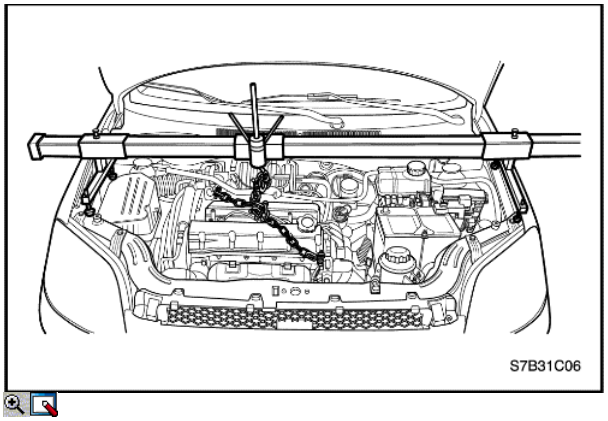


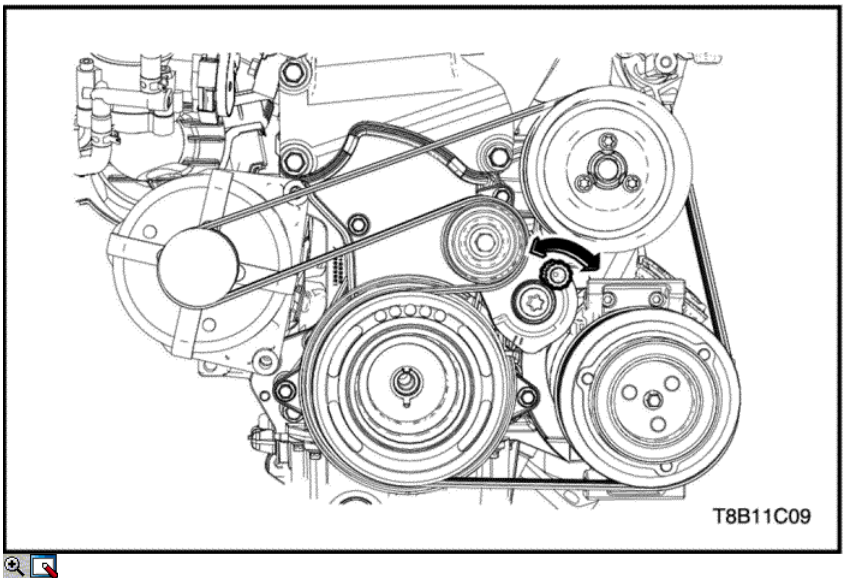
Timing System

Tools Required

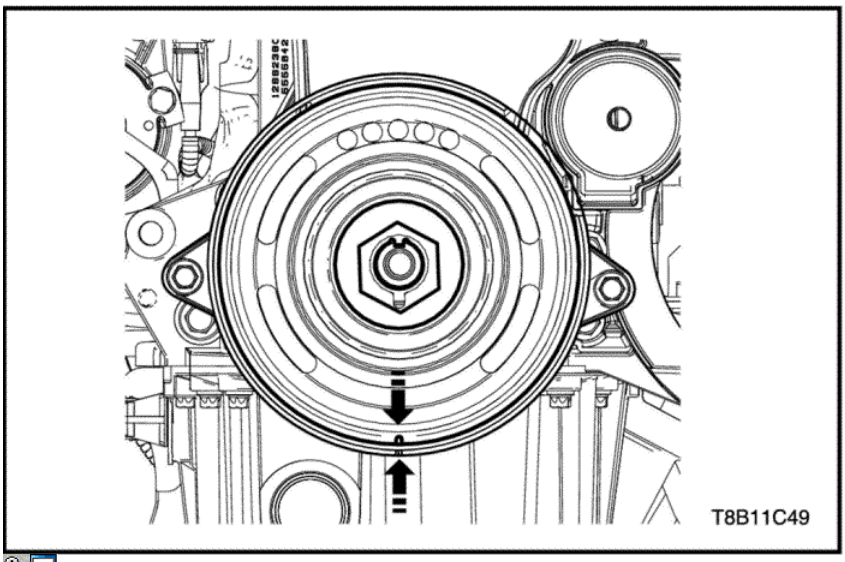
Engine Fixture EN-48356
Flywheel Locking Device KM-6625
Fixing Rod KM-6333
Locking Tool KM-6628-A
Locking Tool KM-6340

Removal Procedure

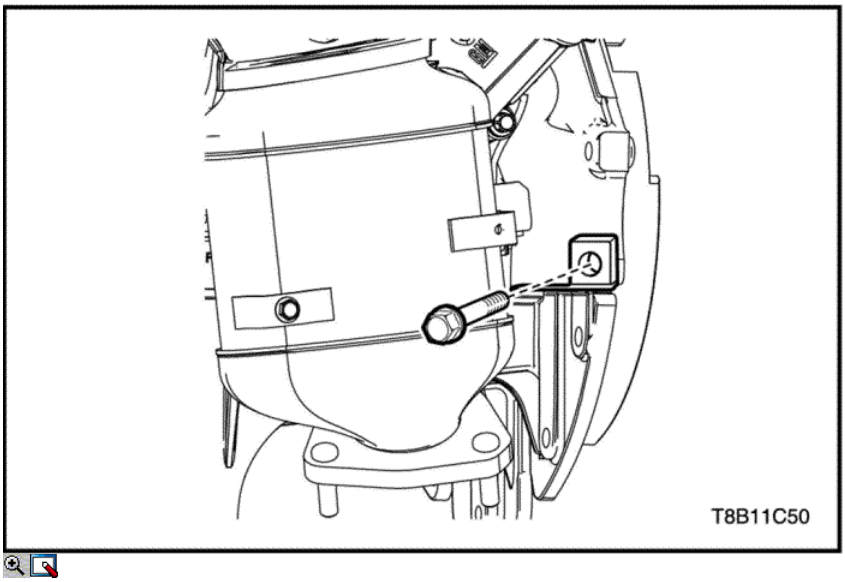
1. Disconnect the battery negative cable.
2. Remove the air cleaner assembly. Refer to "Air Cleaner Assembly" in this section.
3. Install the engine fixture (EN-48356).



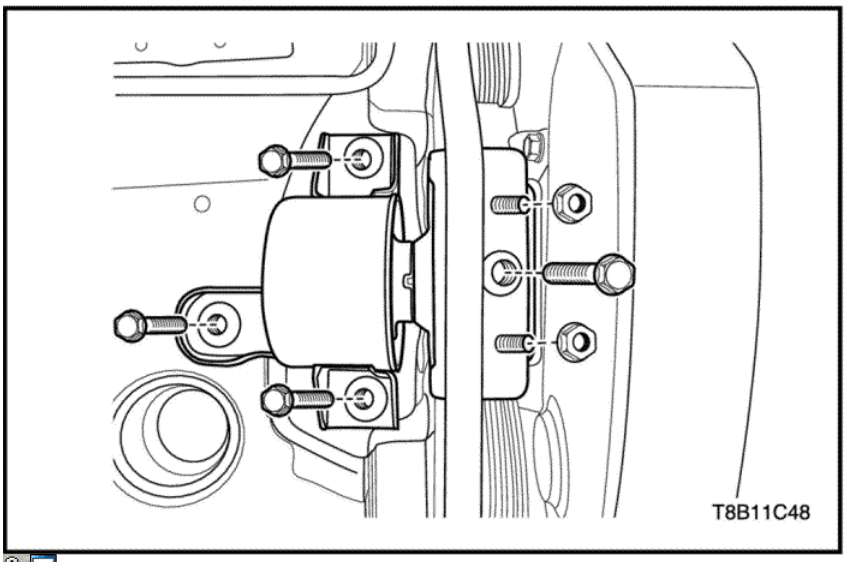
4. Remove the accessory belt. Refer to "Accessory Belt and Tensioner" in this section.
5. Remove the accessory belt tensioner. Refer to "Accessory Belt and Tensioner" in this section.



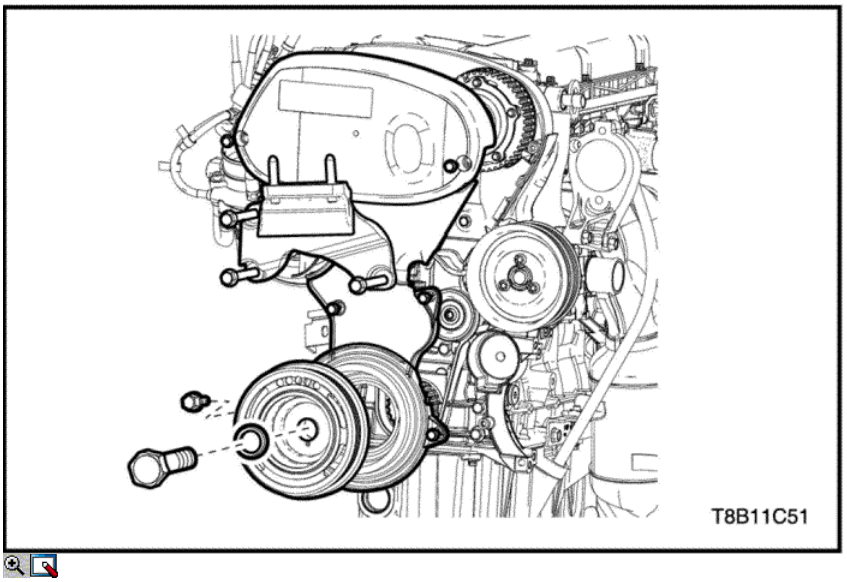
6. Rotate the crankshaft pulley clockwise.
7. Align the notches between the pulley and the cover.



