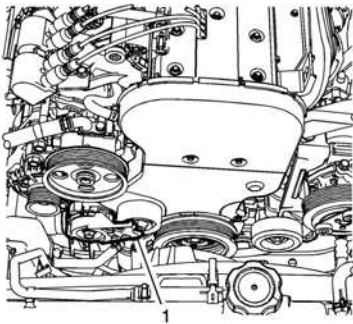
- EN 50890 Crankshaft Pulley Holding Fixture
- EN 9806539 Holding Fixture

For equivalent regional tools, refer to Special Tools.

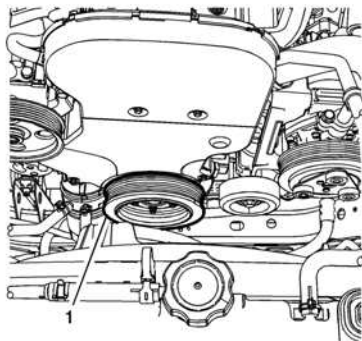
[Removal Procedure](#)



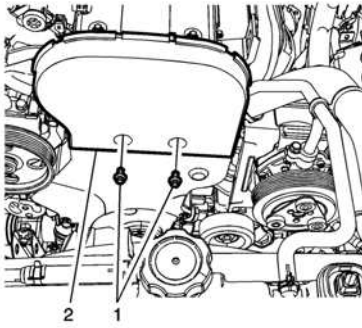
1. Remove the drive belt (1). Refer to Drive Belt Replacement.



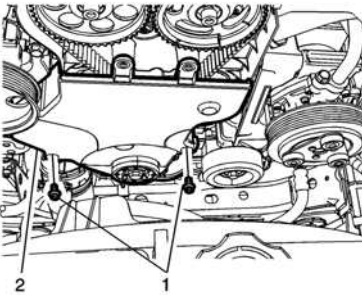
2. Remove the drive belt tensioner (1). Refer to Drive Belt Tensioner Replacement.



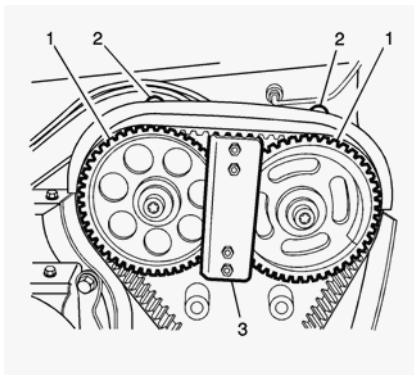
3. Remove the crankshaft pulley (1). Refer to Crankshaft Pulley Replacement.



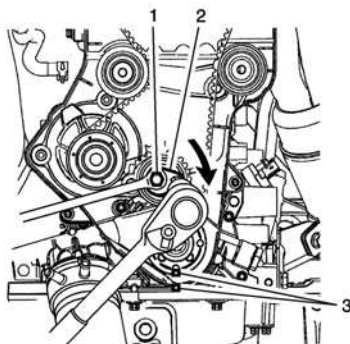
4. Remove the front upper timing cover fastener (1).
5. Remove the front upper timing cover (2).



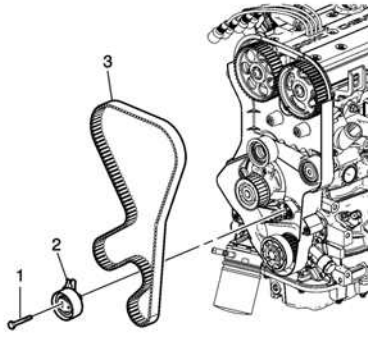
6. Remove the front lower timing cover fastener (1).
7. Remove the front lower timing cover (2).



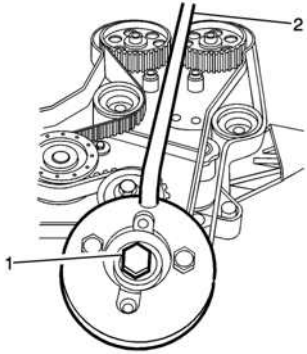
8. Align the marks in the camshafts sprockets (1) with the marks of the camshaft cover (2), and put the *EN 9806539* holding fixture (3) between the camshaft sprockets.



9. Make sure the marks (3) are aligned.
10. Hold the tensioner adjustment lever (2), while loosening the timing belt tensioner bolt (1).
11. Slowly rotate the tensioner clockwise to remove tension from the belt.

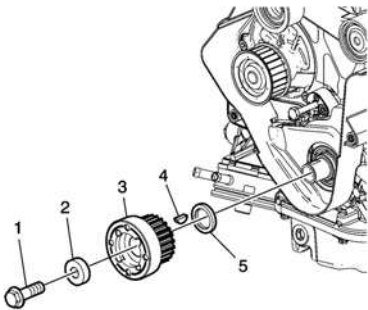


12. Remove the timing belt (3).
13. Remove the tensioner bolt (1) and tensioner (2).

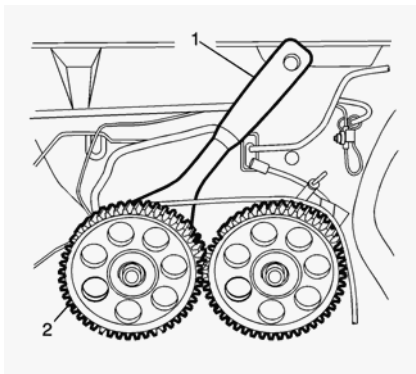


Note: Don't rotate the crankshaft while loosening the crankshaft sprocket bolt.

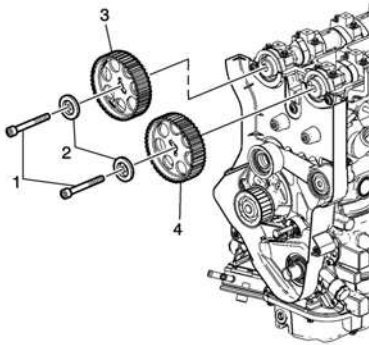
14. Loosen the crankshaft sprocket bolt (1) using the EN 50890 crankshaft pulley holding fixture (2) to hold the crankshaft sprocket.



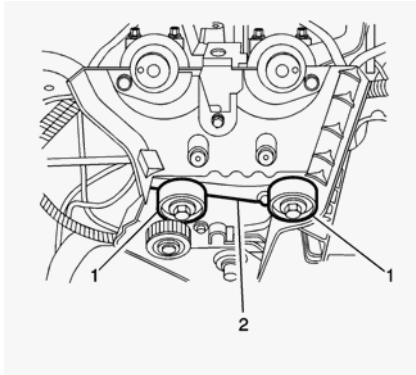
15. Remove the crankshaft sprocket bolt (1) and washer (2).
16. Remove the crankshaft sprocket (3).
17. Remove the crankshaft sprocket key (4) and spacer (5).
18. Remove the upper camshaft cover. Refer to Camshaft Cover Replacement.



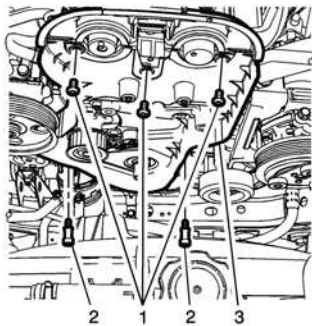
19. Using a wrench (1), hold the camshafts while loosening the camshaft sprocket bolts (2).



20. Remove the camshaft sprocket bolts (1) and washers (2).
21. Remove the camshaft sprockets (3 and 4).

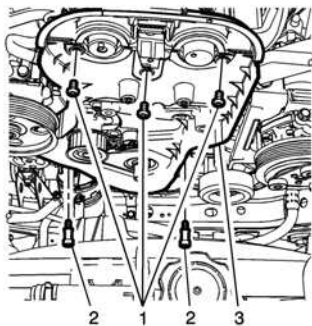


22. Remove the guide rollers (1) and guide rollers bracket (2).



23. Remove the timing belt rear cover bolts (1 and 2).
24. Remove the timing belt rear cover (3).

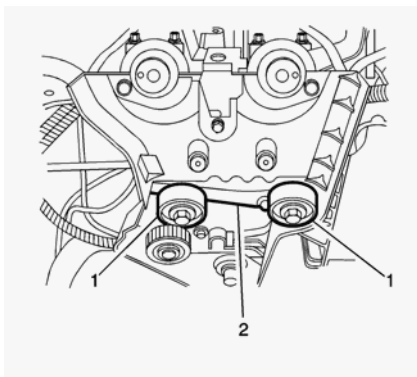
[Installation Procedure](#)



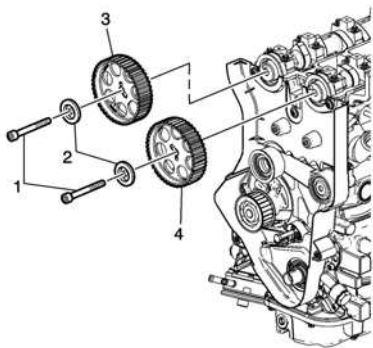
1. Install the timing belt rear cover (3).
2. Install the timing belt rear cover bolts (1 and 2).

Caution: Refer to Fastener Caution.

3. Tighten timing belt rear cover bolts (1) to **6 Y (53 lb in)**.
4. Tighten timing belt rear cover bolts (2) to **8 Y (71 lb in)**.

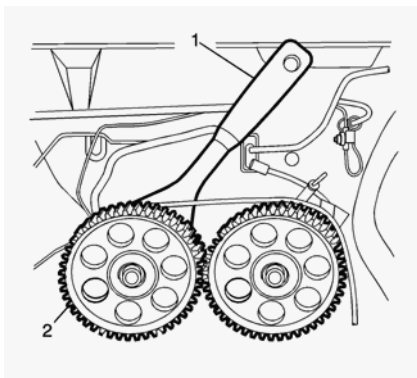


5. Install the guide rollers bracket (2) and guide rollers (1) and tighten to **32 Y (24 lb ft)**.



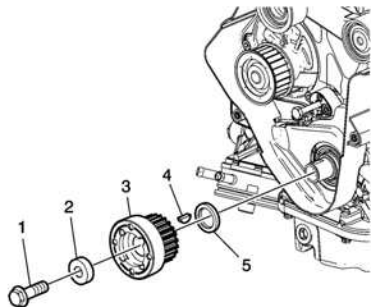
Note: Use care to properly align the sprocket with the locating pins on the camshafts.

6. Install the camshaft sprockets (3 and 4) onto the camshafts.
7. Install the camshaft sprocket bolts (1) and washers (2).



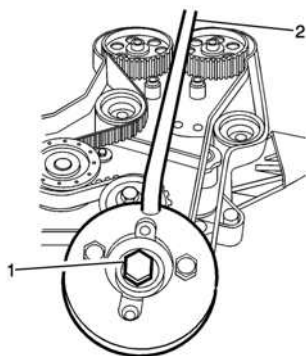
8. Using a wrench (2), hold the camshafts while tightening the camshaft sprocket bolts (1).
9. Tighten to fastener the following.

- First pass **50 Y (37 lb ft)**.
- Second pass additional 60°.
- Final pass additional 15°.
- Install the upper camshaft cover. Refer to Camshaft Cover Replacement.



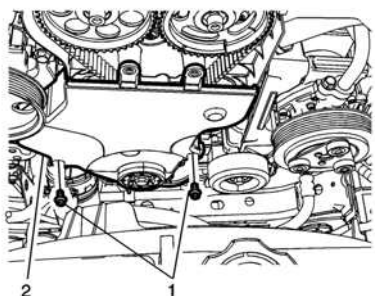
Note: Use care to properly align the keyway with the sprocket (3).

- Install the crankshaft sprocket spacer (5) and key (4) onto the crankshaft.
- Install the crankshaft sprocket (3) onto the crankshaft.
- Install the crankshaft sprocket bolt (1) and washer (2).

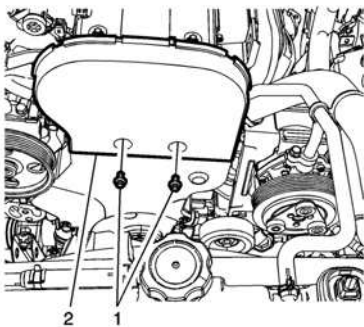


Note: Don't rotate the crankshaft while tightening the crankshaft sprocket bolt.

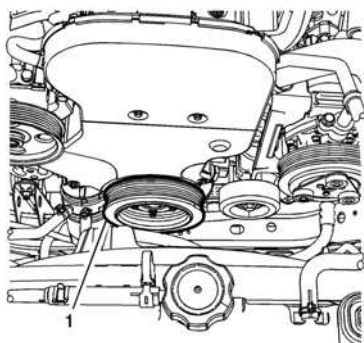
- Tighten the crankshaft sprocket bolt (1) using the *EN 50890* crankshaft pulley holding fixture (2) to hold the crankshaft sprocket.
- Tighten to fastener the following.
 - First pass **135 Y (99 lb ft)**.
 - Second pass additional 30°.
 - Final pass additional 15°.
- For timing belt installation. Refer to Timing Belt Installation.



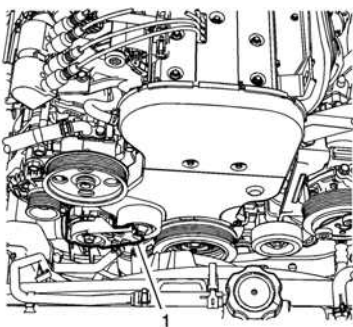
- Install the front lower timing cover (2).
- Install the front lower timing cover fastener (1) and tighten to **8 Y (71 lb in)**.



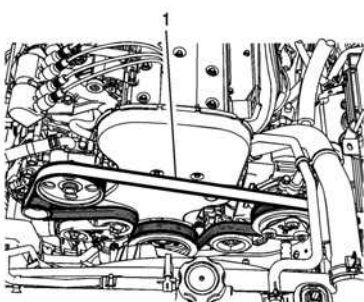
- Install front upper timing cover (2).
- Install front upper timing cover fastener (1) and tighten to **6 Y (53 lb in)**.



- Install the crank pulley (1). Refer to Crankshaft Pulley Replacement.



- Install the drive belt tensioner (1). Refer to Drive Belt Tensioner Replacement.



- Install drive belt (1). Refer to Drive Belt Replacement.

2013 Chevrolet Colorado

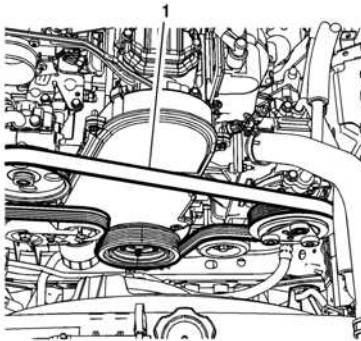
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Special Tools

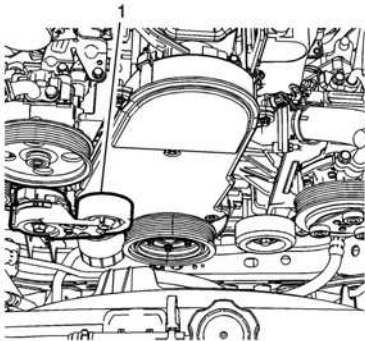
3-0006772 Crankshaft Sprocket Removal

For equivalent regional tools, refer to Special Tools.

