

Repair Manual for Brilliance V5

Overhaul of Engine

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



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Chapter I 4A92 Engine

Instructions

Maintenance steps

- (1) Get to know the installation status of parts according to the profile maps on the parts.
- (2) Use the number of parts to express the operation steps and indicate the parts that can not be used any more (use ) and tightening torque.

Distinguishing of maintenance guidelines

Standard values and the usage of special tools should be described in details as maintenance guidelines.

Marks of lubricating oil, sealant and adhesive

Indicate the positions where lubricating oil, sealant and adhesive are applied or replenished on the maps of parts and components

Disassembly steps: the numbers in the maps of parts and components correspond to the specific parts, indicating the disassembly steps.

Installation steps: installation steps should be indicated in case that the steps opposite against the disassembly steps are not allowed, but if it is allowed, the installation steps can be omitted.

Diagrams

<<A>>: means there are disassembly or dismantling guidelines.

>>A<<: means there are assembly or installation guidelines.



.....lubricating grease: refers to multi-use lubricating grease in case of no special description



.....sealant or adhesive



.....engine oil or gear lubricating oil

Overhaul of Engine—overview

Overview

Name of vehicles	Model	Model of engine	Displacement mL	Specification
Brilliance Jinbei	A series	4A92-U	1,590	Dual overhead camshaft, 16 air valves

General Specifications

Item	4A92-U	
Total displacement mL	1,590	
Bore diameter × stroke mm	75.0 × 90.0	
Compression ratio	10.5	
Combustion chamber	Lend-to roof	
Number of cylinders	4	
Number of air valves	Intake	8
	Exhaust	8
Air valve timing	Intake valves open	BTDC 31°-ATDC1 9°
	Intake valves close	ABDC 21°-ABDC 71°
	Exhaust valves open	BBDC 39°
	Exhaust valves close	ATDC 5°
Rocker	Not equipped	
Automatic slack adjuster	Not equipped	
Fuel injection system	Electronic-controlled multi-point fuel injection (MPI) system	
Ignition system	Electronic-controlled, 4-coil	
Generator	Generator (equipped with built-in IC adjuster)	
Starter	Directly driven	

Overhaul of Engine—maintenance specifications

Maintenance Specifications

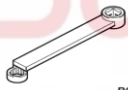
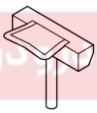
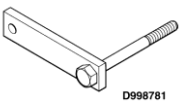
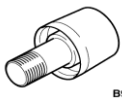

Item		Standard value	Operating limit value
Driving belt tension of generator and air conditioner (in inspection)	Vibration frequency Hz	140 - 171	-
	Tension N	392 - 588	-
	Deviation mm (for reference)	10.9 - 16.5	-
Driving belt tension of generator and air conditioner (in adjustment)	Vibration frequency Hz	148 - 164	-
	Tension N	441 - 539	-
	Deviation mm (for reference)	11.9 - 14.6	-
Driving belt tension of generator and air conditioner (in replacement)	Vibration frequency Hz	198 - 221	-
	Tension N	784 - 980	-
	Deviation mm (for reference)	6.3 - 7.6	-
Compression pressure (when the speed of engine is 300 r/min) kPa		1,550	Minimum 1,100
Difference of compression pressure of cylinders kPa		-	Maximum 98

Overhaul of Engine—sealing, special tool

Sealing

Item	Specification of sealant	Remarks
Timing chain tensioner cover	LOCTITE 5971 or equivalent	Semi-dry sealant
Valve cover disassembly		
Oil pan of engine		
Installation of rear oil seal of crank shaft		
Flywheel bolt	LOCTITE 2701 or equivalent	

Special Tools

Tool	Parts No.	Name	Application
	MB991992	Joint of torque wrench	Disassembly and installation of V.V.T., installation bolt of chain wheel component
	MD998727	Oil pan remover	Disassembly of oil pan of engine
	MD998781	Flywheel stopper	Fixed flywheel component
	MB991993	Front oil seal conduit of crank shaft	Installation of front oil seal conduit of crank shaft
	MB990699	Installer of oil seal of crank shaft	

Overhaul of Engine—inspection and adjustment of driving belt tension

Inspection of Driving Belt Tension of Generator and Air Conditioner

Inspect driving belt tension according to the following steps.