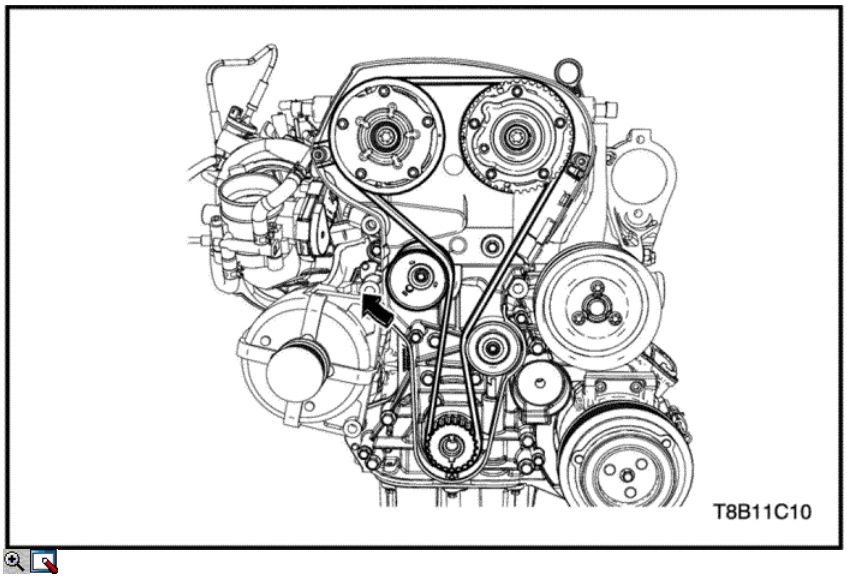
8. Remove the transmission tightening bolt.
9. Install the flywheel locking device(KM-6625) to block the crankshaft.
10. Install the transmission tightening bolt.



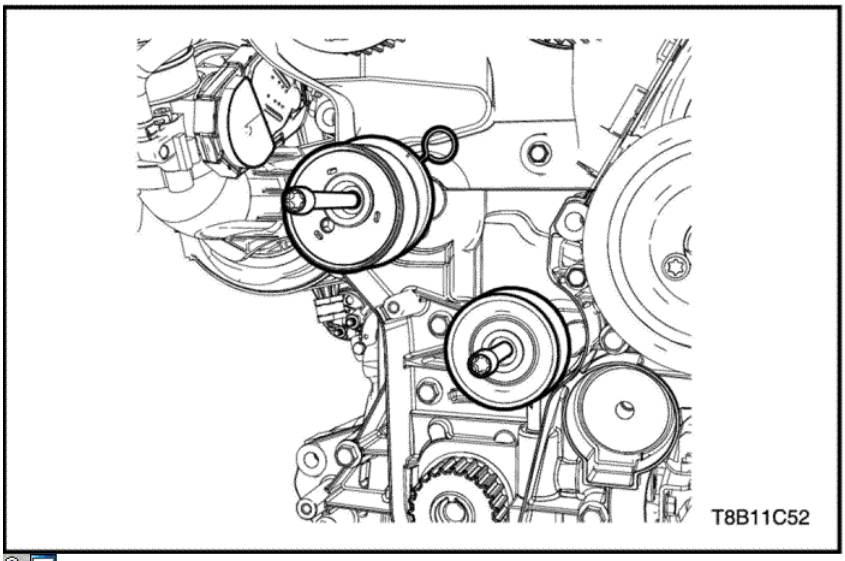
11. Remove the cylinder head cover. Refer to "Cylinder Head Cover" in this section.
12. Remove the engine mount. Refer to "Engine Mount" in this section.



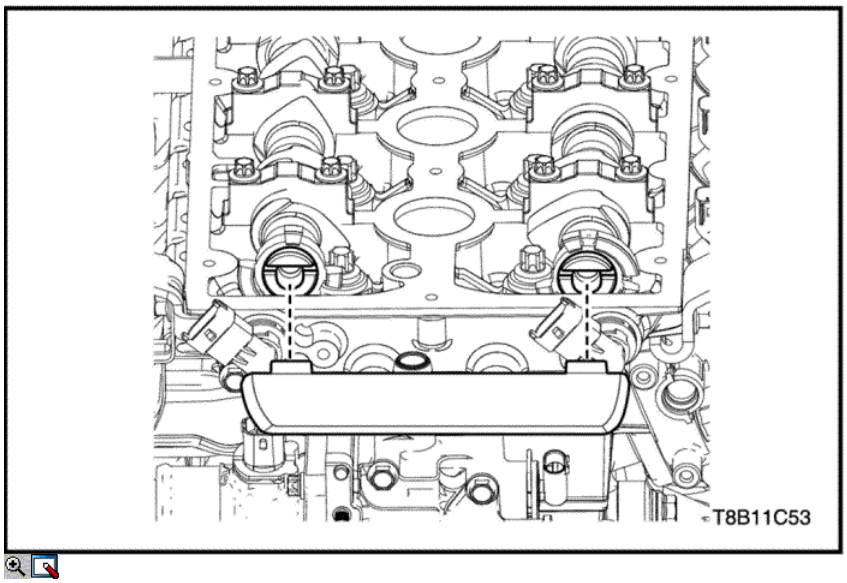
13. Remove the crankshaft pulley.
14. Remove the timing belt upper cover.
15. Remove the engine mount bracket.
16. Remove the timing belt lower cover.
17. Remove the timing belt center cover.



18. Install the fixing rod(KM-6333)(a) during rotating the timing belt tensioner.
19. Remove the timing belt.

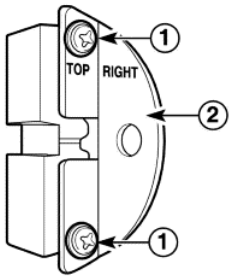


20. Remove the timing belt tensioner.
21. Remove the timing belt idler.



Adjustment

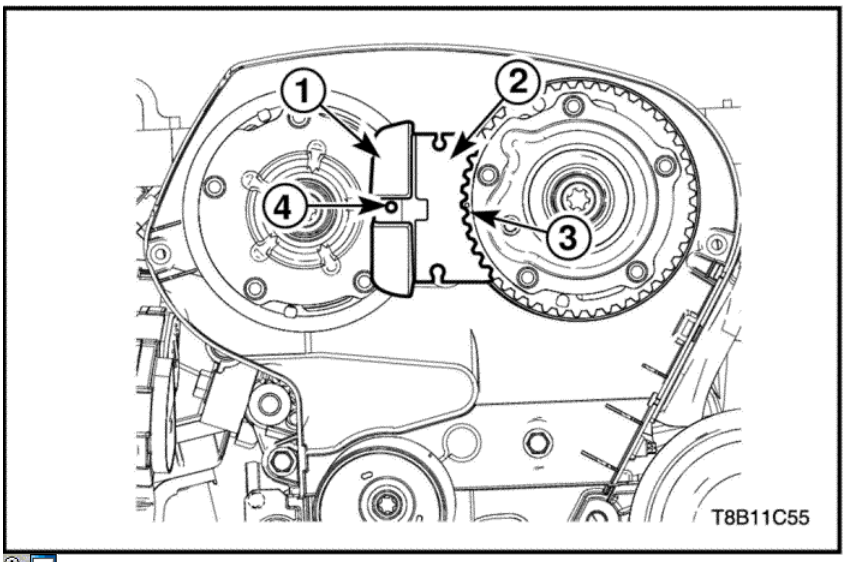
1. Align the both camshaft horizontally to install the camshaft rear locking tool (KM-6628-A).
2. Confirm the both camshaft sprocket spot aligned.



3. Prepare the right half of locking tool(KM-6340).

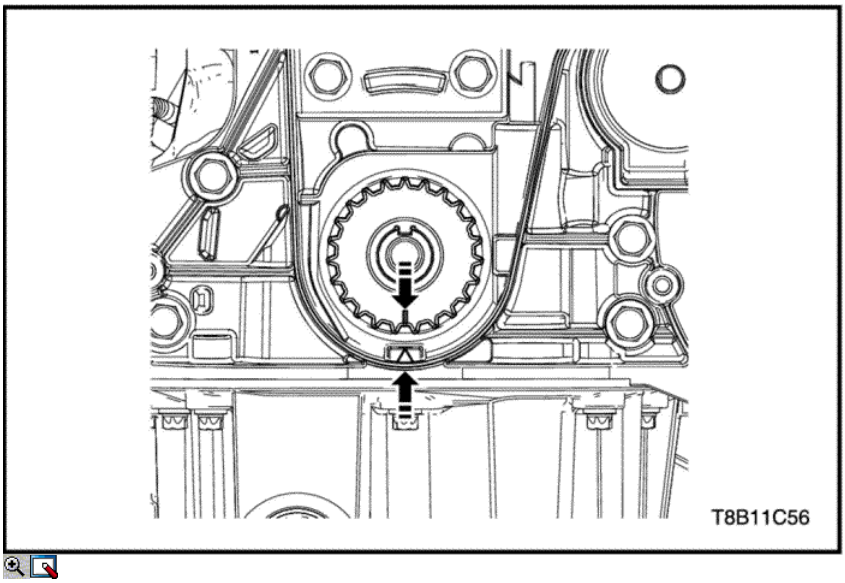
   Notice : Recognizable from the lettering “Right”

4. Unscrew the bolts(1) and detach front panel(2) from KM-6340-Right.



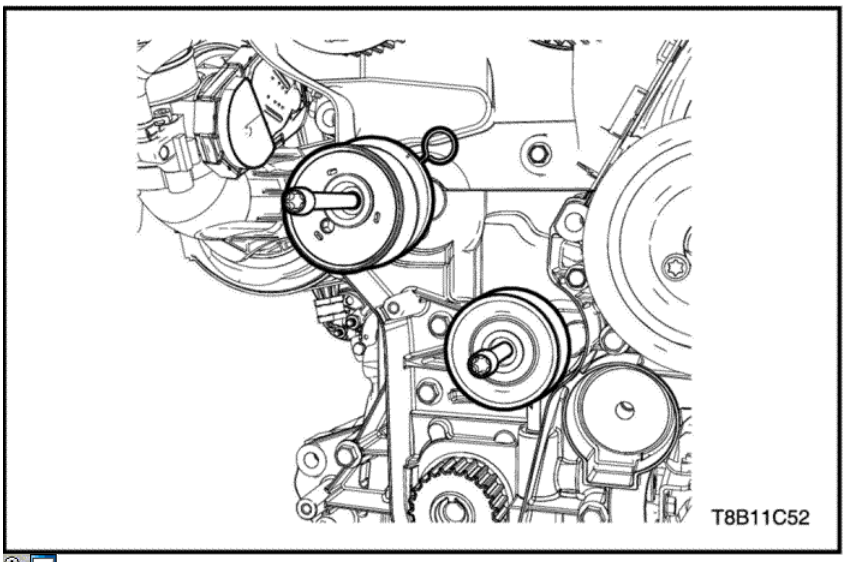
Important : The spot-type marking(4) on the intake camshaft sprocket does not correspond to the groove of KM-6340-Left during this process but must be somewhat above as shown.