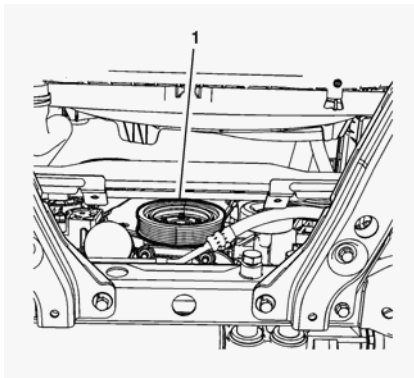
[Removal Procedure](#)



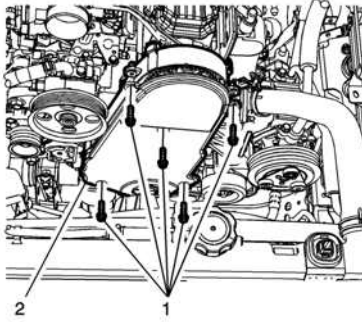
1. Remove the drive belt (1). Refer to Drive Belt Replacement.



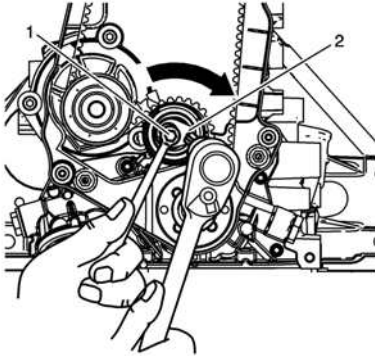
2. Remove the drive belt tensioner (1). Refer to Drive Belt Tensioner Replacement.



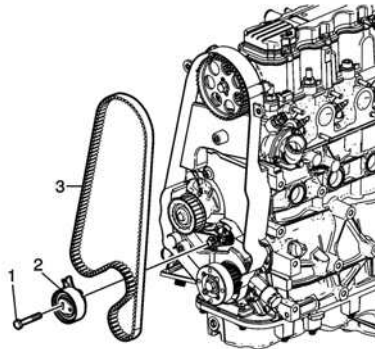
3. Remove the crankshaft pulley (1). Refer to Crankshaft Pulley Replacement.



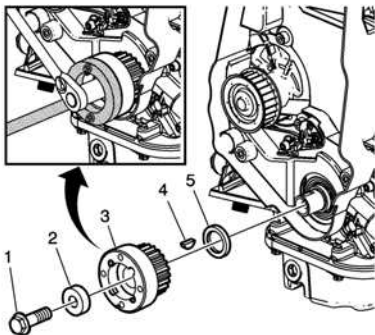
4. Remove the front timing cover fastener (1).
5. Remove the front timing cover (2).



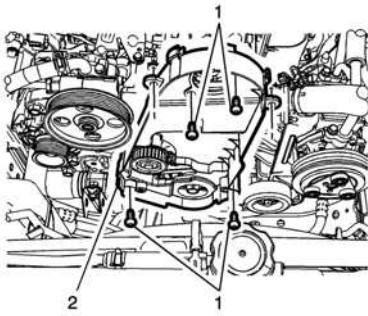
6. Hold the tensioner adjustment lever (2), while loosening the timing belt tensioner bolt (1).
7. Slowly rotate the tensioner clockwise to remove tension from the belt.



8. Remove the timing belt (3).
9. Remove the tensioner bolt (1) and (2).
10. Remove the camshaft sprocket. Refer to Crankshaft Sprocket Replacement.

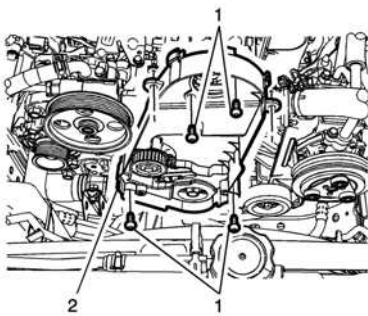


11. Using the 3-0006772 crankshaft sprocket removal, remove the crankshaft sprocket fastener (1) and washer (2).
12. Remove the crankshaft sprocket (3).
13. Remove the crankshaft sprocket key and spacer (5).



14. Remove the timing belt rear cover fastener (1).
15. Remove the timing belt rear cover (2).
16. For timing belt cleaning and inspection. Refer to Timing Belt, Tensioner, and Crankshaft and Camshaft Sprocket Cleaning and Inspection.

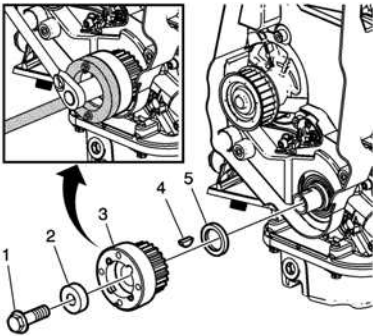
[Installation Procedure](#)



1. Install the belt rear cover (2)

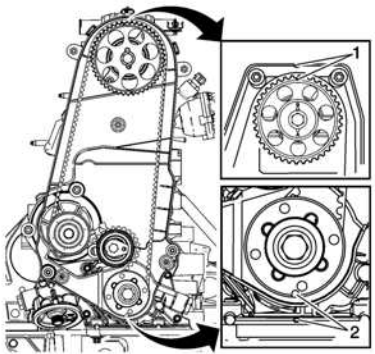
Caution: Refer to Fastener Caution.

2. Install the timing belt rear cover fastener (1).
3. Tighten timing belt rear cover fastener (1) to **6 Y (53 lb in)**.

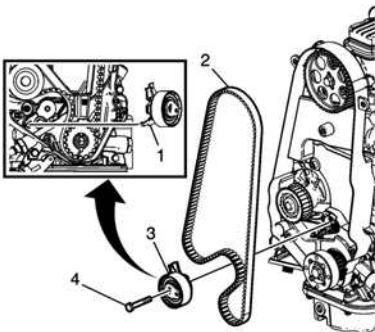


Note: Use care to properly align the keyway with the sprocket (3).

4. Install the crankshaft sprocket spacer (5) and key (4) onto the crankshaft
 5. Install the crankshaft sprocket (3) onto the crankshaft.
 6. Using the 3-0006772 crankshaft sprocket removal, install the crankshaft sprocket bolt (1) and washer (2).
 7. Tighten to **135 Y (99 lb ft)**.
- Tighten the bolt an additional 30 degrees
 - Tighten the bolt an additional 15 degrees
 - Install the camshaft sprocket. Refer to Crankshaft Sprocket Replacement.



- Align the camshaft sprocket timing marks (1).
- Align the crankshaft sprocket timing marks (2).

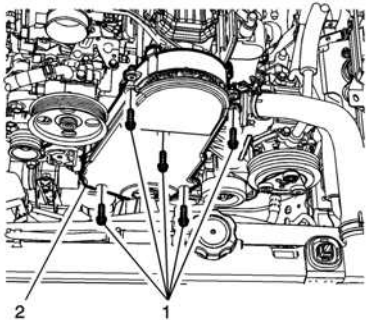


Note: Ensure the lock lug (1) on the tensioner is positioned into the oil pump housing depression correctly.

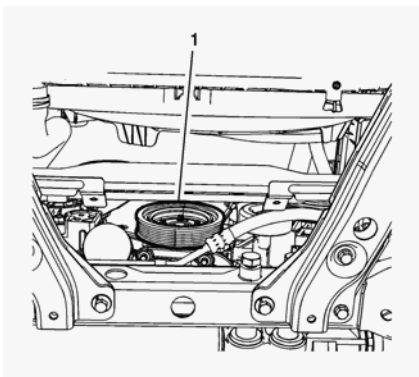
- Install the timing belt tensioner (3) and bolt (4), do not tighten fully.

Note: Use care to not disturb the camshaft and crankshaft sprockets from the timing mark.

- Install the timing belt (2). Refer to Timing Belt Installation.

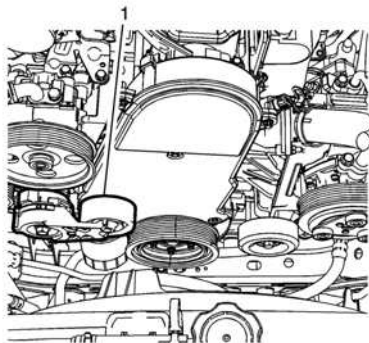


- Install front timing cover (2).
- Install front timing cover fastener (1) and tighten to **6 Y (53 lb ft)**.

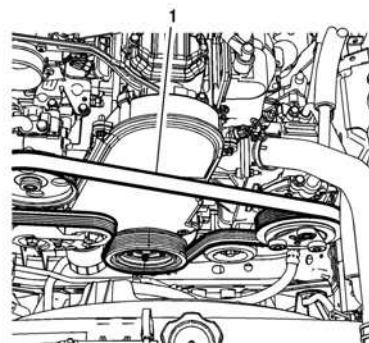


- Install the crank pulley (1). Refer to Crankshaft Pulley Replacement.

Timing Belt Rear Cover Replacement (LP8)



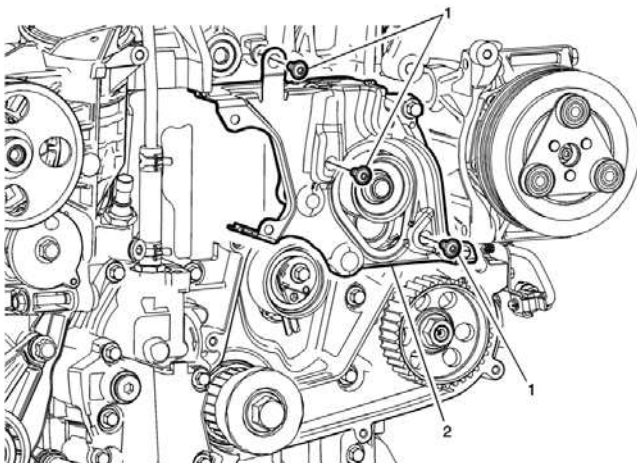
- Install the drive belt tensioner (1). Refer to Drive Belt Tensioner Replacement.



- Install drive belt (1). Refer to Drive Belt Replacement.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



Timing Belt Rear Cover Replacement

Callout

Component Name

Preliminary Procedure

Remove the timing belt . Refer to Timing Belt Replacement.

Timing Belt Rear Cover Fastener (Qty: 3)

Caution: Refer to Fastener Caution.

1

Tighten

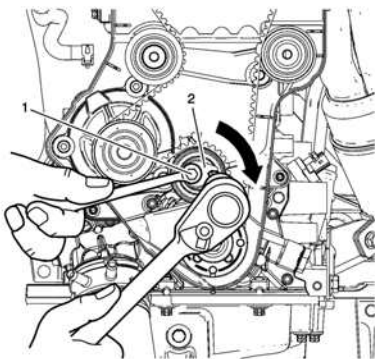
11 Y (97 lb in)

2

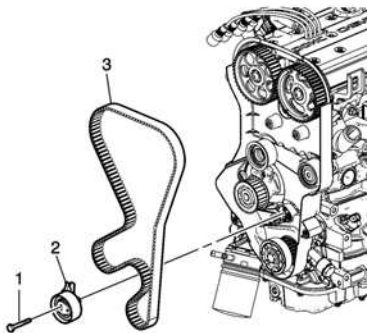
Timing Belt Rear Cover

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



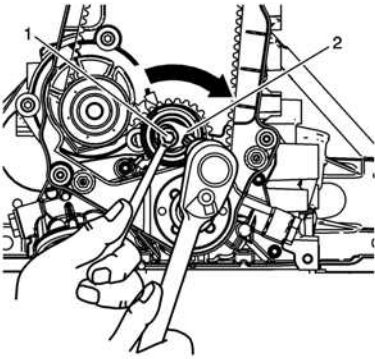
1. Hold the tensioner adjustment lever (2), while loosening the timing belt tensioner bolt (1).
2. Slowly rotate the tensioner clockwise to remove tension from the belt.



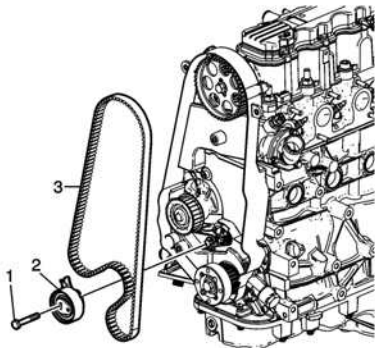
3. Remove the timing belt (3).
4. Remove the tensioner bolt (1) and tensioner (2).

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



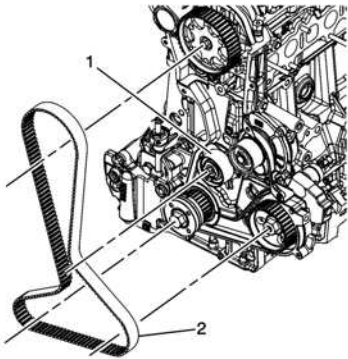
1. Hold the tensioner adjustment lever (2), while loosening the timing belt tensioner bolt (1).
2. Slowly rotate the tensioner clockwise to remove tension from the belt.



3. Remove the timing belt (3).
4. Remove the tensioner bolt (1) and tensioner (2).

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Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



Loosen the timing belt tensioner bolt and rotate tensioner (1) clockwise to remove tension and remove the timing belt (2).

2013 Chevrolet Colorado

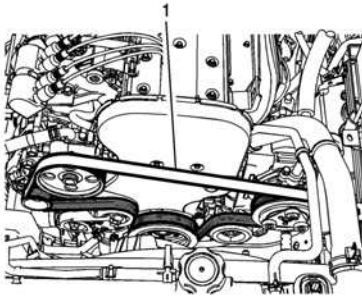
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Special Tools

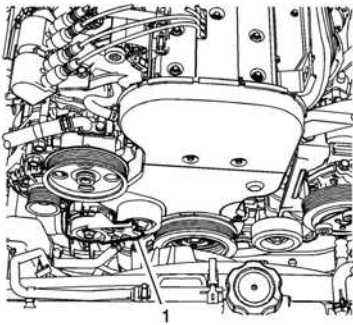
EN 9806539 Device to Lock the Camshaft

For equivalent regional tools, refer to Special Tools.

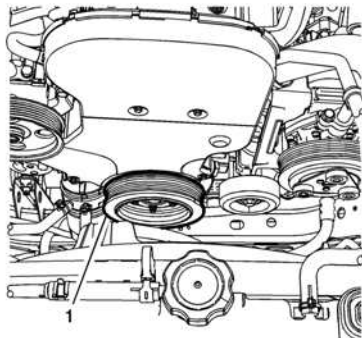
[Removal Procedure](#)



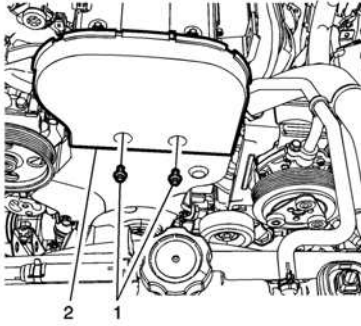
1. Remove the drive belt (1). Refer to Drive Belt Replacement.



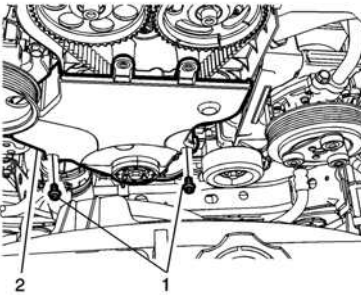
2. Remove the drive belt tensioner (1). Refer to Drive Belt Tensioner Replacement.