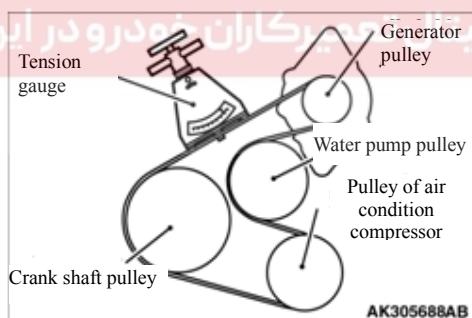
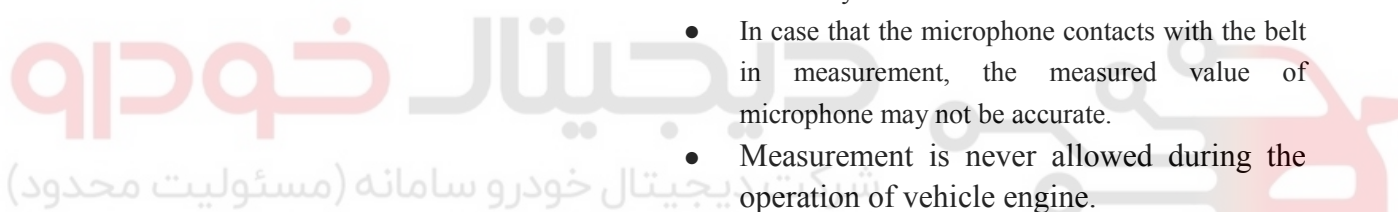
Standard value:

Vibration frequency Hz	140 - 171
Tension N	392 - 588
Deviation mm (for reference)	10.9 - 16.5

- The surface temperature of belt should be close to normal temperature as far as possible
- No water or engine oil (pollutant) is allowed on microphone.
- If strong wind blows over the microphone or there is any noise near the microphone, the measured value may deviate from actual value.

Notice

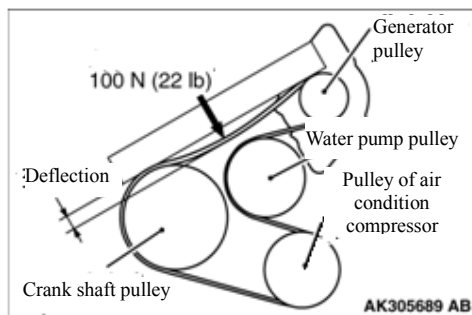
- In case that the microphone contacts with the belt in measurement, the measured value of microphone may not be accurate.
- Measurement is never allowed during the operation of vehicle engine.



<Use of Tension Gauge>

Use a belt tension gauge to determine whether belt tension lies in the range of standard values.

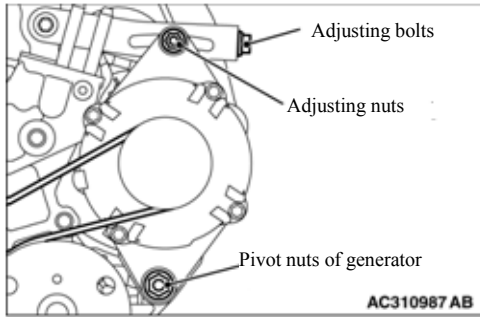
Remarks	Disassemble oil rule conduit before inspection.
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<Belt Deviation Inspection>

Impose about 100 N force (on the position indicated by the arrow) in the middle of belt to determine whether the deviated value is within the standard range.

Overhaul of Engine—inspection and adjustment of driving belt tension



Adjustment of Driving Belt Tension of Generator and Air Conditioner

1. Loosen the nuts on the pivot bolt of engine.
2. Loosen the adjusting nut of engine.
3. Use adjusting bolt to adjust deviation between the belt tension and tension to standard value.