5. Confirm aligning between the intake side spot(3) and the exhaust side spot(4) on the camshaft sprockets as shown.
6. If not aligned as shown, remove and install the camshaft sprocket to align. Refer to "Camshaft Sprocket" in this section.
7. Insert the left of KM-6340(1) into the intake camshaft sprocket side.
8. Insert the right of KM-6340(2) into the exhaust camshaft sprocket side.



Caution : If not aligned the notches, rotate the crankshaft until aligning after remove the flywheel locking device KM-6625 certainly.

9. Confirm align the notches between the crankshaft sprocket and the cover.

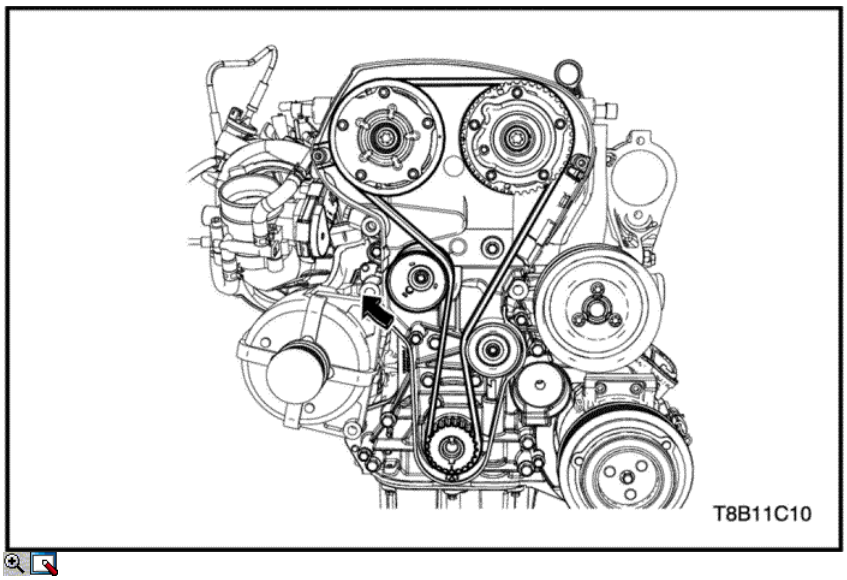


10. Install the timing belt idler.

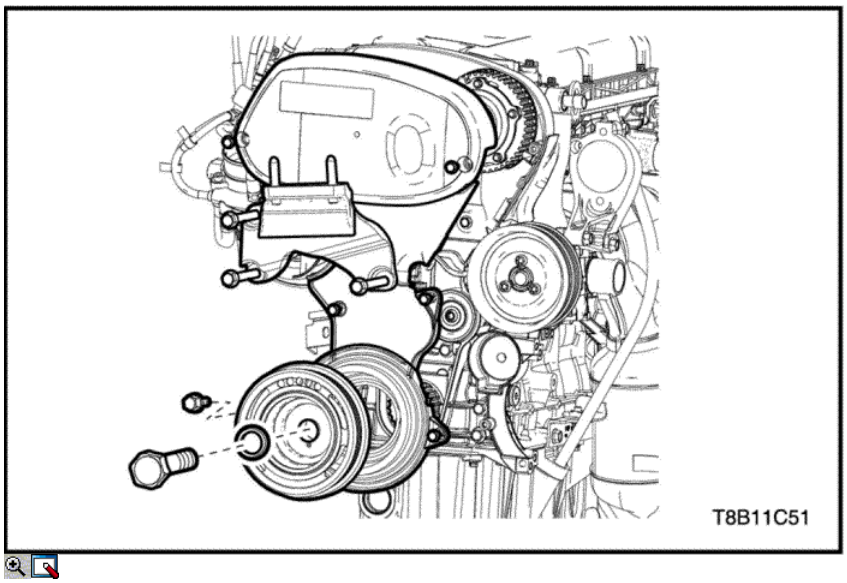
    Tighten
    Tighten the timing belt idler bolt to 50 N•m (36.8 lb-ft).

11. Install the timing belt tensioner.

    Tighten
    Tighten the timing belt tensioner bolt to 55 N•m (40.6 lb-ft).



12. Install the timing belt adjust. Refer to "Timing System-Adjustment" in this section.
13. Pull out the fixing rod(KM-6333)(a).



Installation Procedure

1. Install the timing belt center cover.
2. Install the timing belt lower cover.

   Tighten
   Tighten the timing belt lower cover bolts to 6 N•m (53.1 lb-in).

3. Install the engine mount bracket.

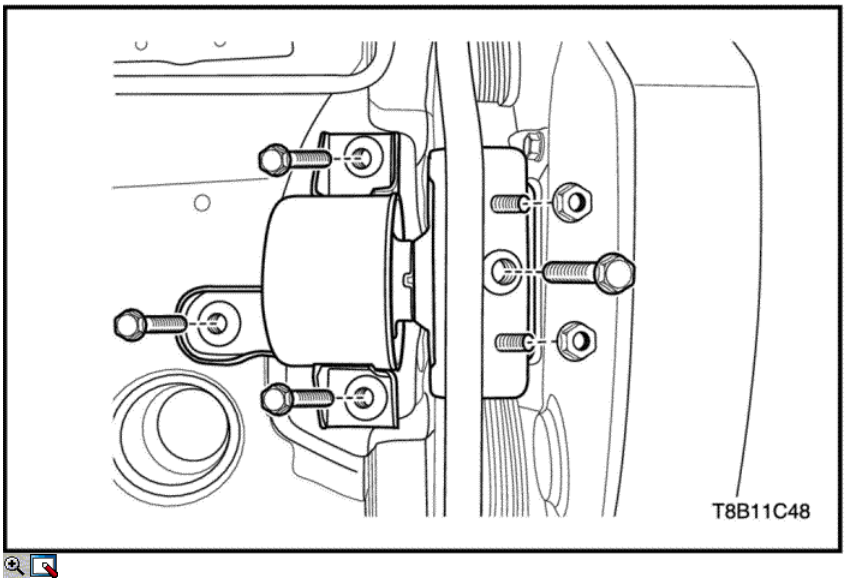
   Tighten
   Tighten the engine mount bracket bolt to 65 N•m (47.9 lb-ft).

4. Install the timing belt upper cover.

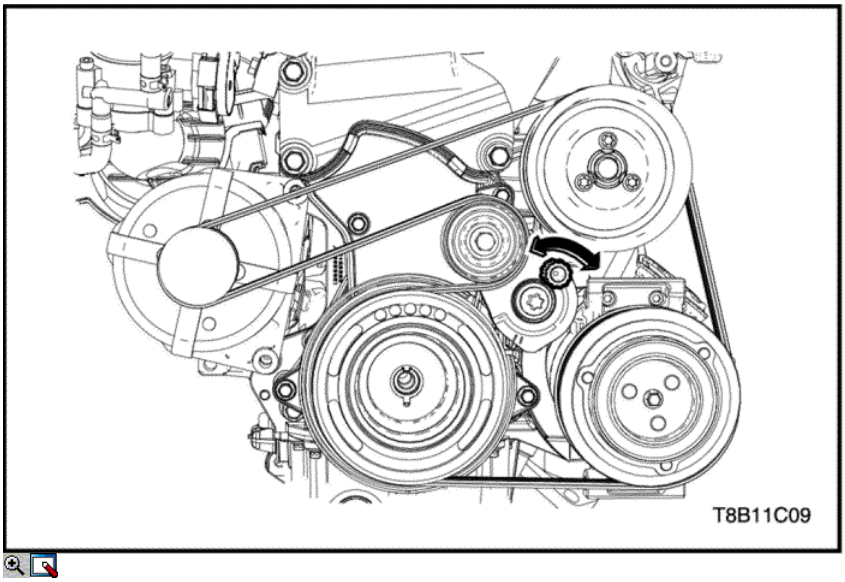
   Tighten
   Tighten the timing belt upper cover bolts to 4 N•m (35.4 lb-ft).

5. Install the crankshaft pulley with aligning crankshaft pulley notches.

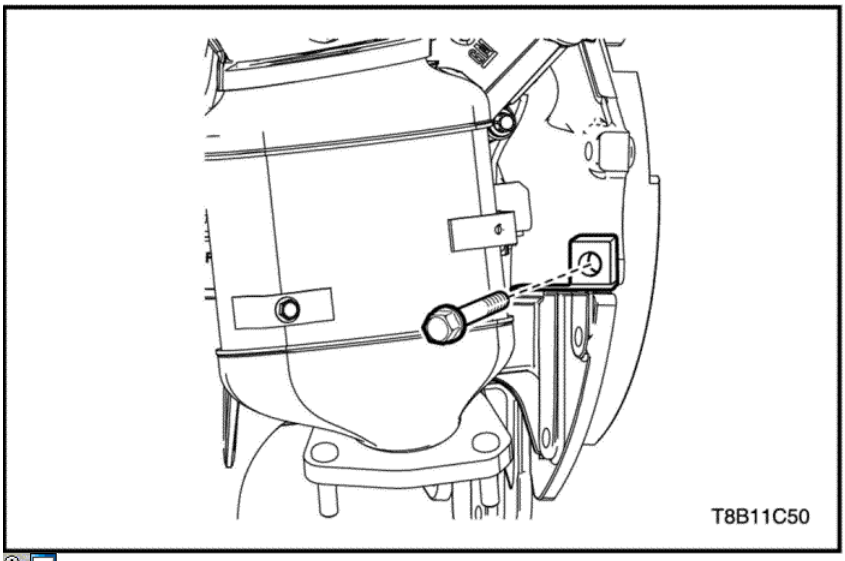
   Tighten
   Tighten the crankshaft pulley bolt to 25 N•m (18.4 lb-ft).



6. Install the engine mount. Refer to "Engine Mount" in this section.
7. Install the cylinder head cover. Refer to "Engine Mount" in this section.

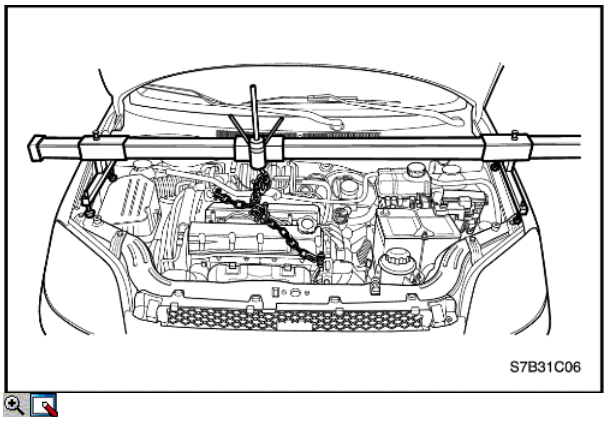


8. Install the accessory belt. Refer to "Accessory Belt and Tensioner" in this section.
9. Install the accessory belt tensioner. Refer to "Accessory Belt and Tensioner" in this section.