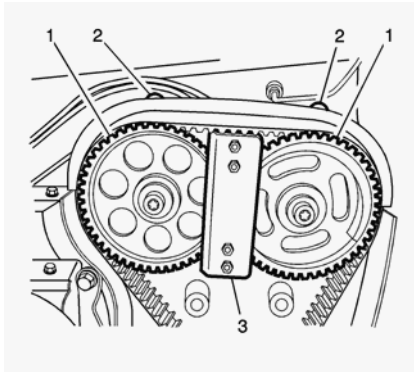
3. Remove the crankshaft pulley (1). Refer to Crankshaft Pulley Replacement.



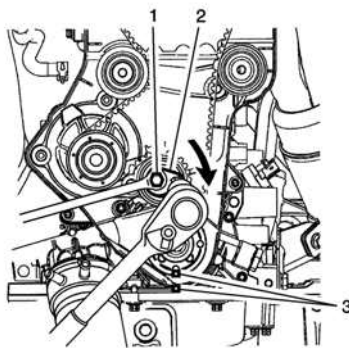
4. Remove the front upper timing cover fastener (1).
5. Remove the front upper timing cover (2)



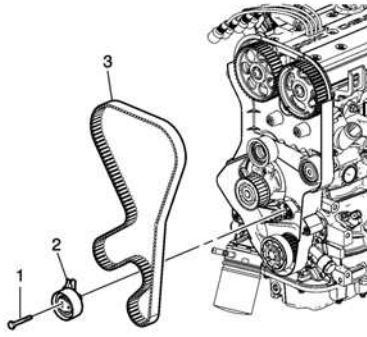
6. Remove the front lower timing cover fastener (1).
7. Remove the front lower timing cover (2).



8. Align the marks in the camshafts sprockets (1) with the marks of the camshaft cover (2), and put the tool EN 9806539 (3) between the camshaft sprockets.



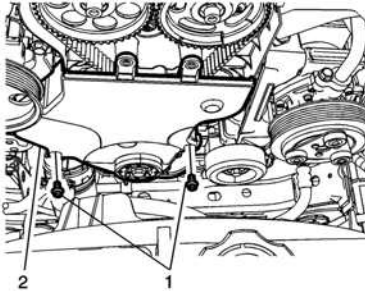
9. Make sure the marks (3) are aligned.
10. Hold the tensioner adjustment lever (2), while loosening the timing belt tensioner bolt (1).
11. Slowly rotate the tensioner clockwise to remove tension from the belt.



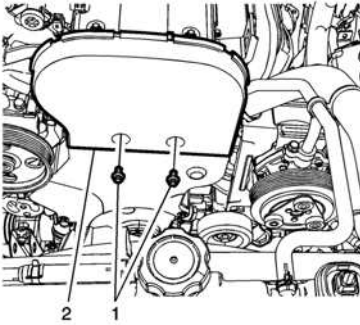
12. Remove the timing belt (3).
13. Remove the tensioner bolt (1) and tensioner (2).
14. Perform visual inspection in the tensioner and guide rollers. Refer to Timing Belt, Tensioner, and Crankshaft and Camshaft Sprocket Cleaning and Inspection.

[Installation Procedure](#)

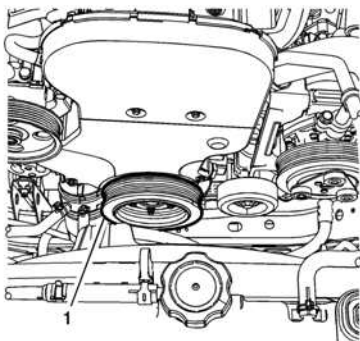
1. For timing belt installation. Refer to Timing Belt Installation.



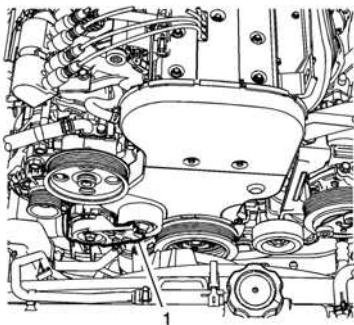
2. Install the front lower timing cover (2).
3. Install the front lower timing cover fastener (1) and tighten to **8 Y (71 lb in)**.



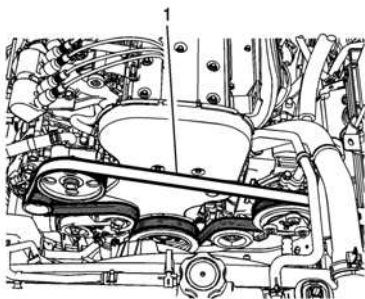
4. Install front upper timing cover (2).
5. Install front upper timing cover fastener (1) and tighten to **6 Y (53 lb in)**.



6. Install the crank pulley (1). Refer to Crankshaft Pulley Replacement.



7. Install the drive belt tensioner (1). Refer to Drive Belt Tensioner Replacement

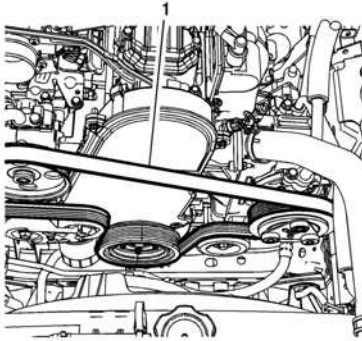


8. Install drive belt (1). Refer to Drive Belt Replacement.

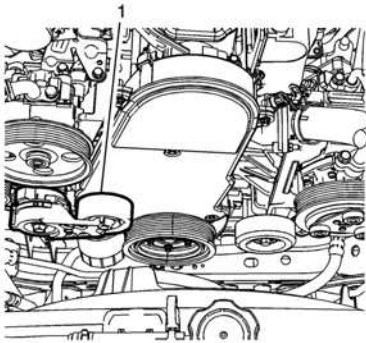
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

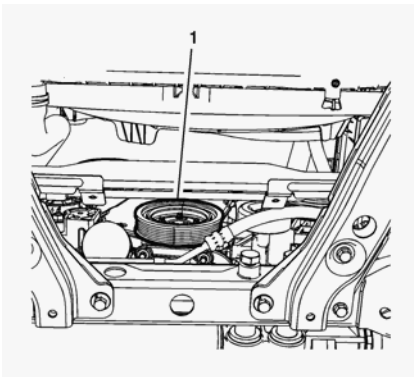
[Removal Procedure](#)



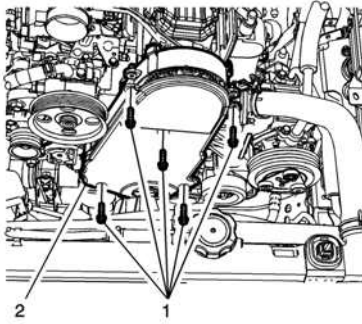
1. Remove the drive belt (1). Refer to Drive Belt Replacement.



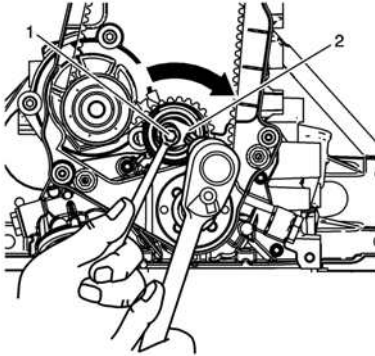
2. Remove the drive belt tensioner (1). Refer to Drive Belt Tensioner Replacement.



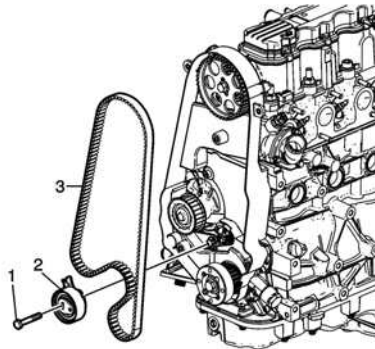
3. Remove the crankshaft pulley (1). Refer to Crankshaft Pulley Replacement.



4. Remove the front timing cover fastener (1).
5. Remove the front lower timing cover (2).

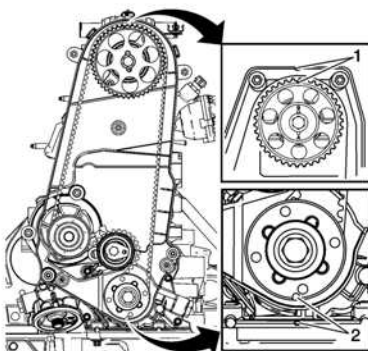


6. Hold the tensioner adjustment lever (2), while loosening the timing belt tensioner bolt (1).
7. Slowly rotate the tensioner clockwise to remove tension from the belt.

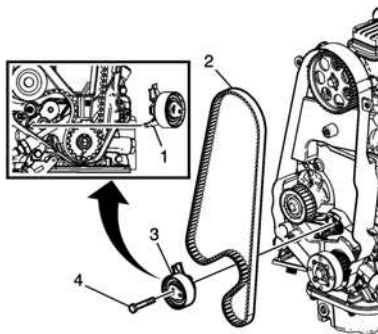


8. Remove the timing belt (3).
9. Remove the tensioner bolt (1) and (2).
10. For timing belt cleaning and inspection. Refer to Timing Belt, Tensioner, and Crankshaft and Camshaft Sprocket Cleaning and Inspection.

[Installation Procedure](#)



1. Align the camshaft sprocket timing marks (1).
2. Align the crankshaft sprocket timing marks (2).

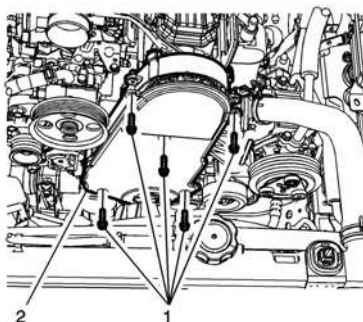


Note: Ensure the lock lug (1) on the tensioner is positioned into the oil pump housing depression correctly.

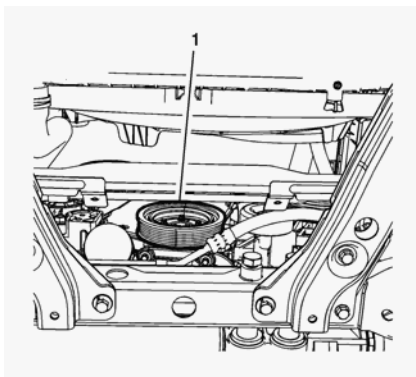
3. Install the timing belt tensioner (3) and bolt (4), do not tighten fully.

Note: Use care to not disturb the camshaft and crankshaft sprockets from the timing mark.

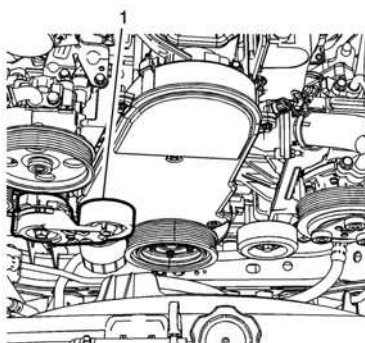
4. Install the timing belt (2). Refer to Timing Belt Installation.



5. Install front timing cover (2).
6. Install front timing cover fastener (1) and tighten to **6 Y (53 lb ft)**.

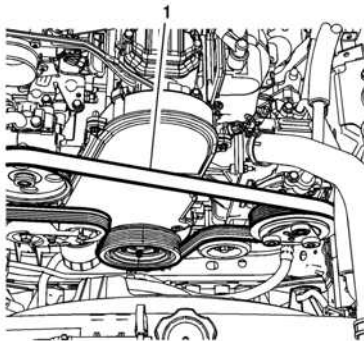


7. Install the crank pulley (1). Refer to Crankshaft Pulley Replacement.



8. Install the drive belt tensioner (1). Refer to Drive Belt Tensioner Replacement.

Timing Belt Replacement (LP8)



9. Install drive belt (1). Refer to Drive Belt Replacement.

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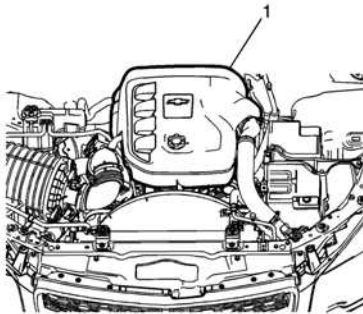
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Special Tools

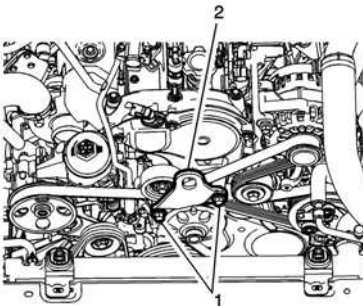
- EN-50025 Pulley Holding Wrench
- EN-50029 Camshaft Holding Tool
- EN-50030 Crankshaft Locking Tool

For equivalent regional tools, refer to Special Tools.

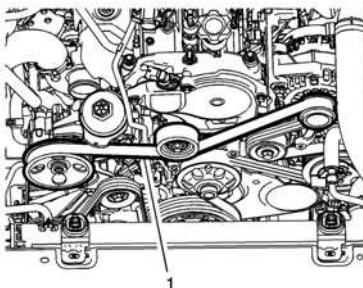
[Removal Procedure](#)



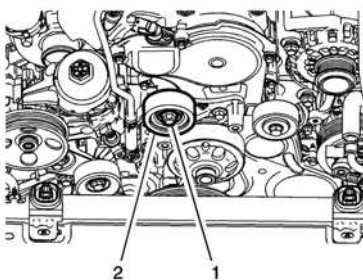
1. Remove the intake manifold cover (1). Refer to Intake Manifold Cover Replacement.
2. Remove the engine coolant fan shroud. Refer to Engine Coolant Fan Shroud Replacement.



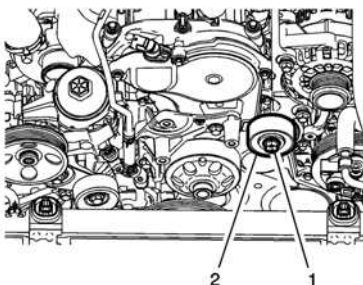
3. Remove the engine lift bracket front (2). Refer to Engine Lift Front Bracket Replacement.



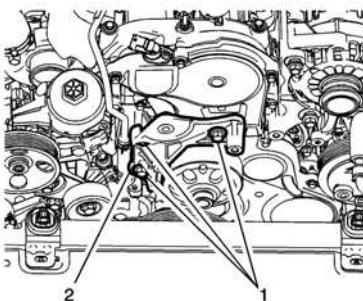
4. Remove the drive belt (1). Refer to Drive Belt Replacement.



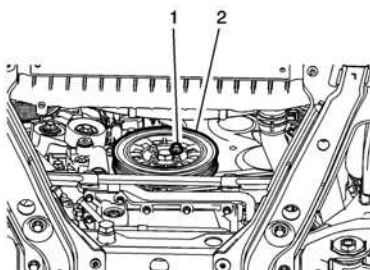
5. Remove the drive belt idler pulley fastener (1).
6. Remove the drive belt idler pulley (2).



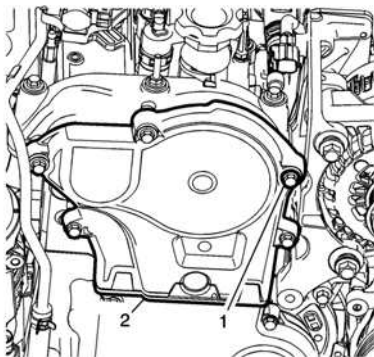
7. Remove the drive belt idler pulley fastener (1).
8. Remove the drive belt idler pulley (2).