Standard value:

Item	Adjustment	Replacement
Vibration frequency Hz	148 - 164	198 - 221
Tension N	441 - 539	784 - 980
Deviation mm (for reference)	11.9 - 14.6	6.3 - 7.6

4. Tighten the nuts on the pivot bolt of engine.

Tightening torque: 39.5 ± 4 N m

5. Tighten the adjusting nut of engine.

Tightening torque: 20 ± 2 N m

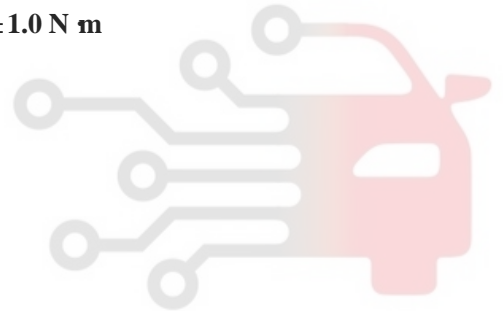
6. Tighten the adjusting bolt.

Tightening torque: 5.0 ± 1.0 N m

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Inspection and Adjustment of Valve Clearance

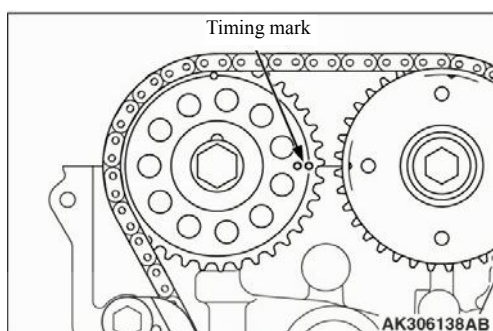
Remarks

Inspect and adjust valve clearance in the cooling state of engine.

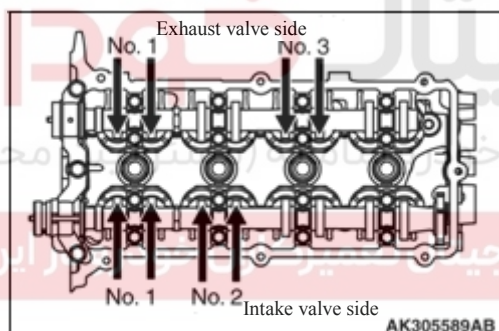
1. Remove all ignition coil
2. Remove valve cover.

Notice

Rotate the crank shaft clockwise.



3. Rotate the crank shaft clockwise and align it with the timing mark on the chain wheel of exhaust cam shaft opposite against the cylinder cover (as shown in the drawing). At this time, No.1 cylinder moves to upper dead center of the compression travel.

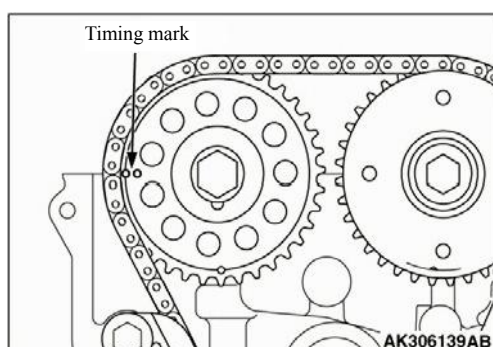


4. Use thickness gauge to measure the valve clearance indicated by the arrow in the drawing. Record the valve clearance if it fails to comply with the specification.