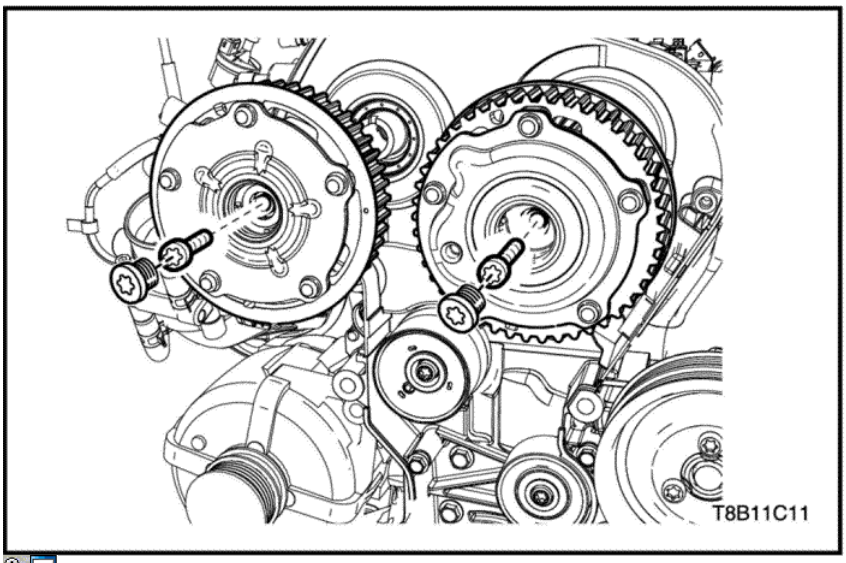


10. Remove the transmission tightening bolt.
11. Remove the flywheel locking device(KM-6625) to block the crankshaft.
12. Install the transmission tightening bolt.

Tighten
Tighten the transmission tightening bolt to 60 N•m (44.2 lb-ft).



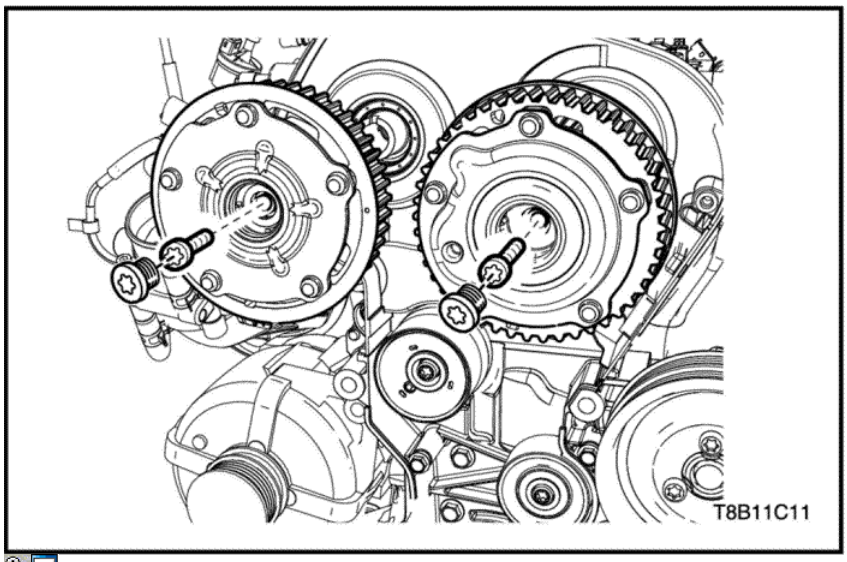
13. Remove the engine fixture (EN-48356).
14. Install the air cleaner assembly. Refer to "Air Cleaner Assembly" in this section.
15. Connect the battery negative cable.



Camshaft Sprocket

Removal Procedure

1. Remove the timing belt. Refer to "Timing System" in this section.
2. Remove the camshaft sprocket bolt cap.
3. Remove the camshaft sprocket bolts.
4. Remove the camshaft sprockets.



Installation Procedure

Important : When installing the camshaft sprockets, the timing adjustment procedure must be accomplished. Refer to "Timing System-Adjustment" in this section.

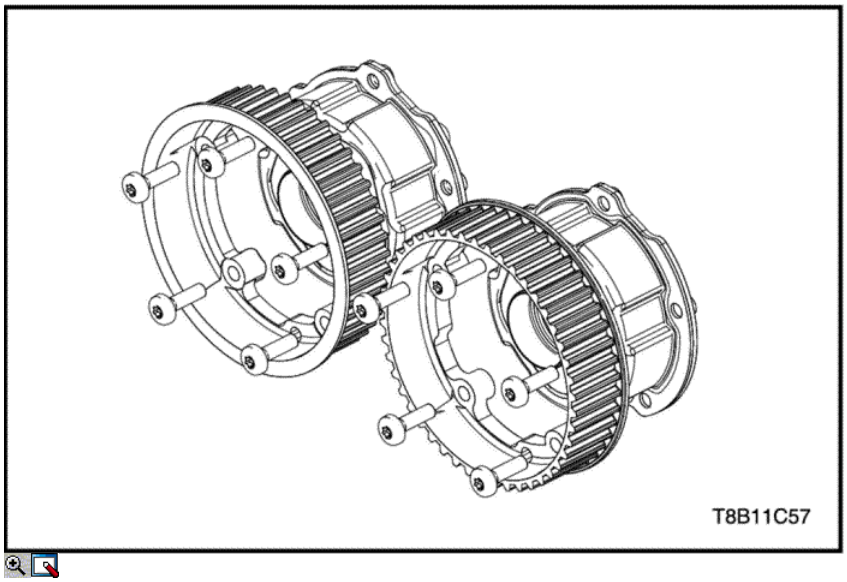
1. Install the camshaft sprockets.
2. Install the camshaft sprocket bolts.

   Tighten
   Tighten the camshaft sprocket bolts to 65 N•m (47.9 lb-ft).

3. Install the camshaft sprocket bolt caps.

   Tighten
   Tighten the camshaft sprocket bolt cap to 50 N•m (36.8 lb-ft).

4. Install the timing belt. Refer to "Timing System" in this section.



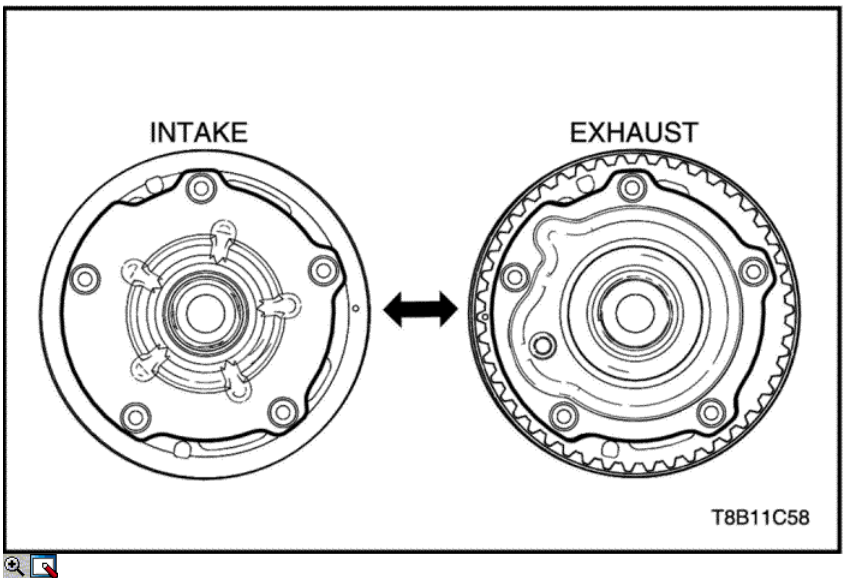
Camshaft Adjuster

Removal and Installation Procedure

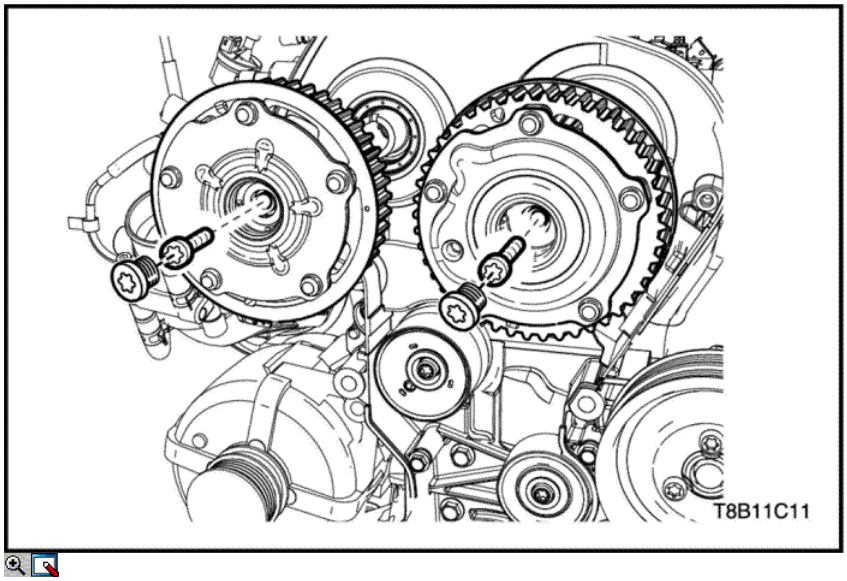
1. Remove the camshaft adjuster bolts.

   Tighten
   Tighten the camshaft adjuster bolts to 65+120°+15° N•m (47.9+120°+15° lb-ft).

2. Remove the camshaft adjusters.



Important : Don’t be confused the location and direction of the intake/exhaust adjusters.