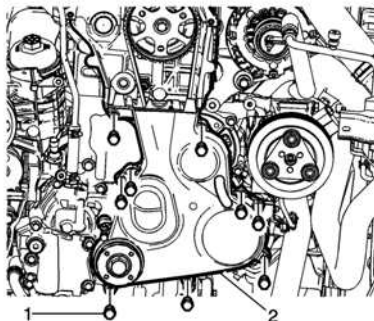
9. Remove the engine coolant fan bracket fastener (1).
10. Remove the engine coolant fan bracket (2). Refer to Engine Coolant Fan Bracket Replacement



11. Remove the crankshaft pulley fastener (1).
12. Remove the crankshaft pulley (2).

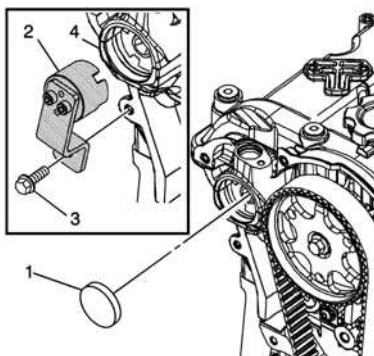


13. Remove the timing belt upper cover fastener (1).
14. Remove the timing belt upper cover (2).

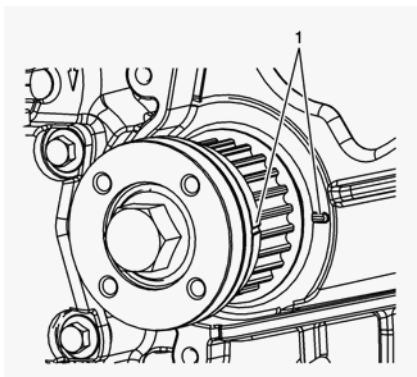


Note: The bolts in the lower front cover are captured and cannot be removed.

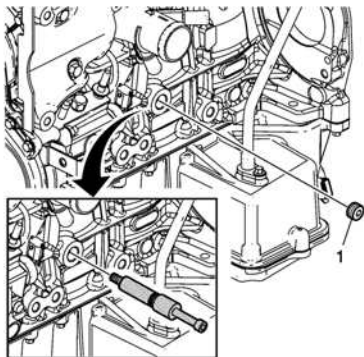
15. Remove the timing belt lower cover fastener (1).
16. Remove the timing belt lower cover (2).
17. Remove the timing belt lower cover seal and DISCARD.



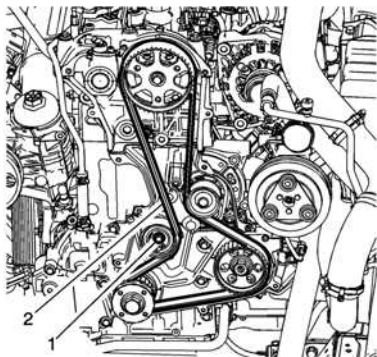
18. Remove exhaust camshaft cover (1), rotate the engine until find the correct position to install EN-50029 holding tool (2) on the exhaust camshaft (4) and install the bolt (3) as indicated.



19. Ensure that the timing mark on the crankshaft timing pulley (1) is aligned at 90 degrees ATDC with the mark on the front cover (1).
20. Remove the front left tire and wheel assembly. Refer to Tire and Wheel Removal and Installation.
21. Remove the engine protection shield. Refer to Engine Protection Shield Replacement.

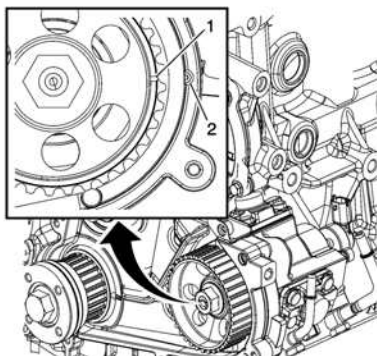


22. Remove the plug (1) and install the EN-50030 locking tool

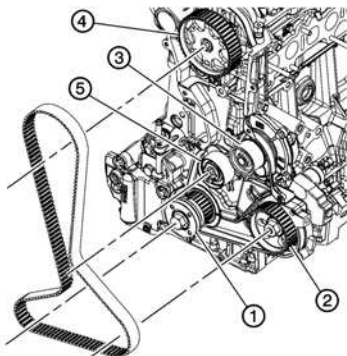


23. Loosen the timing belt tensioner bolt and rotate tensioner (1) clockwise to remove tension and remove the timing belt (2).

Installation Procedure



1. Align the fuel injection pump pulley timing notch (1) with the notch on the front cover (2).

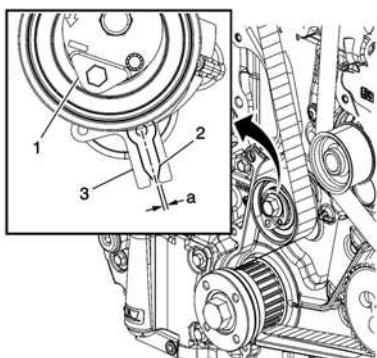


Note: Relieve the tensioner in order to fit the belt over the pulleys.

2. Install the timing belt over the pulleys in the following order:

1. Crankshaft
2. Injector pump
3. Water pump
4. Camshaft

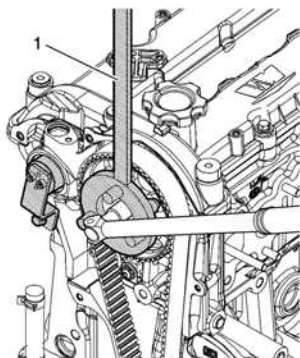
5. Tensioner



3. Move the tensioner pulley by rotating the plate (1) counterclockwise until the pointer (2) is positioned in the groove at the edge of the index (3), within 1 mm, dimension (a).

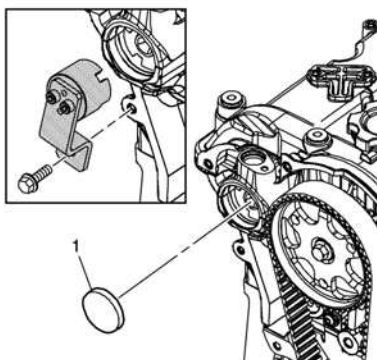
Caution: Refer to Fastener Caution

4. Tighten the timing belt tensioner to **28 Y (21 lb ft)**.



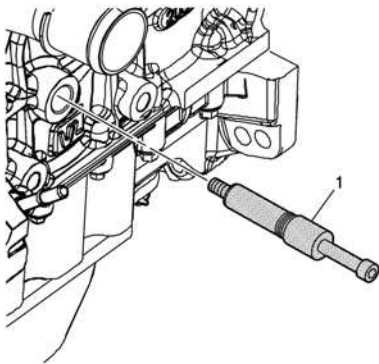
Note: EN-50029 holding tool is not designed for tightening applications. Always use EN-50025 wrench when tightening the pulley bolt.

5. Hold the camshaft timing pulley with the EN-50025 wrench (1) and tighten the retaining bolt.
 1. First pass **20 Y (15 lb ft)**.
 2. Final pass additional **60 degrees**.

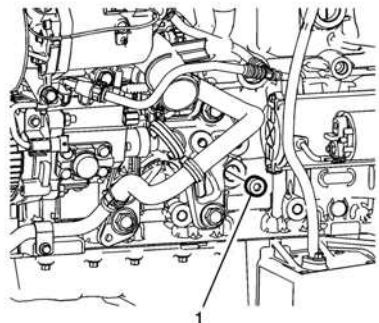


Note: Ensure the plug (1) is fully seated in the bore.

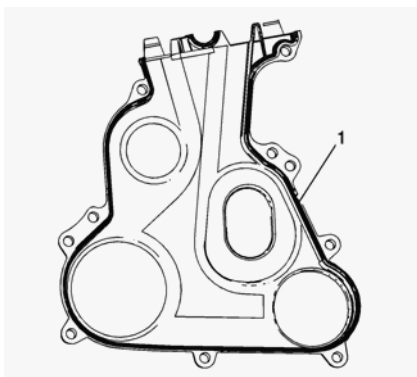
6. Remove the EN-50029 holding tool.
7. Remove the holding tool and install a NEW plug (1).



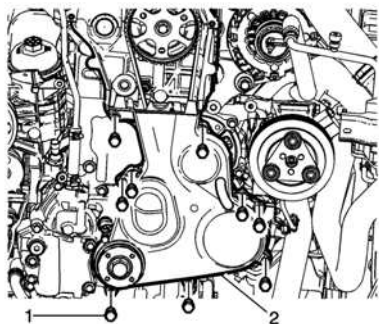
8. Remove the EN-50030 locking tool (1).



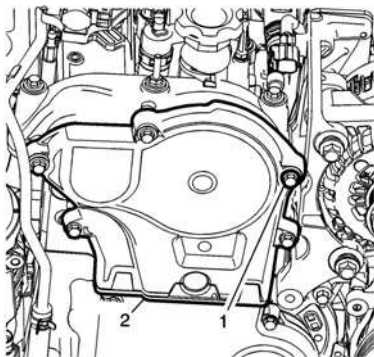
9. Install the cylinder block core hole plug (1) and tighten to **50 Y (37 lb ft)**.
10. Install the front left tire and wheel assembly. Refer to Tire and Wheel Removal and Installation.
11. Install the engine lower front splash shield. Refer to Engine Lower Front Splash Shield Replacement.



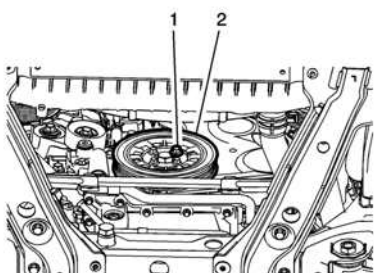
12. Install NEW lower timing belt cover seal (1).



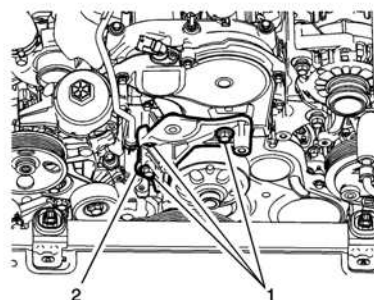
13. Install the lower timing belt cover (2).
14. Tighten the timing belt lower front cover bolts (1) to **8 Y (71 lb in)**.



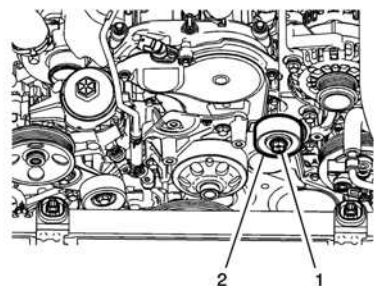
15. Install the upper front timing belt cover (2).
16. Tighten the timing belt upper front cover bolts (1) to **8 Y (71 lb in)**.



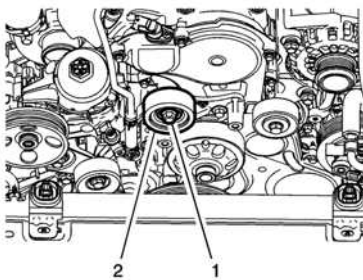
17. Install the crankshaft pulley (2).
18. Install the crankshaft pulley fastener (1) and tighten to **32 Y (23 lb ft)**.



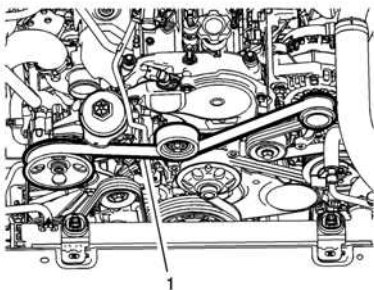
19. Install the engine coolant fan bracket (2).
20. Install the engine coolant fan bracket fastener (1).



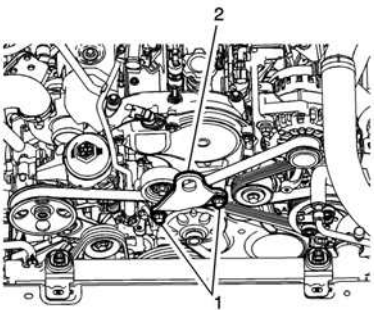
21. Install drive belt idler pulley (2) and fastener (1) and tighten to **50 Y (37 lb ft)**.



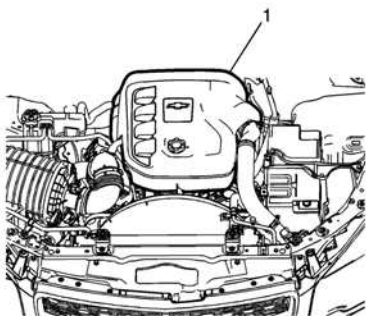
22. Install drive belt idler pulley (2) and fastener (1) and tighten to **50 Y (37 lb ft)**.



23. Install drive belt. Refer to Drive Belt Replacement.



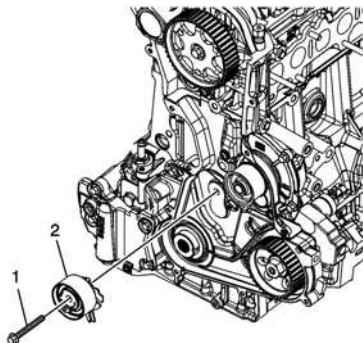
24. Install the engine lift front bracket (2).
25. Install the engine lift front bracket fastener (1) and tighten to **68 Y (50 lb ft)**.
26. Install the engine coolant fan shroud. Refer to Engine Coolant Fan Shroud Replacement.



27. Install the intake manifold cover (1). Refer to Intake Manifold Cover Replacement.

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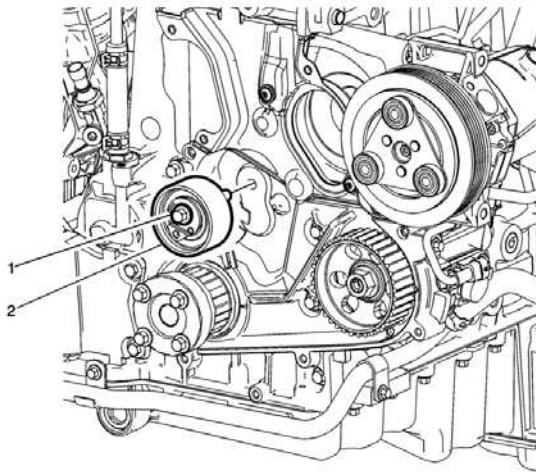


Remove the timing belt tensioner bolt (1) and remove the timing belt tensioner (2).

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Timing Belt Tensioner Replacement

Callout

Component Name

Preliminary Procedure

Remove the timing belt . Refer to Timing Belt Replacement.

Timing Belt Tensioner Fastener

1

Procedure

For tighten specification. Refert to Timing Belt Installation.

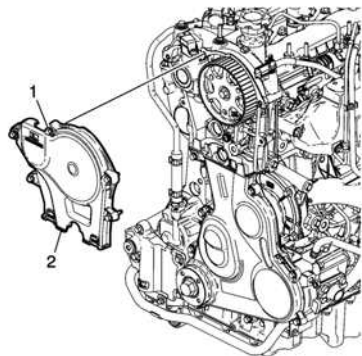
2

Timing Belt Tensioner

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:



Note: The bolts in the upper front cover are captured and cannot be removed.