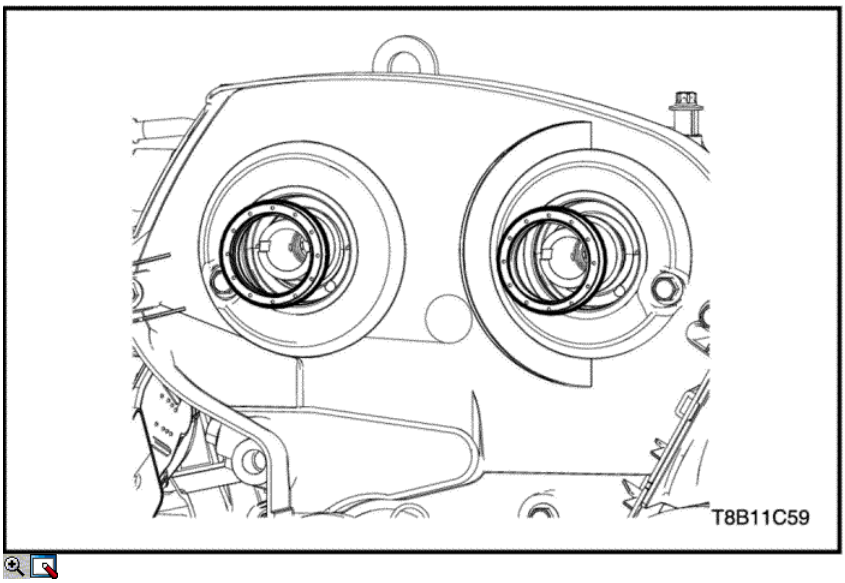
Camshaft Seal Ring

Tools Required

Installer KM-422

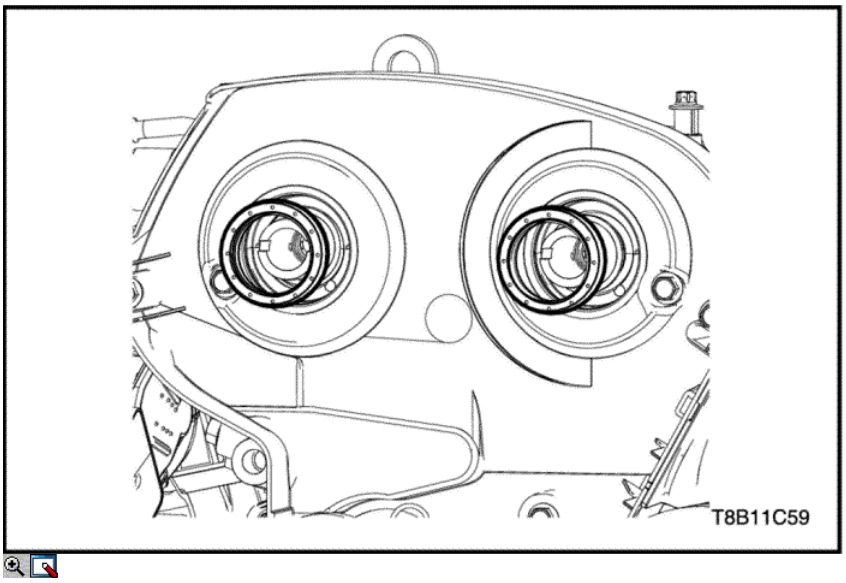
Removal Procedure

1. Remove the camshaft sprocket. Refer to “Camshaft Sprocket” in this section.



Caution : Extremely take care of contacting of camshaft surface. If damaged on the camshaft surface, engine oil could be leaked.

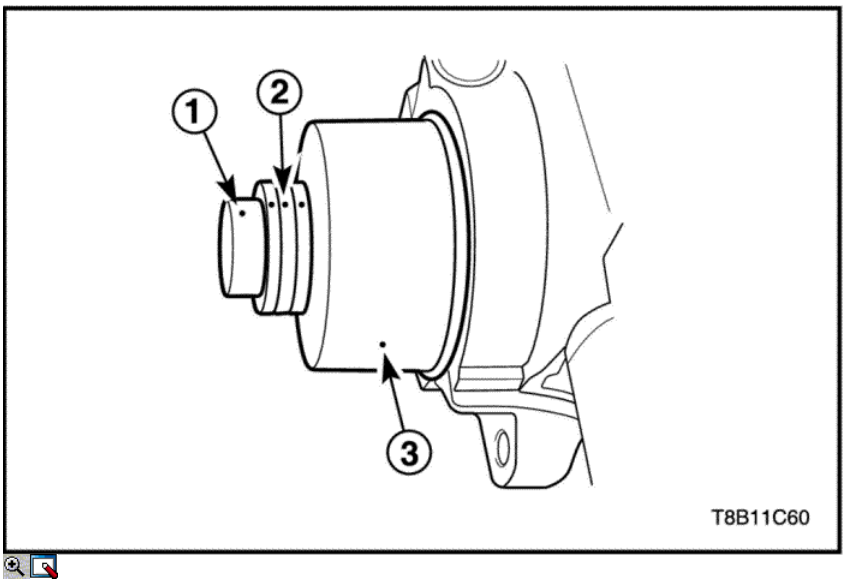
2. Remove the camshaft seal ring.



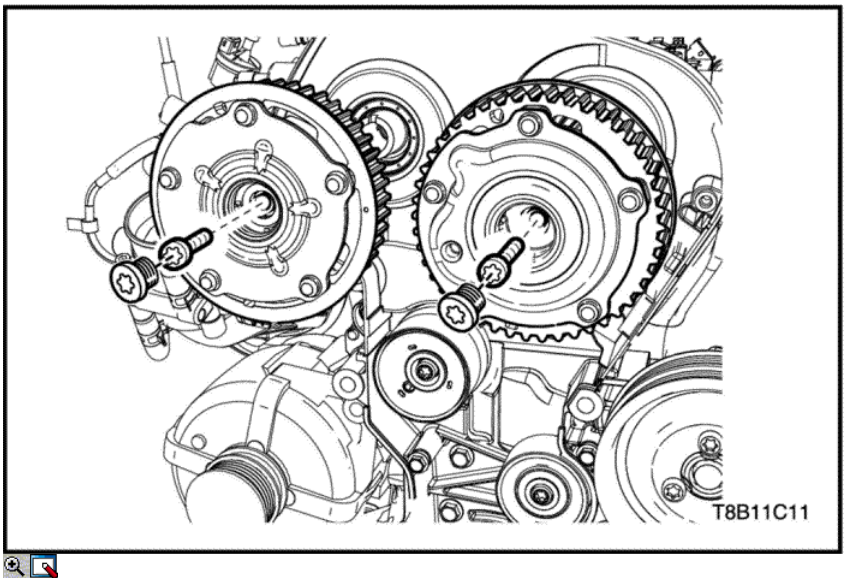
Installation Procedure

Notice : Don’t use camshaft seal ring again.

1. Install the camshaft seal ring with new one.



2. Install the installer KM-422(3) with shims(2) with a total thickness of approx. 10mm and tighten the camshaft bolt(1) manually.
3. Remove the installer KM-422.

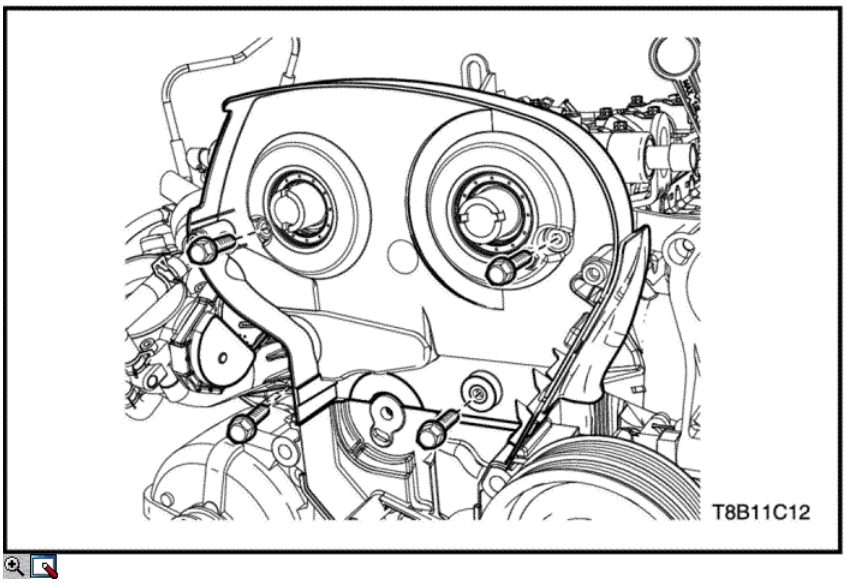


Camshaft

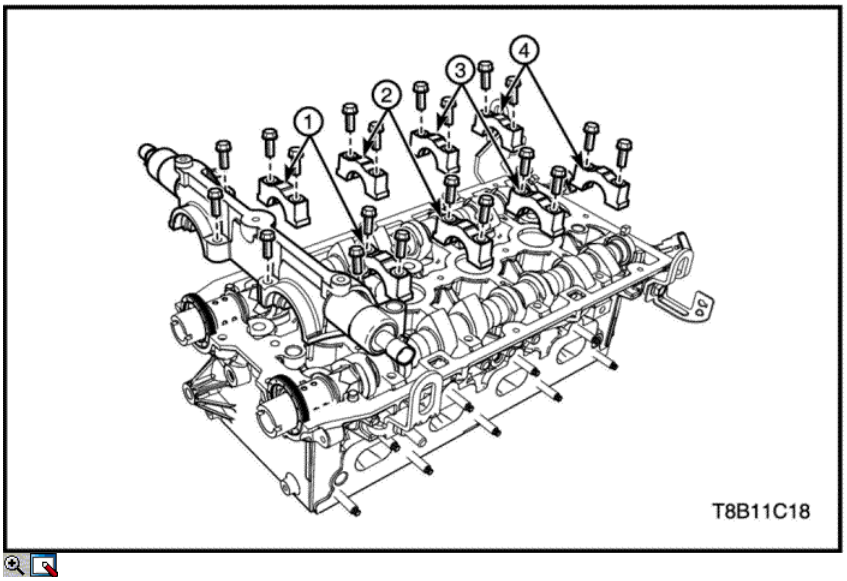
Removal Procedure

Caution : Take extreme care to prevent any scratches, nicks or damage to the camshafts and caps bearing surfaces. If scratched, damage may happen to engine.

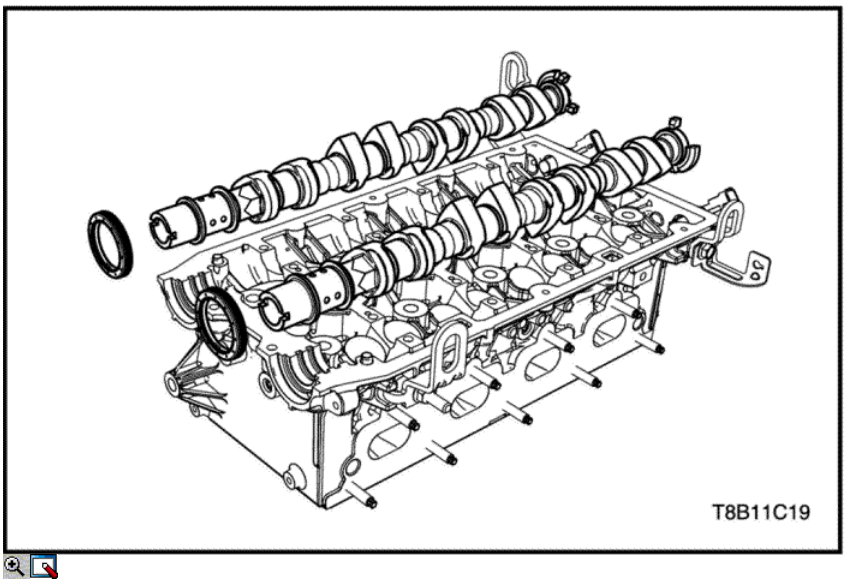
1. Remove the camshaft sprocket. Refer to "Camshaft Sprocket" in this section.
2. Remove the timing belt tensioner. Refer to "Timing System" in this section.



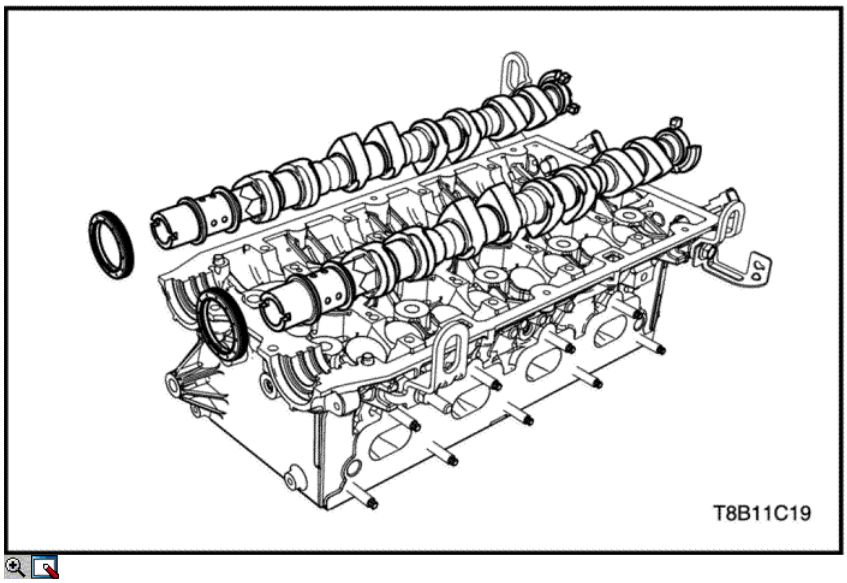
3. Remove the timing belt rear cover.



4. Remove the camshaft position solenoid valve housing.
5. Remove the camshaft cap bolts in this sequence (1)-(4)-(2)-(3).
6. Remove the camshaft caps.

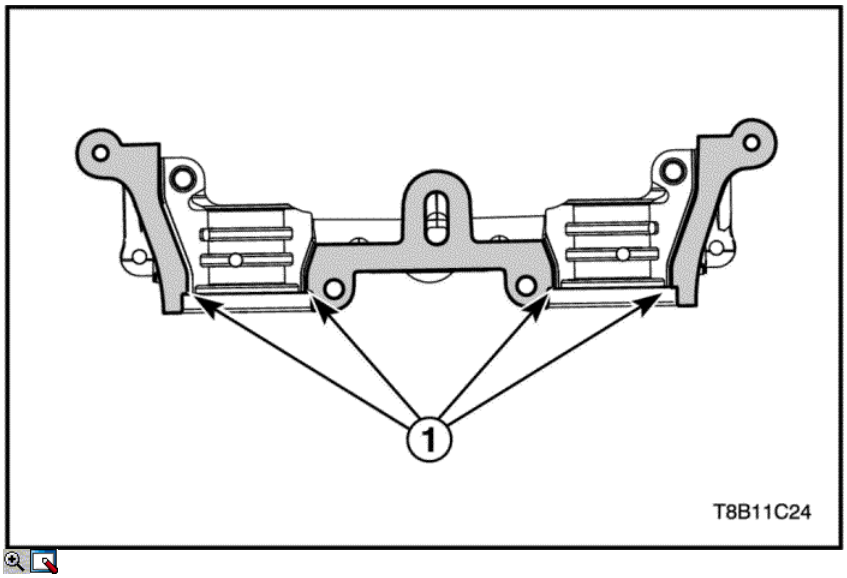


7. Remove the intake/exhaust camshafts with the seal rings.



Installation Procedure

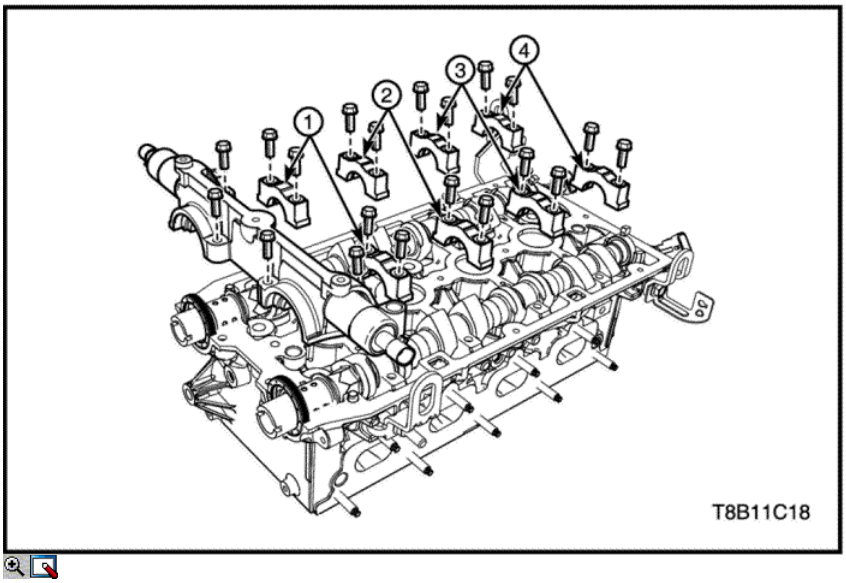
1. Coat/Lubricate the camshaft bearing and cam surfaces with clean engine oil.
2. Install the camshafts on the cylinder head.



Important : It is essential to ensure that no sealant is applied outside the marked sealing areas.

3. Apply surface sealant(LOCTITE 574) to sealing surfaces(1) of the 1st camshaft bearing cap thinly and evenly.

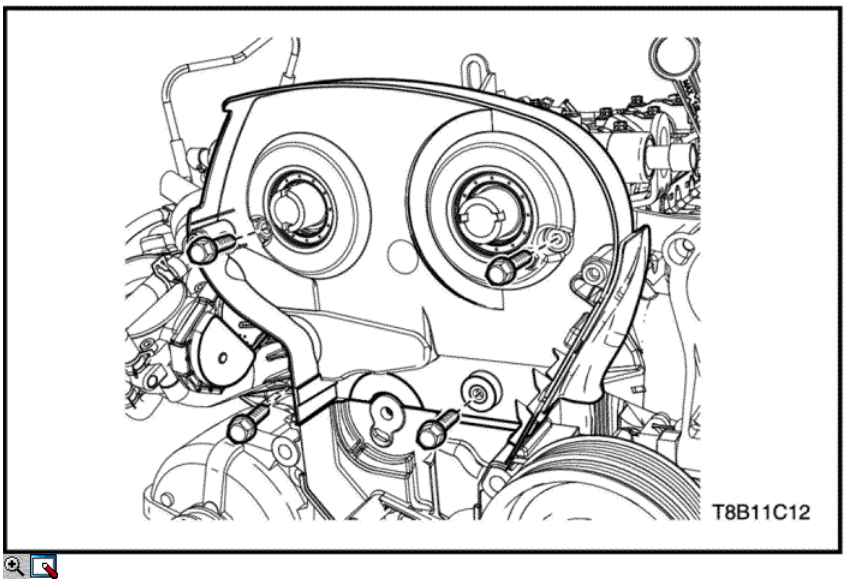
Notice : The grooves (1) adjacent to the sealing surfaces must remain free from sealant.



4. Install the camshaft bearing caps in this sequence (2)-(3)-(1)-(4).
5. Install the camshaft position solenoid valve housing.

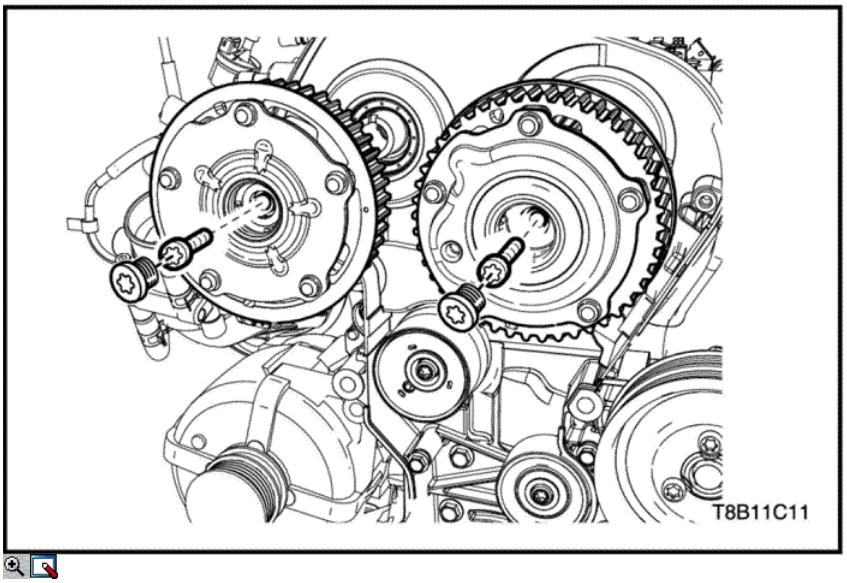
Tighten
Tighten the camshaft bearing cap bolts to 8 N•m (70.8 lb-in).