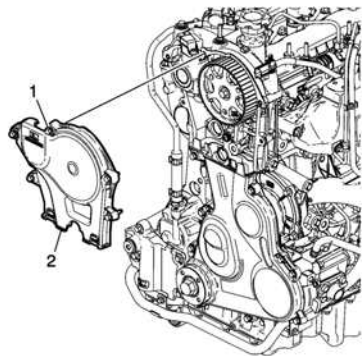
1. Install the upper front timing belt cover (2).

Caution: Refer to Fastener Caution.

2. Tighten the upper front timing belt cover bolts (1) to **8 Y (71 lb in)**.

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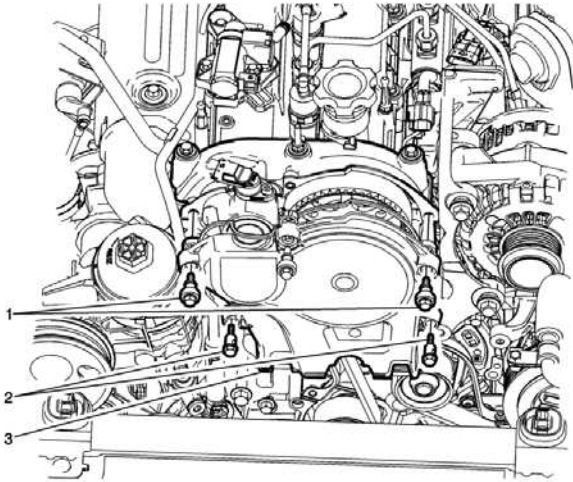


Note: The bolts in the upper front cover are captured and cannot be removed.

1. Loosen the upper front cover bolts (1).
2. Remove the upper front cover (2).

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
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Timing Belt Upper Front Cover Replacement

Callout

Component Name

Preliminary Procedure

Remove the intake manifold cover. Refer to Intake Manifold Cover Replacement

Timing Belt Upper Front Cover Fastener (Qty:3)

Caution: Refer to Fastener Caution.

1

Tighten

8 Y (71 lb in)

Timing Belt Upper Front Cover Fastener (Qty:2)

2

Tighten

8 Y (71 lb in)

Timing Belt Upper Front Cover

3

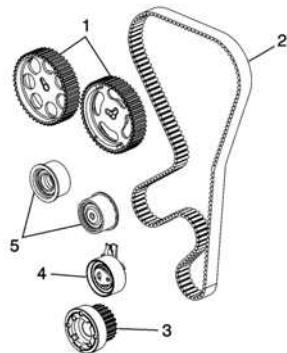
Procedure

Ensure to replace the timing belt upper front cover seal whenever removing the cover.

2013 Chevrolet Colorado

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Fuel Delivery: | Fuel:



1. Clean camshaft sprockets, crankshaft sprocket, tensioner, and rollers with solvent.

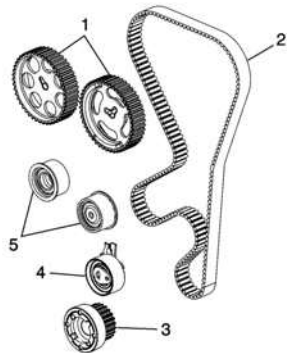
Warning: Refer to Safety Glasses Warning.

2. Inspect the camshaft sprocket teeth (1) for signs of wear.
3. Inspect the timing belt (2) for signs of cracking or wear.
4. Inspect the crankshaft sprocket teeth (3) for signs of wear.
5. Inspect the timing belt tensioner assembly (4) and guide rollers (5) for scoring.
6. Replace the components as necessary.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:



1. Clean camshaft sprockets, crankshaft sprocket, tensioner, and rollers with solvent.

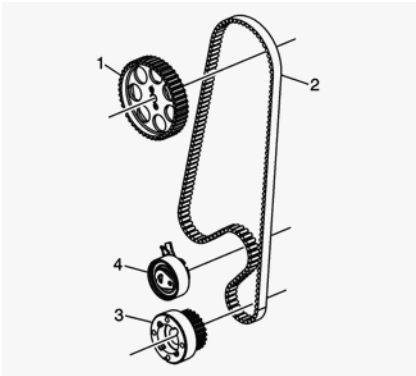
Warning: Refer to Safety Glasses Warning.

2. Inspect the camshaft sprocket teeth (1) for signs of wear.
3. Inspect the timing belt (2) for signs of cracking or wear.
4. Inspect the crankshaft sprocket teeth (3) for signs of wear.
5. Inspect the timing belt tensioner assembly (4) and guide rollers (5) for scoring.
6. Replace the components as necessary.

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1. Clean the camshaft sprocket, crankshaft sprocket, and tensioner with solvent.

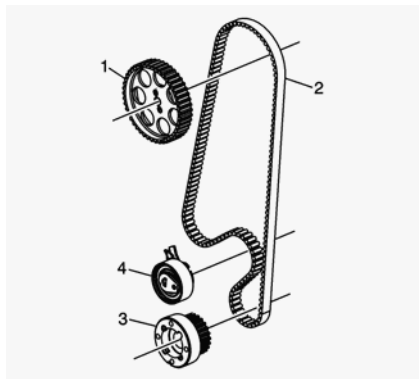
Warning: Refer to Safety Glasses Warning.

2. Inspect the camshaft sprocket teeth (1) for signs of wear.
3. Inspect the timing belt (2) for signs of cracking or wear.
4. Inspect the crankshaft sprocket teeth (3) for signs of wear.
5. Replace components as necessary.

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Fuel Delivery: | Fuel:



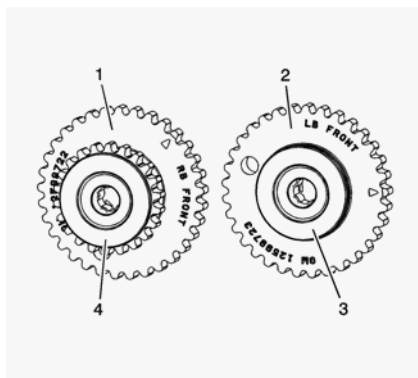
1. Clean the camshaft sprocket, crankshaft sprocket, and tensioner with solvent.

Warning: Refer to Safety Glasses Warning.

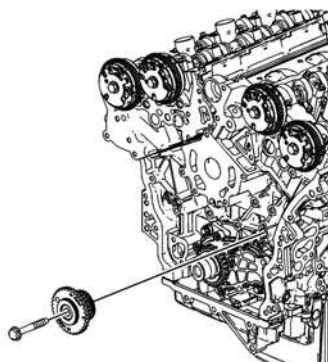
2. Inspect the camshaft sprocket teeth (1) for signs of wear.
3. Inspect the timing belt (2) for signs of cracking or wear.
4. Inspect the crankshaft sprocket teeth (3) for signs of wear.
5. Replace components as necessary.

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1. Ensure that the left camshaft intermediate drive chain idler (2) is being installed. The recessed hub (3) and the larger sprocket of the left camshaft intermediate drive chain idler is installed outward. The raised hub and the smaller sprocket of the left camshaft intermediate drive chain idler is installed towards the block.



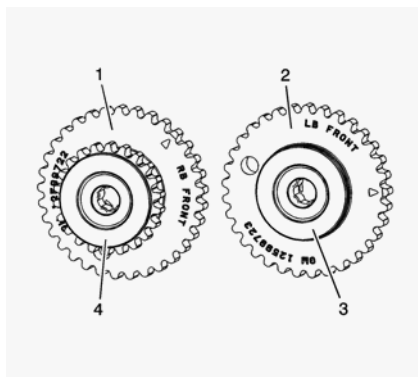
2. Place the left camshaft intermediate drive chain idler to the cylinder block.

Caution: Refer to Fastener Caution.

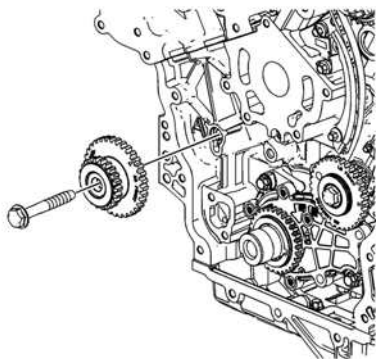
3. Install the camshaft intermediate drive chain idler bolt and tighten to **58 Y (43 lb ft)**.

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Fuel Delivery: | Fuel:



1. Ensure that the right camshaft intermediate drive chain idler (1) is being installed. The recessed hub (4) and the smaller sprocket of the right camshaft intermediate drive chain idler is installed outward. The raised hub and the larger sprocket of the right camshaft intermediate drive chain idler is installed towards the block.



2. Install the right camshaft intermediate drive chain idler.

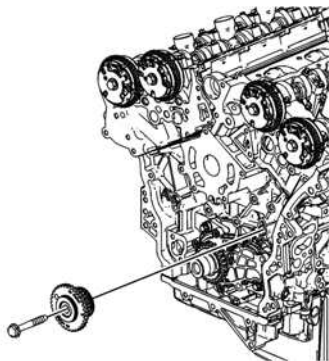
Caution: Refer to Fastener Caution.

3. Install the camshaft intermediate drive chain idler bolt and tighten to **58 Y (43 lb ft)**.

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Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:

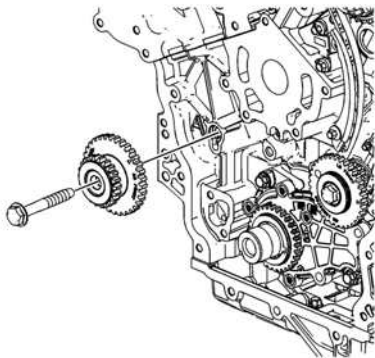


1. Remove the left camshaft intermediate drive chain idler bolt.
2. Remove the left camshaft intermediate drive chain idler.

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Submodel: | Engine Type: | Liters:

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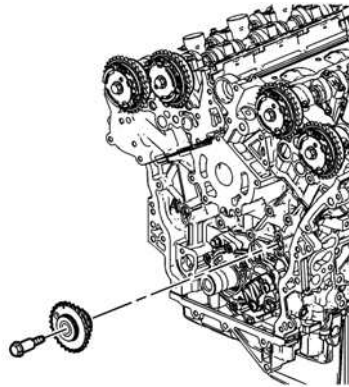


1. Remove the right camshaft intermediate drive chain idler bolt.
2. Remove the right camshaft intermediate drive chain idler.

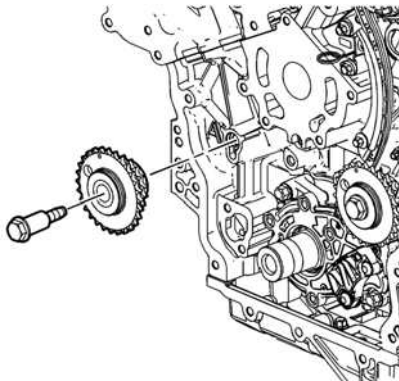
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

[Removal Procedure](#)

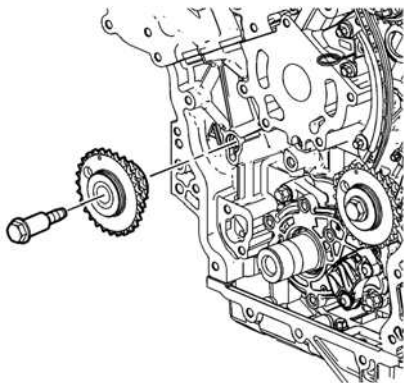


1. Remove the engine front cover. Refer to Engine Front Cover Replacement.
2. Remove the right bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Removal - Right Side.
3. Remove the right bank secondary camshaft drive chain shoe. Refer to Secondary Camshaft Drive Chain Shoe Removal - Right Side.
4. Remove the right bank secondary camshaft drive chain guide. Refer to Secondary Timing Chain Guide Removal - Right Side.
5. Remove the right bank secondary camshaft drive chain. Refer to Secondary Camshaft Intermediate Drive Chain Removal - Right Side.
6. Remove the primary camshaft drive chain tensioner. Refer to Primary Camshaft Intermediate Drive Chain Tensioner Removal.
7. Remove the primary upper camshaft drive chain guide. Refer to Primary Timing Chain Guide Removal - Upper.
8. Remove the primary camshaft drive chain. Refer to Primary Camshaft Intermediate Drive Chain Removal.
9. Remove the right bank camshaft intermediate drive chain idler. Refer to Timing Chain Idler Sprocket Removal - Right Side.

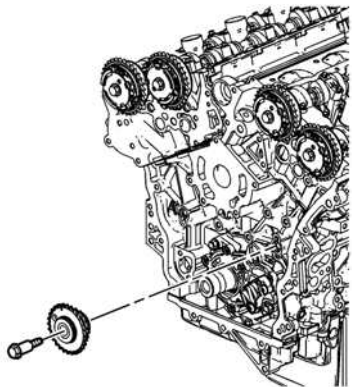


10. If you are servicing the left bank camshaft intermediate drive chain idler, perform the following steps:
 1. Remove the left bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Removal - Left Side.
 2. Remove the left bank secondary camshaft drive chain shoe. Refer to Secondary Camshaft Drive Chain Shoe Removal - Left Side.
 3. Remove the left bank secondary camshaft drive chain guide. Refer to Secondary Timing Chain Guide Removal - Left Side.
 4. Remove the left bank secondary camshaft drive chain. Refer to Secondary Camshaft Intermediate Drive Chain Removal - Left Side.
 5. Remove the left bank camshaft intermediate drive chain idler. Refer to Timing Chain Idler Sprocket Removal - Left Side.

[Installation Procedure](#)



1. If you are servicing the left bank idler sprocket, perform the following steps:
 1. Install the left bank camshaft intermediate drive chain idler. Refer to Timing Chain Idler Sprocket Installation - Left Side.
 2. Install the left bank secondary camshaft drive chain. Refer to Secondary Camshaft Intermediate Drive Chain Installation - Left Side.
 3. Install the left bank secondary camshaft drive chain guide. Refer to Secondary Timing Chain Guide Installation - Left Side.
 4. Install the left bank secondary camshaft drive chain shoe. Refer to Secondary Camshaft Drive Chain Shoe Installation - Left Side.
 5. Install the left bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Installation - Left Side.

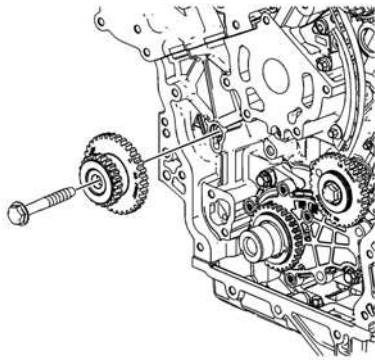


2. Install the right bank camshaft intermediate drive chain idler. Refer to Timing Chain Idler Sprocket Installation - Right Side.
3. Install the primary camshaft drive chain. Refer to Primary Camshaft Intermediate Drive Chain Installation.
4. Install the primary upper camshaft drive chain guide. Refer to Primary Timing Chain Guide Installation - Upper.
5. Install the primary camshaft drive chain tensioner. Refer to Primary Camshaft Intermediate Drive Chain Tensioner Installation.
6. Install the right bank secondary camshaft drive chain. Refer to Secondary Camshaft Intermediate Drive Chain Installation - Right Side.
7. Install the right bank secondary camshaft drive chain guide. Refer to Secondary Timing Chain Guide Installation - Right Side.
8. Install the right bank secondary camshaft drive chain shoe. Refer to Secondary Camshaft Drive Chain Shoe Installation - Right Side.
9. Install the right bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Installation - Right Side.
10. Install the engine front cover. Refer to Engine Front Cover Replacement.

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Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

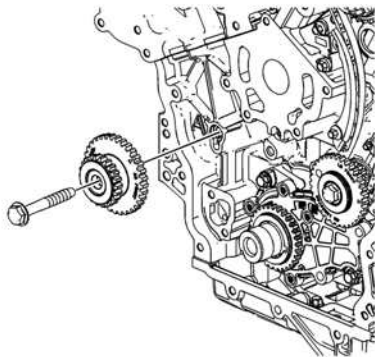
[Removal Procedure](#)



1. Remove the engine front cover. Refer to Engine Front Cover Replacement.
2. Remove the spark plugs in order to ease crankshaft/engine rotation. Refer to Spark Plug Replacement.
3. Remove the right bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Removal - Right Side.
4. Remove the right bank secondary camshaft drive chain shoe. Refer to Secondary Camshaft Drive Chain Shoe Removal - Right Side.
5. Remove the right bank secondary camshaft drive chain guide. Refer to Secondary Timing Chain Guide Removal - Right Side.
6. Remove the right bank secondary camshaft drive chain. Refer to Secondary Camshaft Intermediate Drive Chain Removal - Right Side.
7. Remove the primary camshaft drive chain tensioner. Refer to Primary Camshaft Intermediate Drive Chain Tensioner Removal.
8. Remove the primary upper camshaft drive chain guide. Refer to Primary Timing Chain Guide Removal - Upper.
9. Remove the primary camshaft drive chain. Refer to Primary Camshaft Intermediate Drive Chain Removal.
10. Remove the right bank camshaft intermediate drive chain idler. Refer to Timing Chain Idler Sprocket Removal - Right Side.

[Installation Procedure](#)

1. Ensure stage 1 camshaft timing is correct. Refer to Setting Camshaft Timing.



2. Install the right bank camshaft intermediate drive chain idler. Refer to Timing Chain Idler Sprocket Installation - Right Side.
3. Install the primary camshaft drive chain. Refer to Primary Camshaft Intermediate Drive Chain Installation.
4. Install the primary upper camshaft drive chain guide. Refer to Primary Timing Chain Guide Installation - Upper.
5. Install the primary camshaft drive chain tensioner. Refer to Primary Camshaft Intermediate Drive Chain Tensioner Installation.
6. Install the right bank secondary camshaft drive chain. Refer to Secondary Camshaft Intermediate Drive Chain Installation - Right Side.
7. Install the right bank secondary camshaft drive chain guide. Refer to Secondary Timing Chain Guide Installation - Right Side.
8. Install the right bank secondary camshaft drive chain shoe. Refer to Secondary Camshaft Drive Chain Shoe Installation - Right Side.
9. Install the right bank secondary camshaft drive chain tensioner. Refer to Secondary Timing Chain Tensioner Installation - Right Side.
10. Install the spark plugs. Refer to Spark Plug Replacement.
11. Install the engine front cover. Refer to Engine Front Cover Replacement.



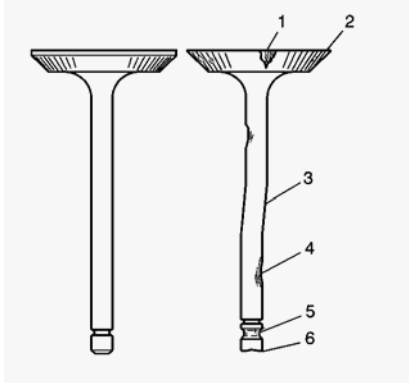
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Caution: A wrench must be used on the hex of the camshaft when loosening or tightening in order to prevent component damage. Failure to prevent the torque reaction against the timing drive chain can lead to timing drive chain failure.

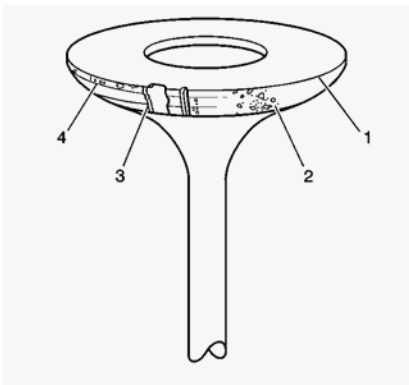
2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

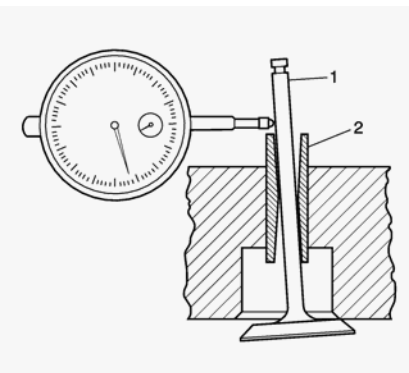


1. Inspect the valves for the following conditions:

- Burnt or eroded areas (1)
- A worn margin (2)
- A bent stem (3)
- A worn or scored stem (4)
- A worn key groove (5)
- A worn stem tip (6)



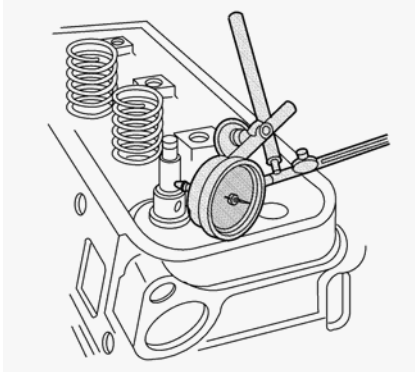
- Inspect the valve face for the following conditions:
 - Worn margin (4)
 - No margin (1)
 - Pitted surfaces (2)
 - Burnt or eroded areas (3)
- Inspect the valve seats for a loose fit in the cylinder head.



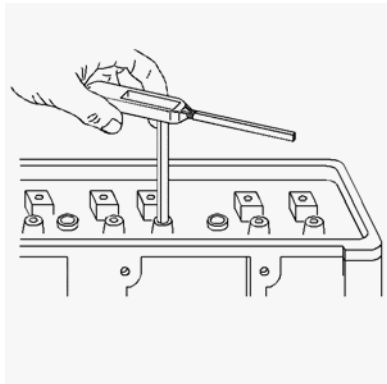
Caution: Proper valve stem-to-valve guide clearance is necessary for proper engine operation and component life. Excessive clearance may cause a noisy valve train, premature valve stem oil seal failure, excessive oil consumption and related component damage. Insufficient clearance may cause a noisy valve train, rough engine operation or sticking valves that may lead to related component damage. Failure to inspect valve stem-to-valve guide clearance and repair or replace necessary components may lead to extensive engine damage.

Note: Excessive valve stem-to-guide clearance may cause the following conditions:

- A noisy valve train
- Premature valve stem oil seal wear
- Component damage
- Excessive engine oil consumption
- Inspect for excessive valve stem (1) to guide (2) clearance.



- Use a dial indicator in order to measure the valve stem-to-guide clearance. Complete the following steps:
 1. Install the valve into the guide.
 2. Install the cam lobe lift indicator onto the cylinder head.
 3. Locate the dial indicator so that the movement of the valve stem from side to side, crosswise to the cylinder head, will cause a direct movement on the indicator stem.
 4. Ensure that the indicator stem contacts the side of the valve stem just above the valve guide.
 5. Drop the valve head about 2 mm (1/8 in) off the valve seat.
 6. Use light pressure and move the valve stem side to side in order to obtain a clearance reading.
 7. If the valve stem to guide clearance is not within specification, replace the valve and/or repair the guide in order to obtain the proper clearances.



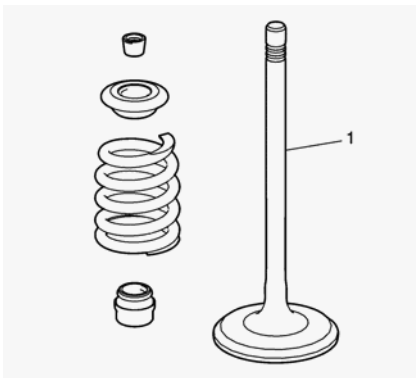
Note: Replace a valve stem that has excessive scoring or wear. A valve guide that is worn and has excessive stem-to-guide clearance may need to be sleeved.

- Ream the valve guides for oversize valves if the clearance exceeds the specifications. Refer to Engine Mechanical Specifications.



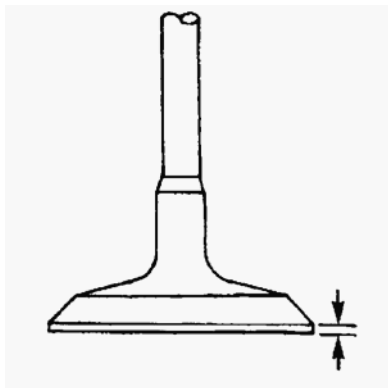
Note: Follow the manufacturers instructions when using valve guide reamers, sleeves, and installers.

- Ream the valve guide in order to obtain the proper specification. Refer to Engine Mechanical Specifications.



Note: Valves that are pitted must be refaced to the proper angle. Replace valve stems that show excessive wear, or replace valves that are warped. Several different types of equipment are available for refacing valves and valve seats. Follow the manufacturers recommendations when performing these procedures.

- Inspect the valves (1) for excessive scoring.



- Inspect the valve face.

Replace the valve if the valve margin is not within specifications after grinding.

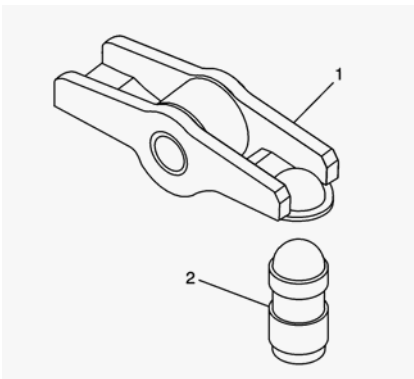
- Reface pitted valves on a valve refacing machine in order to ensure the correct relationship between the head and the stem.

Note: Reconditioning the valve seats is very important. Ensure perfect seating of the valves in the engine in order to deliver optimum power and performance. Clean the valve guides of all debris and dirt before grinding the valve seat.

- Recondition the valve seats after reaming the valve guide bores or installing the new valve guides.
- The valve seats should be concentric to within 0.05 mm (0.031 in) total indicator reading.

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Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:



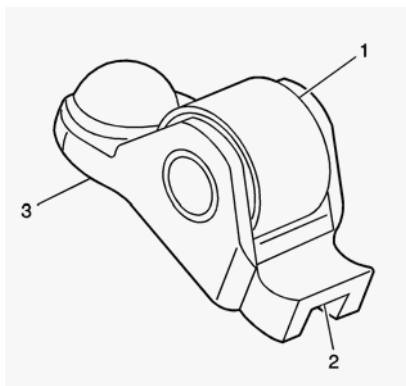
Note: Take care not to compress the valve lifters. Compressing the lifters may force the oil out, causing extended ticking upon initial startup.

Clean and inspect the valve rocker arm (1) and lifters (2).

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Fuel Delivery: | Fuel:



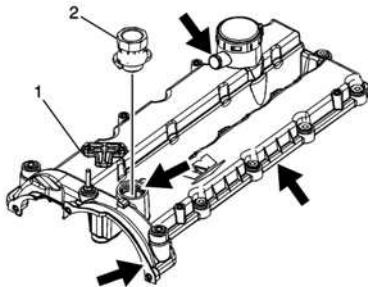
1. Inspect the camshaft follower roller (1) for the following:

- Flat spots
- Excessive scoring and pitting
- Ensure the roller spins freely
- Inspect the camshaft follower valve tip area (2).
- Inspect the camshaft follower stationary hydraulic lash adjuster (SHLA) pivot area (3).
- Replace the camshaft follower or followers as necessary.

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Submodel: | Engine Type: | Liters:

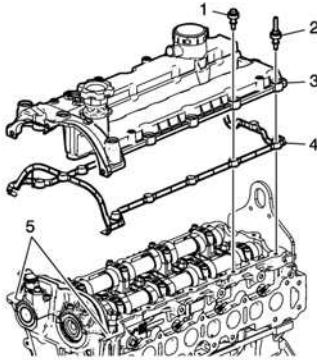
Fuel Delivery: | Fuel:



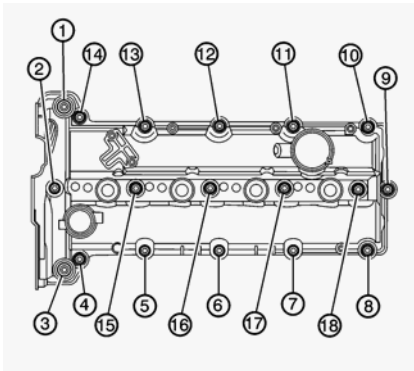
1. Remove the oil filler spacer (2).
2. Clean and inspect the valve rocker arm cover (1).
3. Install the oil filler spacer.

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1. Install NEW valve rocker arm cover grommets and cover bolts if they are serviced with the grommet.
2. Apply a thin bead of sealant to the interface of the front camshaft cap and the valve rocker arm cover gasket sealing surface (5). Refer to Adhesives, Fluids, Lubricants, and Sealers for the recommended sealant.
3. Install the valve rocker arm cover gasket (4).
4. Install the valve rocker arm cover (3).
5. Install the valve rocker arm cover bolts (1) and stud (2) finger tight.

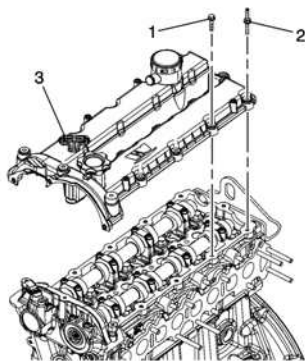


6. Tighten the valve rocker arm cover bolts in sequence to 11 Y (97 lb in).

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Submodel: | Engine Type: | Liters:

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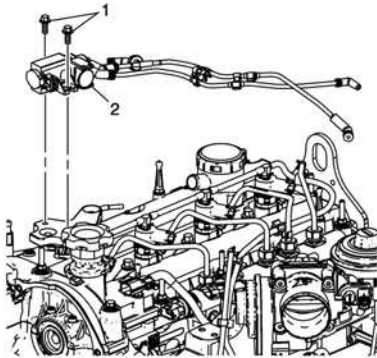
1. Remove the valve rocker arm cover bolts (1) and studs (2).
2. Remove the valve rocker arm cover (3).
3. Remove and discard the valve rocker arm cover gasket, grommets, and bolts if they are serviced with the grommet.

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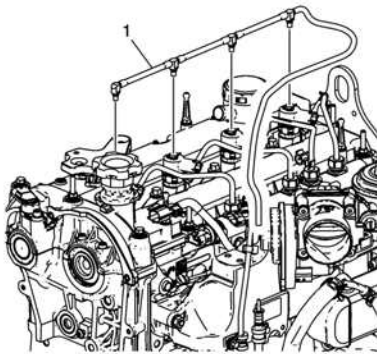
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

[Removal Procedure](#)

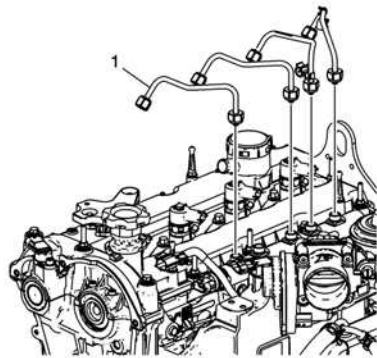
1. Remove the cowl front panel. Refer to Cowl Front Panel Replacement.
2. Remove the intake manifold cover. Refer to Intake Manifold Cover Replacement
3. Remove the timing belt upper front cover. Refer to Timing Belt Upper Front Cover Replacement



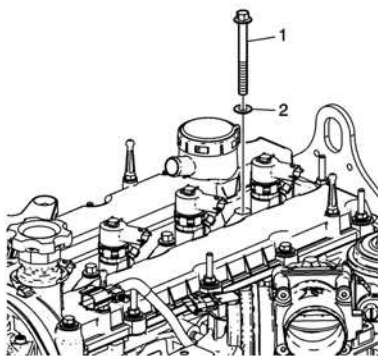
4. Remove the vacuum modulator bolts (1) and disconnect the vacuum modulator lines.
5. Remove the vacuum modulator bracket
6. Remove the vacuum modulator (2).
7. Remove the camshaft position sensor. Refer to Camshaft Position Sensor Replacement.