6. Install the new camshaft oil seal rings using by Installer(KM-422). Refer to "Camshaft Seal Ring" in this section.

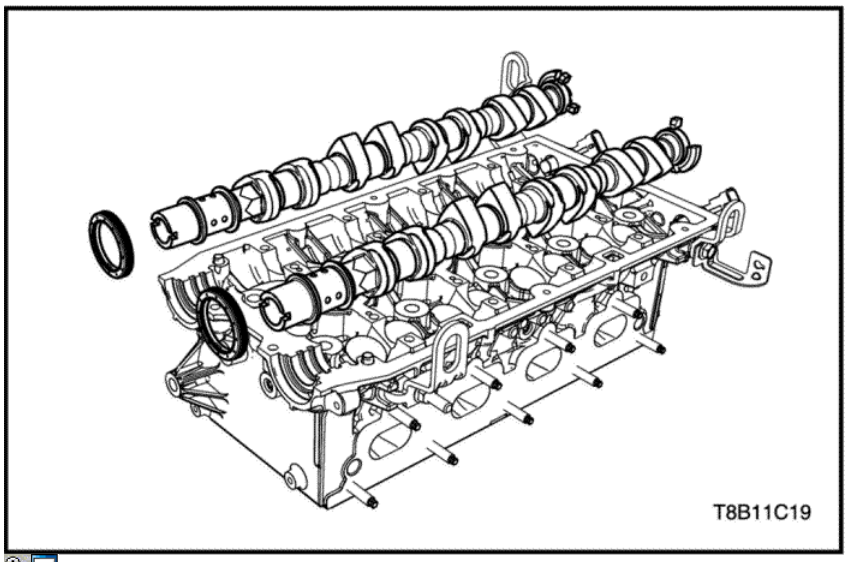


7. Install the timing belt rear cover.

Tighten
Tighten the timing belt rear cover bolts to 6 N•m (53.1 lb-in).



8. Install the timing belt tensioner. Refer to "Timing System" in this section.
9. Install the camshaft sprocket. Refer to "Camshaft Sprocket" in this section.



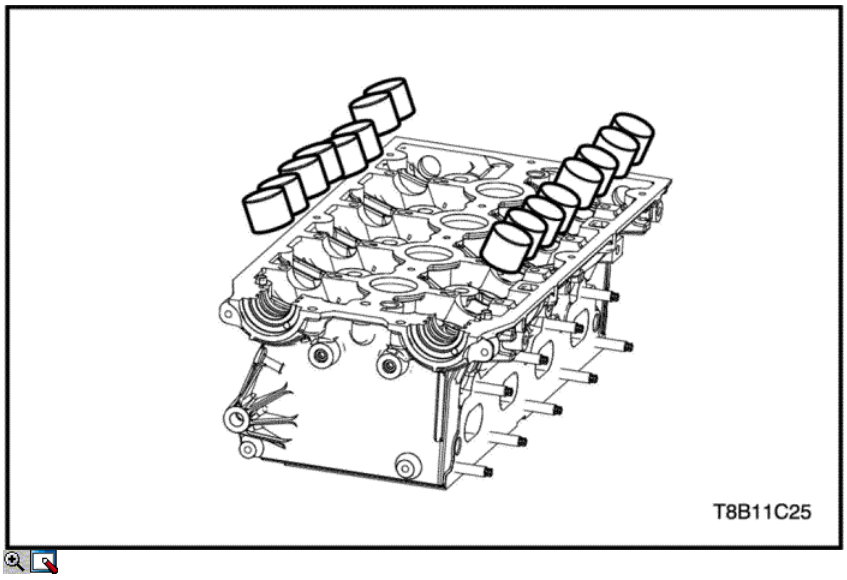
Valve Train - Cylinder Head Installed -

Tools Required

Universal Valve Spring Compressor EN-49074
Valve Spring Compressing Adapter EN-49155
Adapter-Cylinder Pressure EN-49154
Suction Device KM-845

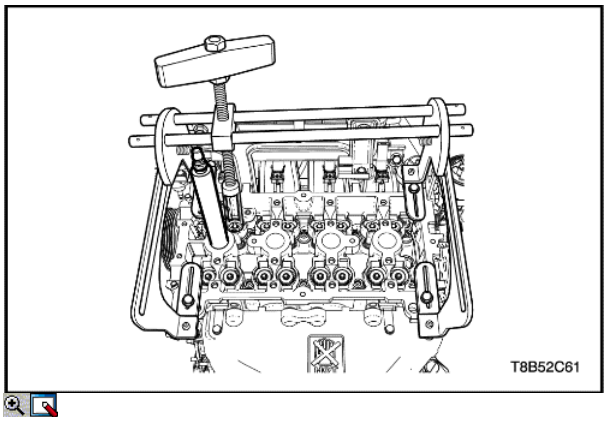
Removal Procedure

1. Remove the camshaft. Refer to "Camshaft" in this section.



Caution : Do not scratch on the valve tappet. And it must not be used by gloves or tools except special service tools.

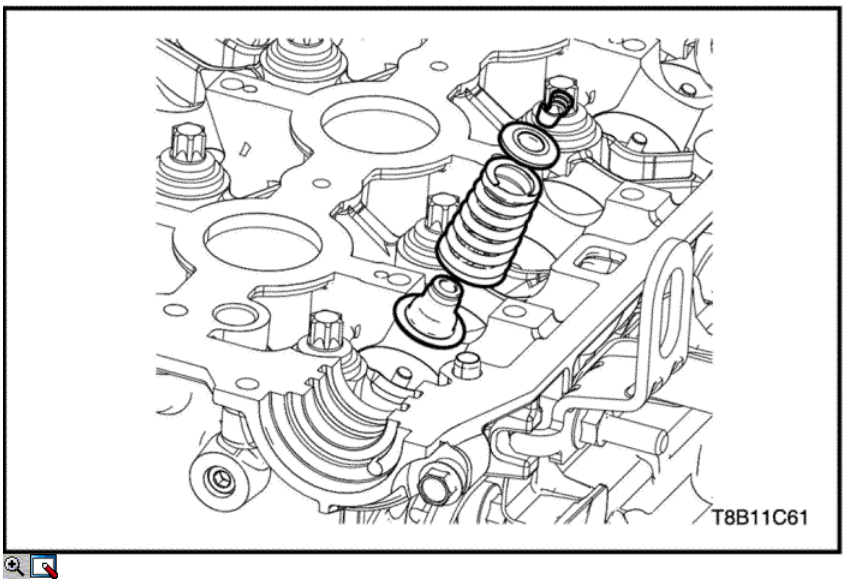
2. Remove the valve tappet using by suction device(KM-845).



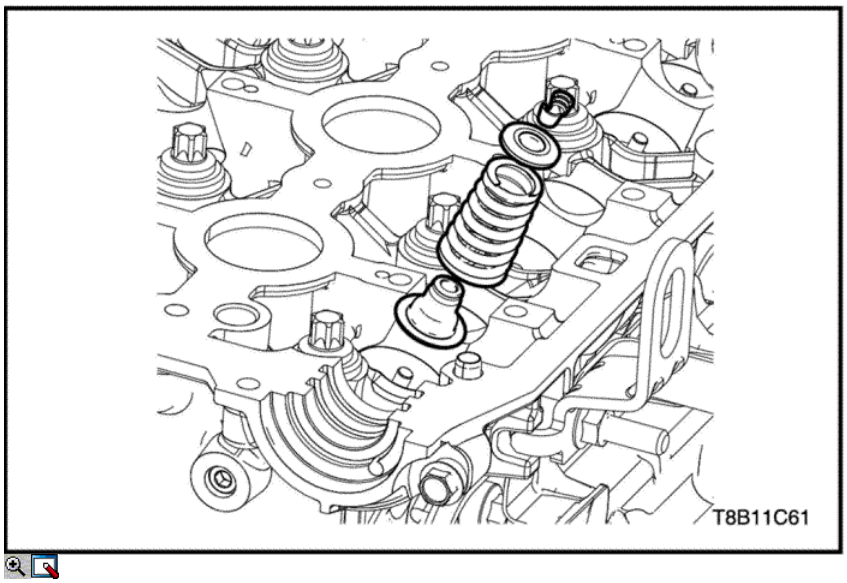
3. Remove the spark plugs and then install the cylinder pressure adapter(EN-49154).

   Caution : Don't stop this procedure until complete. If stop the applying the compressed air, cylinder head removal procedure should be accomplished.

4. Apply the compressed air to the adapter to avoid dropping of valves in the cylinders inside.
5. Install the universal valve spring compressor(EN–49074) and adapter(EN-49155).

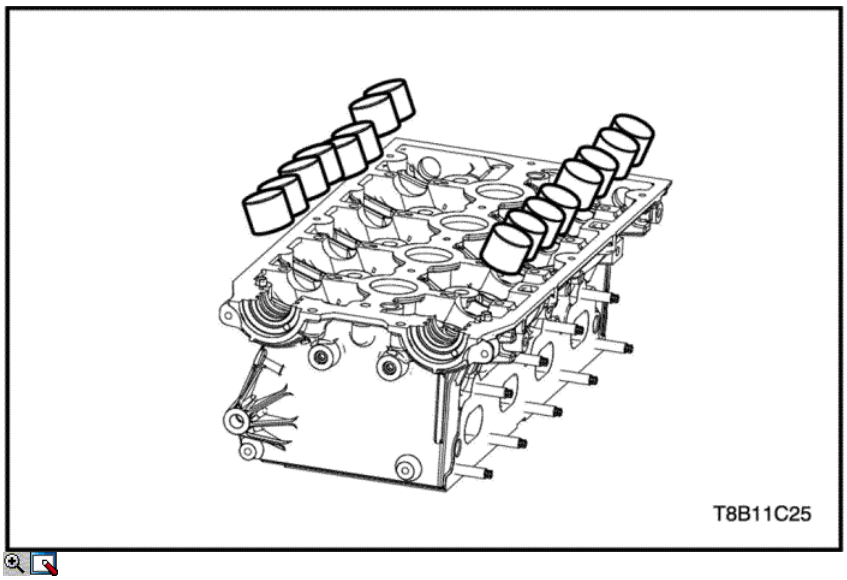


6. Remove the valve key.
7. Remove the valve springs, retainers, and seals.
8. Remove the universal valve spring compressor(EN–49074) and adapter(EN-49155).