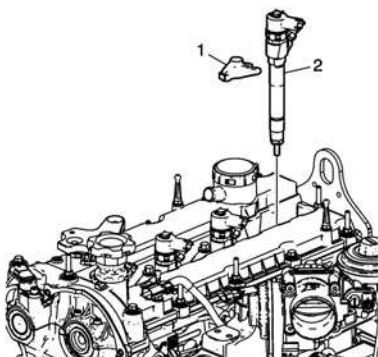
8. Disconnect the fuel return pipe quick connect fitting
9. Release the pipe retaining clips and remove the pipe (1).



10. Remove the fuel injector pipes (1).



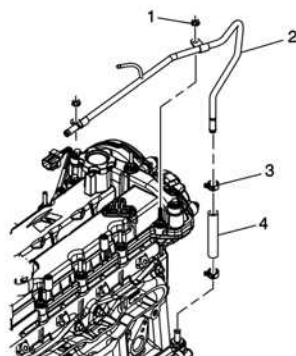
11. Remove the fuel injector bracket bolts (1) and washers (2).



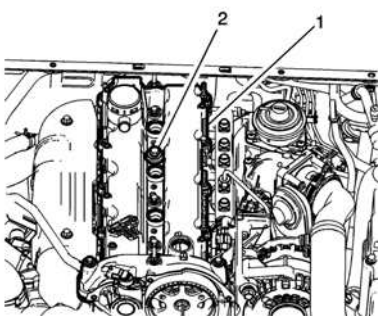
Note: Be sure that the drift punch does not contact the injector bracket bolt threads.

Note: The unique fuel injector flow rates are programmed into the ECM according to cylinder location. Mark the fuel injectors for correct re-installation to the same cylinders. Failure to do so may result in a poor drive-ability condition.

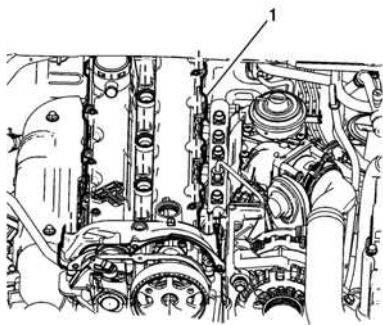
12. Install a drift punch to the injector bracket bolt bore and pull towards the front of the engine to loosen the injector from the bore.
13. Remove the fuel injector brackets (1) and fuel injectors (2). Refer to Fuel Injector Replacement



14. Remove the vacuum line nuts (1).
15. Disconnect the vacuum line hose clamps (3) from the hose (4) and pipe (2).
16. Remove the vacuum line (2).

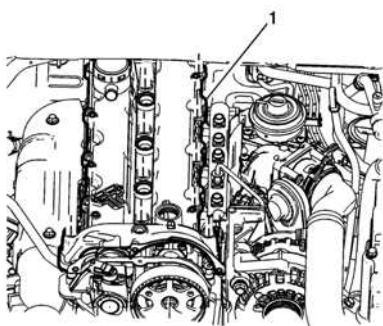


17. Remove the valve rocker arm cover bolts (1) and studs (2).

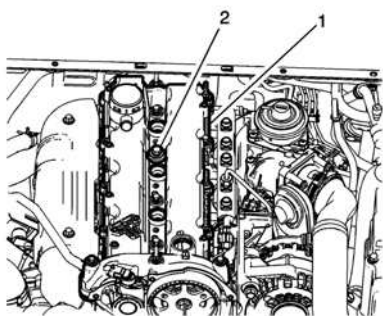


18. Remove the valve rocker arm cover (3).
19. Remove and discard the valve rocker arm cover gasket, grommets, and bolts if they are serviced with the grommet.
20. For cleaning and inspection. Refer to Valve Rocker Arm Cover Cleaning and Inspection

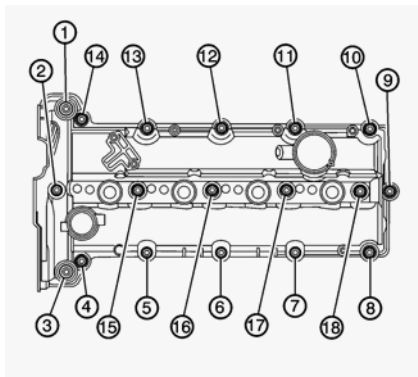
[Installation Procedure](#)



1. Install NEW valve rocker arm cover grommets and cover bolts if they are serviced with the grommet.
2. Install the valve rocker arm cover (3).

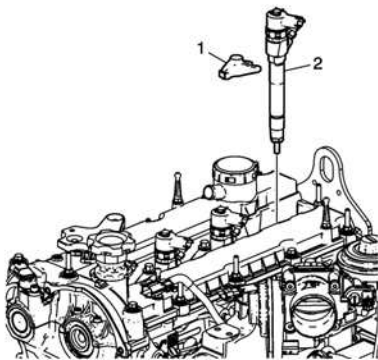


3. Install the valve rocker arm cover bolts (1) and stud (2) finger tight



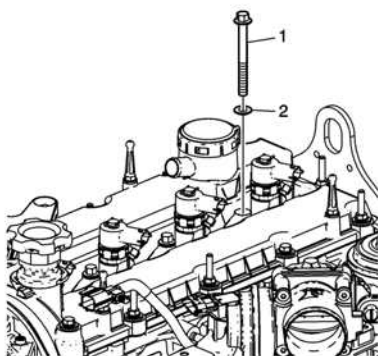
Caution: Refer to Fastener Caution

4. Tighten the valve rocker arm cover bolts in sequence to **11 Y(97 lb in)**.

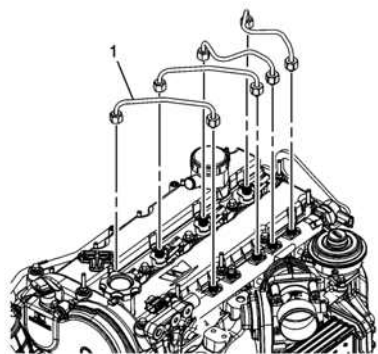


Note: The unique fuel injector flow rates are programmed into the ECM according to cylinder location. Mark the fuel injectors for correct re-installation to the same cylinders. Failure to do so may result in a poor drive-ability condition.

5. Install the fuel injectors (2) and fuel injector brackets (1).

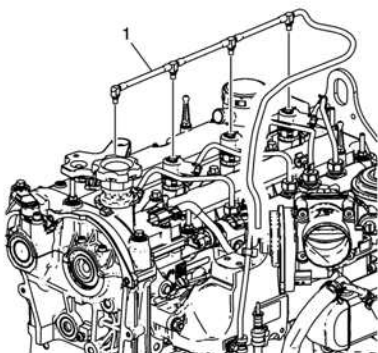


6. Install the fuel injector bracket bolts (1) with washers (2) and tighten to **32 Y(24 lb ft)**.

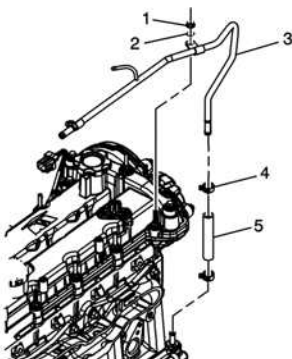


7. Install the fuel injector pipes (1) and tighten.

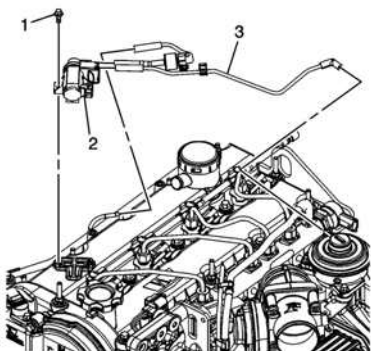
- First pass tighten the fuel injector lines at the fuel rail to **24 Y(18 lb ft)**.
- Final pass tighten the fuel injector lines at the injector to **28Y(20 lb ft)**.



- install the pipe (1) and connect the pipe retaining clips.



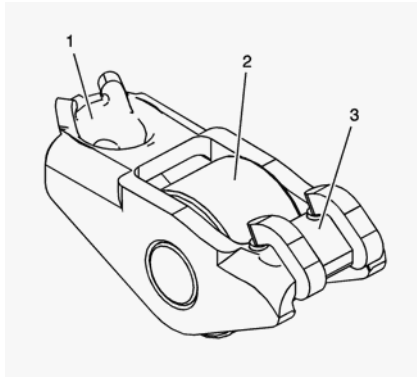
- Install the vacuum hose (5) and clamps (4).
- Install the vacuum line (3).
- Install the vacuum line washer (2) and nut (1) and tighten to **11 Y(97 lb in)**



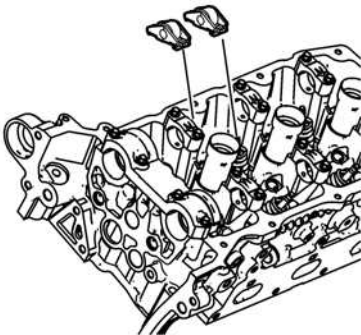
- Install vacuum modulator bracket.
- Install the vacuum modulator (2) and connect the vacuum modulator line (3).
- Install the vacuum modulator bolt (1) and tighten to **11Y(97 lb in)**.
- Install the camshaft position sensor. Refer to Camshaft Position Sensor Replacement.
- Install the timing belt upper front cover. Refer to Timing Belt Upper Front Cover Replacement
- Install the intake manifold cover. Refer to Intake Manifold Cover Replacement
- Install the cowl front panel. Refer to Cowl Front Panel Replacement.

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1. Apply a liberal amount of lubricant GM P/N 12345501 (Canadian P/N 992704) or equivalent to the pivot pocket (1), roller (2) and valve slot (3) areas of the camshaft followers.

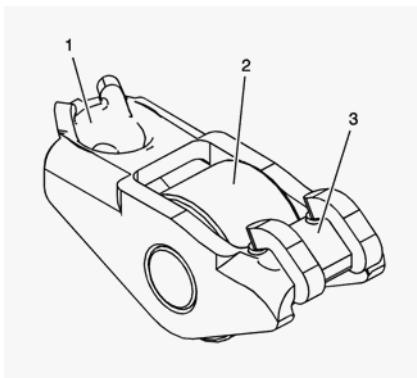


Important: The follower must be positioned squarely on the valve tip so that the full width of the roller will completely contact the camshaft lobe. If the followers are being reused you must put them back in their original location.

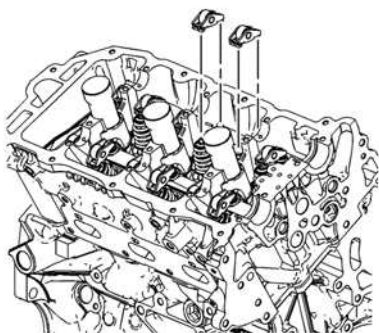
2. Place the camshaft followers in position on the valve tip and stationary hydraulic lash adjuster (SHLA).
3. The rounded head end of the follower goes on the SHLA while the flat end goes on the valve tip.
4. Clean the camshaft journals and carriers with a clean, lint-free cloth.

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1. Apply a liberal amount of lubricant GM P/N 12345501 (Canadian P/N 992704) or equivalent to the pivot pocket (1), roller (2) and valve slot (3) areas of the camshaft followers.



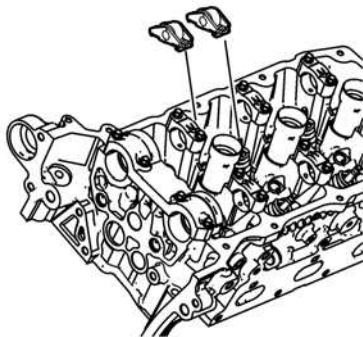
Important: The follower must be positioned squarely on the valve tip so that the full width of the roller will completely contact the camshaft lobe. If the followers are being reused you must put them back in their original location.

2. Place the camshaft followers in position on the valve tip and stationary hydraulic lash adjuster (SHLA).
3. The rounded head end of the follower goes on the SHLA while the flat end goes on the valve tip.
4. Clean the camshaft journals and carriers with a clean, lint-free cloth.

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Submodel: | Engine Type: | Liters:

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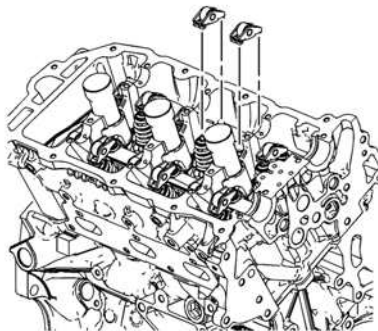


Remove the valve rocker arms from the cylinder head. If the rocker arms are to be reused, keep in order so they can be reinstalled in the same position.

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Submodel: | Engine Type: | Liters:

Fuel Delivery: | Fuel:



Remove the valve rocker arms from the cylinder head. If the rocker arms are to be reused, keep in order so they can be reinstalled in the same position.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

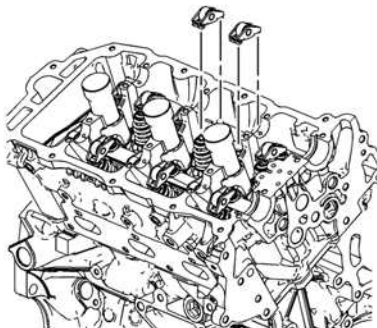
[Removal Procedure](#)

1. Remove the applicable camshaft(s). Refer to Camshaft Replacement - Left Side.



2. Remove the rocker arms. Refer to Valve Rocker Arm Removal - Left Side.
3. Clean and inspect the camshaft(s) and the rocker arm(s). Repair or replace as necessary. Refer to Camshaft Cleaning and Inspection and Valve Rocker Arm Cleaning and Inspection.

[Installation Procedure](#)



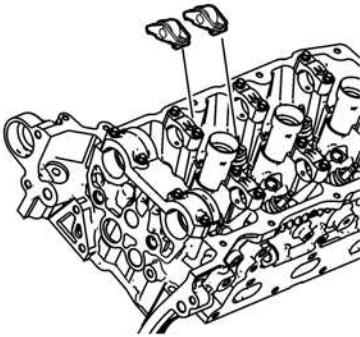
1. Install the rocker arms. Refer to Valve Rocker Arm Installation - Left Side.
2. Install the applicable camshaft(s). Refer to Camshaft Replacement - Left Side.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

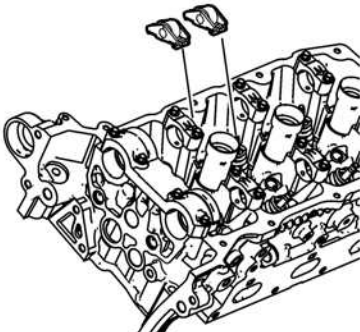
[Removal Procedure](#)

1. Remove the applicable camshaft(s). Refer to Camshaft Replacement - Right Side.



2. Remove the rocker arms. Refer to Valve Rocker Arm Removal - Right Side.
3. Clean and inspect the camshaft(s) and the rocker arm(s). Repair or replace as necessary. Refer to Camshaft Cleaning and Inspection and Valve Rocker Arm Cleaning and Inspection.

[Installation Procedure](#)



1. Install the rocker arms. Refer to Valve Rocker Arm Installation - Right Side.
2. Install the applicable camshaft(s). Refer to Camshaft Replacement - Right Side.

2013 Chevrolet Colorado

Submodel: | **Engine Type:** | **Liters:**
Fuel Delivery: | **Fuel:**

Special Tools

EN 22738-B Valve Spring Tester

For equivalent regional tools, refer to Special Tools.

[Inspection Procedure](#)

1. Clean the valve springs in solvent.
Warning: Refer to Safety Glasses Warning.
2. Dry the valve springs with compressed air.
3. Inspect the valve springs for broken coils or coil ends.

[Measurement Procedure](#)



1. Measure the valve spring tension using the EN 22738-B tester . Refer to Engine Mechanical Specifications.
2. If low valve spring load is found, replace the valve springs. DO NOT use shims to increase spring load. The use of shims can cause the valve spring to bottom out before the camshaft lobe is at peak lift.

2013 Chevrolet Colorado

Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Warning: Valve springs can be tightly compressed. Use care when removing retainers and plugs. Personal injury could result.

2013 Chevrolet Colorado

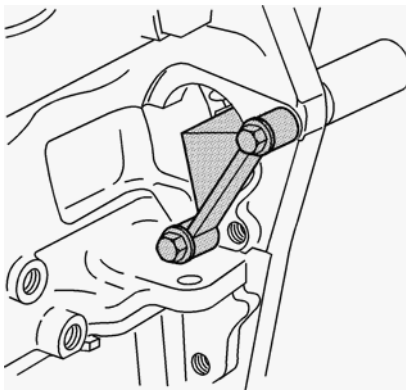
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Special Tools

- EN 46106 Flywheel Holding Tool
- EN 46110 On-Vehicle Valve Spring Compressor
- EN 46116 Valve Stem Seal Remover/Installer
- EN-48313 Timing Chain Retention Tool
- J 39313 Spark Plug Port Adapter

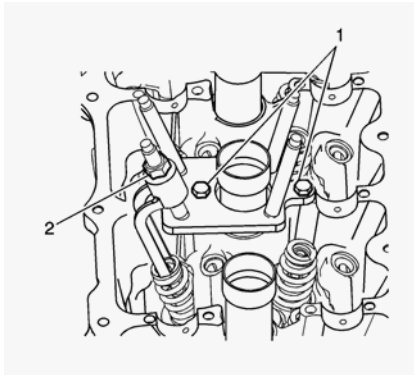
[Removal Procedure](#)

1. Remove the starter motor. Refer to Starter Replacement.
2. Remove the camshafts and rocker arms. Refer to Camshaft Replacement - Left Side and Valve Rocker Arm Replacement - Left Side.

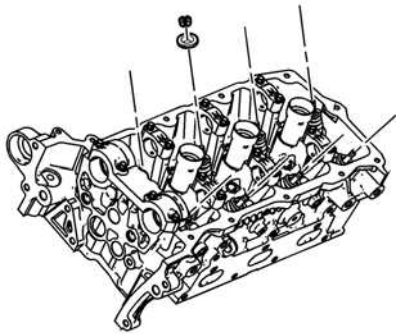


Note: If the EN 46106 Flywheel Holding Tool is not installed, the crankshaft may rotate. If the crankshaft rotates, disassembly and reassembly of the entire camshaft timing system may be required.

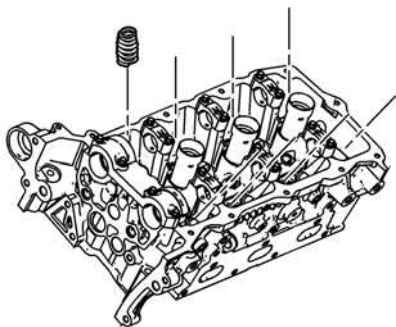
3. Install the EN 46106 Flywheel Holding Tool in order to prevent crankshaft rotation.
4. Remove the spark plug from the applicable cylinder. Refer to Spark Plug Replacement.
5. Install the J 39313 Spark Plug Port Adapter to the applicable cylinder.
6. Connect the J 39313 Spark Plug Port Adapter to a compressed air source.



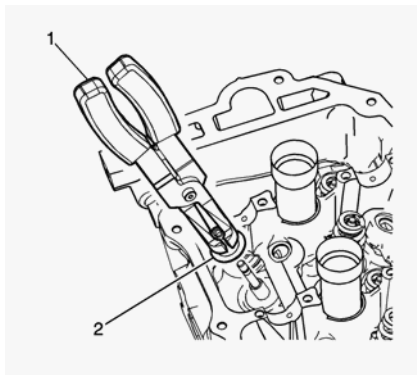
7. Install the EN 46110 On-Vehicle Valve Spring Compressor above the applicable cylinder as shown.
8. Tighten the EN 46110 On-Vehicle Valve Spring Compressor nut (2).



9. Remove the valve keepers.
10. Loosen the *EN 46110* On-Vehicle Valve Spring Compressor nut.
11. Remove the valve spring retainer.

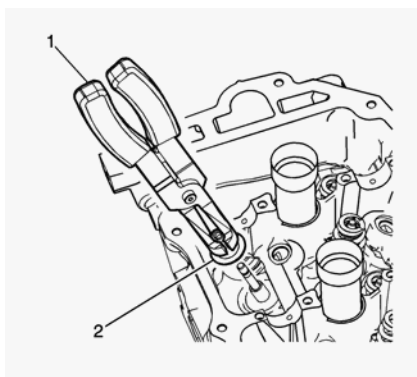


12. Remove the valve spring.

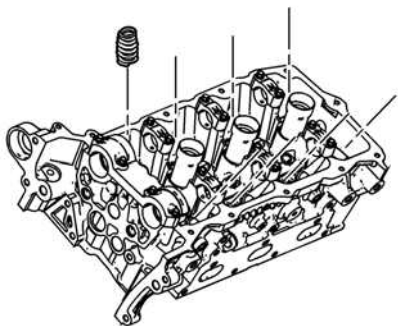


13. Use the *EN 46116* Valve Stem Seal Remover/Installer (1) in order to remove the valve stem seal (2).

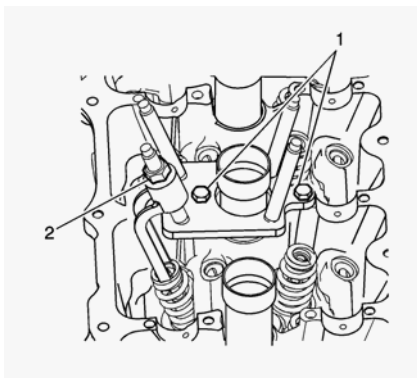
[Installation Procedure](#)



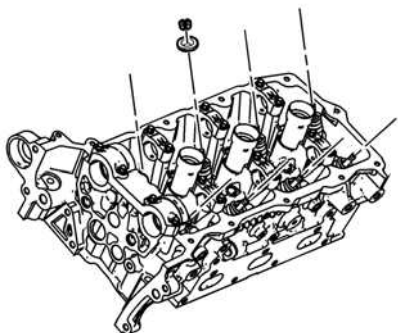
1. Use the *EN 46116* Valve Stem Seal Remover/Installer (1) in order to install the valve stem seal (2).



2. Install the valve spring.
3. Install the valve spring retainer.



4. Install the *EN 46110* On-Vehicle Valve Spring Compressor above the applicable valve spring as shown.
Tighten the *EN 46110* On-Vehicle Valve Spring Compressor nut (2).



5. Install the valve spring keepers.
6. Remove the *EN 46110* On-Vehicle Valve Spring Compressor.
7. Disconnect the *J 39313* Spark Plug Port Adapter from the compressed air source.
8. Remove the *J 39313* Spark Plug Port Adapter.
9. Install the spark plugs. Refer to Spark Plug Replacement.
10. Install the rocker arms and camshafts. Refer to Valve Rocker Arm Replacement - Left Side and Camshaft Replacement - Left Side.
11. Remove the *EN 46106* Flywheel Holding Tool.
12. Install the starter motor. Refer to Starter Replacement.

2013 Chevrolet Colorado

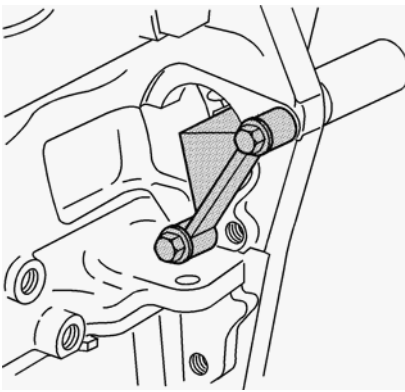
Submodel: | Engine Type: | Liters:
Fuel Delivery: | Fuel:

Special Tools

- EN 46106 Flywheel Holding Tool
- EN 46110 On-Vehicle Valve Spring Compressor
- EN 46116 Valve Stem Seal Remover/Installer
- EN-48313 Timing Chain Retention Tool
- J 39313 Spark Plug Port Adapter

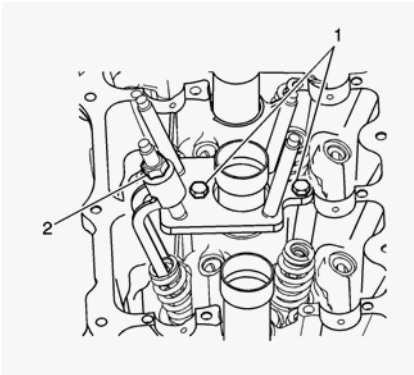
[Removal Procedure](#)

1. Remove the starter motor. Refer to Starter Replacement.
2. Remove the camshafts and rocker arms. Refer to Camshaft Replacement - Right Side and Valve Rocker Arm Replacement - Right Side.

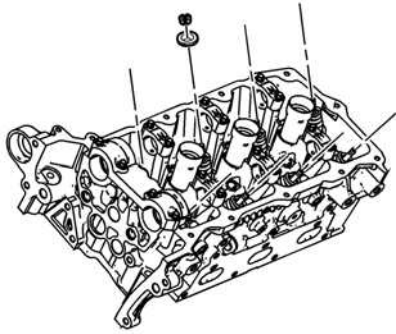


Note: If the EN 46106 Flywheel Holding Tool is not installed, the crankshaft may rotate. If the crankshaft rotates, disassembly and reassembly of the entire camshaft timing system may be required.

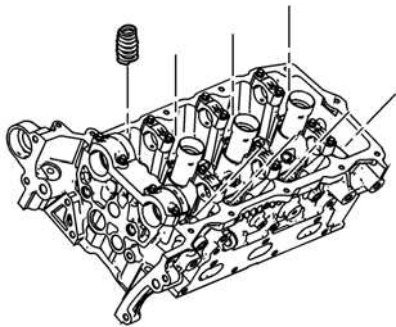
3. Install the EN 46106 Flywheel Holding Tool in order to prevent crankshaft rotation.
4. Remove the spark plug from the applicable cylinder. Refer to Spark Plug Replacement.
5. Install the J 39313 Spark Plug Port Adapter to the applicable cylinder.
6. Connect the J 39313 Spark Plug Port Adapter to a compressed air source.



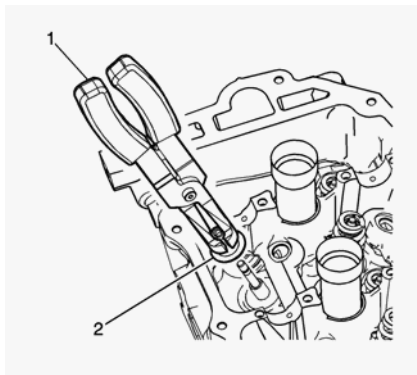
7. Install the EN 46110 On-Vehicle Valve Spring Compressor above the applicable cylinder as shown.
8. Tighten the EN 46110 On-Vehicle Valve Spring Compressor nut (2).



9. Remove the valve keepers.
10. Loosen the *EN 46110* On-Vehicle Valve Spring Compressor nut.
11. Remove the valve spring retainer.

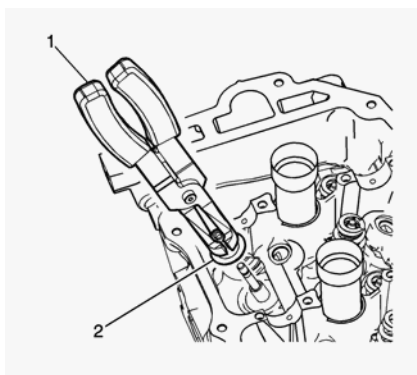


12. Remove the valve springs.

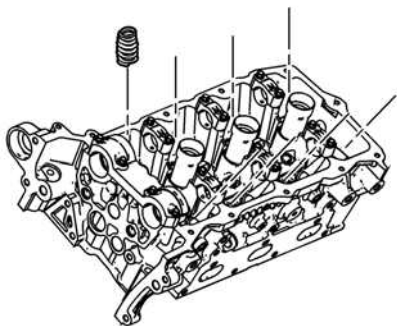


13. Use the *EN 46116* Valve Stem Seal Remover/Installer (1) in order to remove the valve stem seal (2).

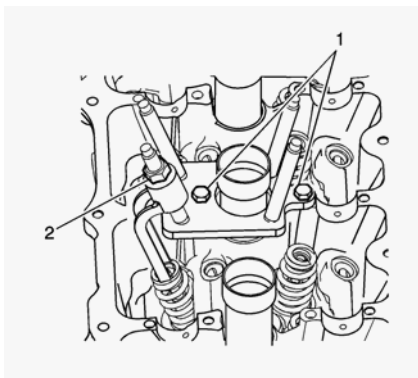
[Installation Procedure](#)



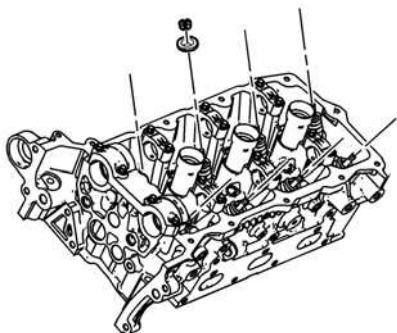
1. Use the *EN 46116* Valve Stem Seal Remover/Installer (1) in order to install the valve stem seals (2).



2. Install the valve spring.
3. Install the valve spring retainer.



4. Install the *EN 46110* On-Vehicle Valve Spring Compressor above the applicable valve spring as shown.
Tighten the *EN 46110* On-Vehicle Valve Spring Compressor nut (2).



5. Install the valve spring keepers.
6. Remove the *EN 46110* On-Vehicle Valve Spring Compressor.
7. Disconnect the *J 39313* Spark Plug Port Adapter from the compressed air source.
8. Remove the *J 39313* Spark Plug Port Adapter.
9. Install the spark plugs. Refer to Spark Plug Replacement.
10. Install the rocker arms and camshafts. Refer to Valve Rocker Arm Replacement - Right Side and Camshaft Replacement - Right Side.
11. Remove the *EN 46106* Flywheel Holding Tool.
12. Install the starter motor. Refer to Starter Replacement.