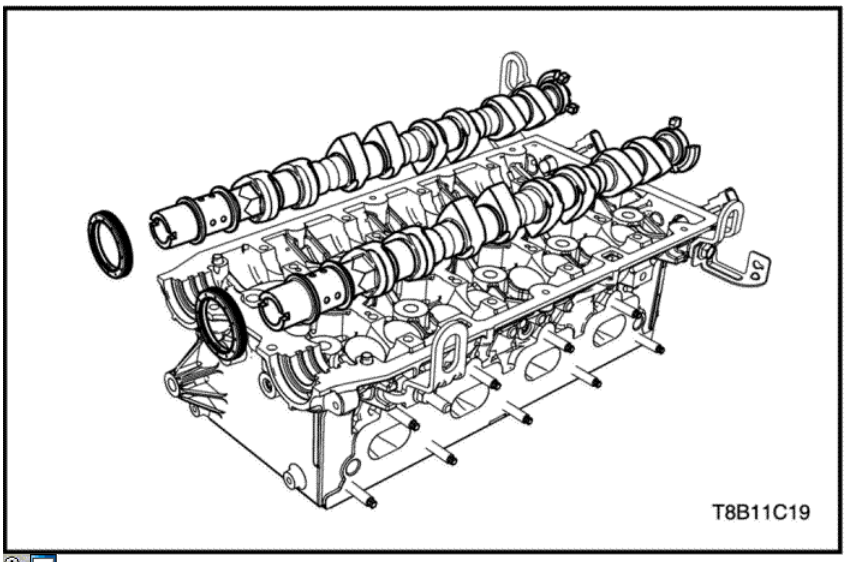
Installation Procedure

1. Install the seals, retainers, and valve springs.
2. Install the universal valve spring compressor(EN–49074) and adapter(EN-49155).
3. Install the valve key.
4. Install the valve spring, retainer, and seal.

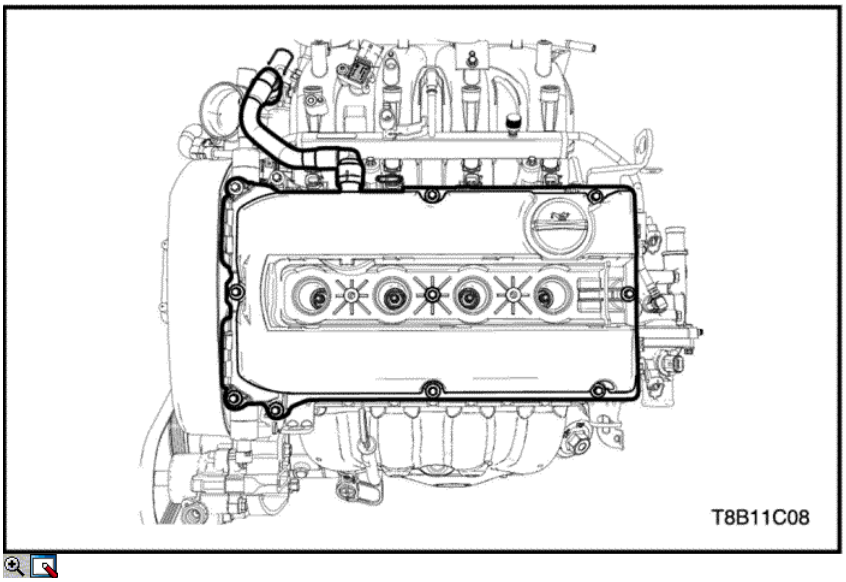


Caution : Do not scratch on the valve tappet. And it must not be used by gloves or tools except special service tools when remove and install.

5. Install the valve tappet using by suction device(KM-845).



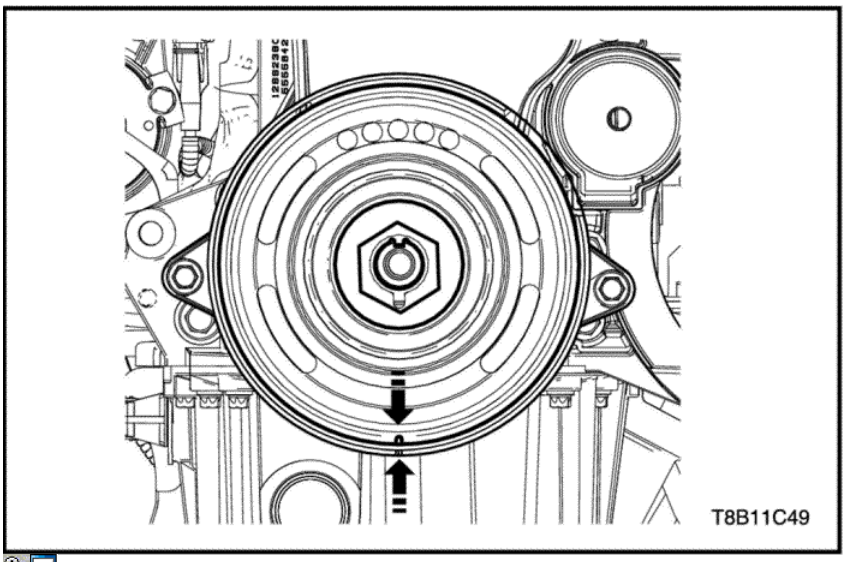
6. Install the camshaft. Refer to "Camshaft" in this section.



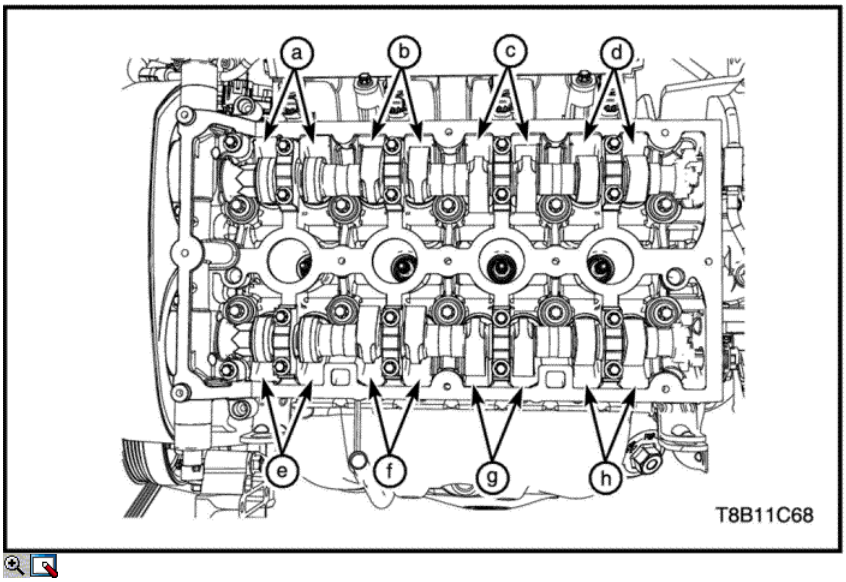
Valve Clearance

Measurement

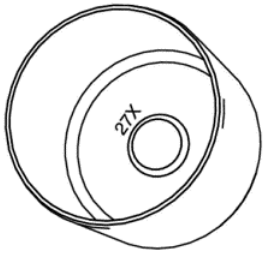
1. Remove the cylinder head cover. Refer to "Cylinder Head Cover" in this section.



2. Rotate the crankshaft pulley clockwise.
3. Align the notches between the pulley and the cover.



4. Measure the valve clearance (b) and (g). Rotate the crankshaft pulley clockwise through 180°.
5. Measure the valve clearance (c) and (f). Rotate the crankshaft pulley clockwise through 180°.
6. Measure the valve clearance (d) and (e). Rotate the crankshaft pulley clockwise through 180°.
7. Measure the valve clearance (a) and (h). Rotate the crankshaft pulley clockwise through 180°.
8. If the measured values are out-of-specifications, replace the new valve tappets.
   - Specifications:
   - Intake Side: 0.21-0.29mm (Nominal Value: 0.25mm)
   - Exhaust Side: 0.27-0.35mm (Nominal Value: 0.30mm)
9. Determine the tappet size. Refer to "Valve Clearance-Determine Tappet Size" in this section.
10. Replace the valve tappets if necessary. Refer to "Valve Train (Cylinder Head Installed)" in this section.



Determine Tappet Size

1. Remove the tappet of out-of-specifications.
2. Read ID number the tappet inside.
3. Find the value(a) the ID number as below table.
4. Calculate:
   Value(a)+Measured Value-Nominal Value = X
5. Find the ID number through Value X as below table.
   - Example(intake side)
   - ID number = no.20 = 3.20mm(in Table)
   - Measured Value = 0.31mm
   - Intake Nominal Value = 0.25mm
     3.20+0.31-0.25 = 3.265mm -> 27X(ID number) ->55353766(Parts Number)

.	Parts Number	ID Number	Values(a)
1	24465260	04	3.060 - 3.050
2	24465261	06	3.050 - 3.070
3	24438041	08	3.070 - 3.090
4	24438145	10	3.090 - 3.110
5	24438146	12	3.110 - 3.130
6	24438147	14	3.130 - 3.150
7	24438148	16	3.150 - 3.170
8	24438149	18	3.170 - 3.190
9	24438150	20	3.190 - 3.210
10	24438151	22	3.210 - 3.230
11	55353764	24X	3.230 - 3.244
12	55353765	25X	3.244 - 3.258
13	55353766	27X	3.258 - 3.272
14	55353767	28X	3.272 - 3.286
15	55353768	30X	3.286 - 3.300
16	55353769	31X	3.300 - 3.314
17	55353770	32X	3.314 - 3.328
18	55353771	34X	3.328 - 3.342
19	55353772	35X	3.342 - 3.356
20	55353773	36X	3.356 - 3.370
21	55353774	38X	3.370 - 3.384
22	55353775	39X	3.384 - 3.398
23	55353776	41X	3.398 - 3.412
24	55353777	42X	3.412 - 3.426
25	55353778	43X	3.426 - 3.440
26	55353779	45	3.440 - 3.460
27	55353780	47	3.460 - 3.480
28	55353781	49	3.480 - 3.500
29	55353782	51	3.500 - 3.520
30	55353783	53	3.520 - 3.540

.	Parts Number	ID Number	Values(a)
31	55353784	55	3.540 - 3.560
32	55353785	57	3.560 - 3.580
33	55353786	59	3.580 - 3.600