Standard value:

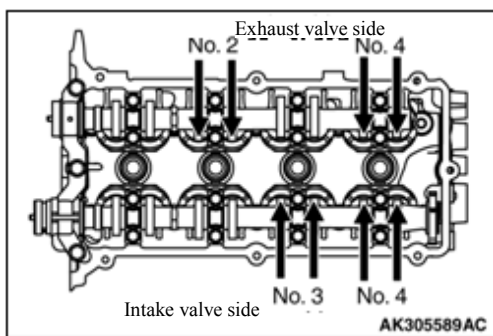
Intake valve 0.22 ± 0.04 mm

Exhaust valve 0.30 ± 0.04 mm

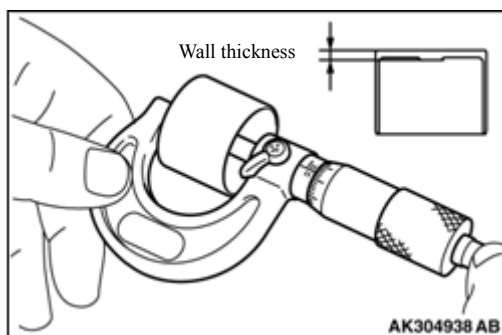


5. Rotate the crank shaft 360° clockwise and place the timing mark on the position indicated in the drawing. At this time, No.4 cylinder moves to the upper dead center of the compression stroke.

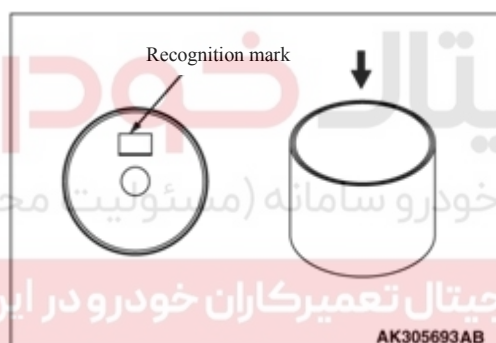
Overhaul of Engine—Inspection and Adjustment of Valve Clearance



6. Inspect the valve clearance indicated by the arrow according to step 4.
7. Remove camshaft and valve lifter if the valve clearance fails to comply with the specification.



8. Use a micrometer to measure the thickness of the removed valve lifter.



9. Calculate the thickness of the valve lifter newly assembled through the following equation.

A: Thickness of the valve lifter newly assembled

B: Thickness of the valve lifter removed.

C: Measured valve clearance

Equation

Intake valve: $A = B + (C - 0.22 \text{ mm})$

Exhaust valve: $A = B + (C - 0.30 \text{ mm})$

Remarks

The thickness of valve lifter lies in the range of 2.70 - 3.30 mm and the difference among different models (31) is 0.02 mm. The thickness of decimal-point section should be printed on the back of valve lifter. For example, when the thickness is 2.90 mm, print "90" on the back.

10. Select valve lifter to be assembled and place it on the position of camshaft as per step 9.
11. Clean away the residual liquid sealant on the valve cover, timing chain case and the forepart of cylinder.
- 12.

Notice

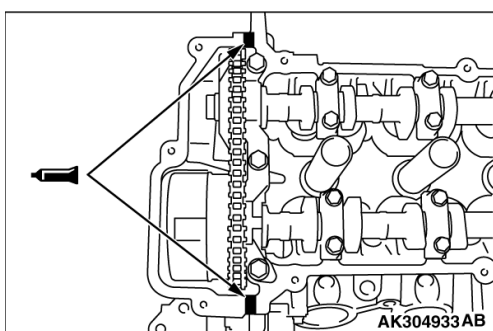
Timing chain should be assembled within 3 min after liquid sealant is used.

Use 4 mm-continuous beaded liquid sealant as the drawing shows.

Specification of sealant: LOCTITE 5971 or equivalent.

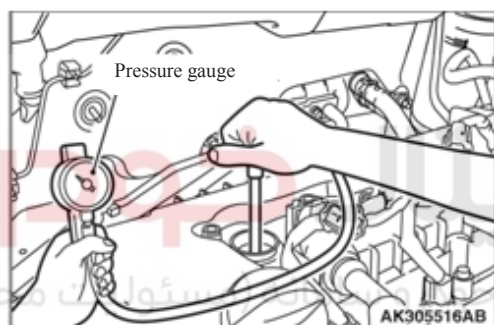
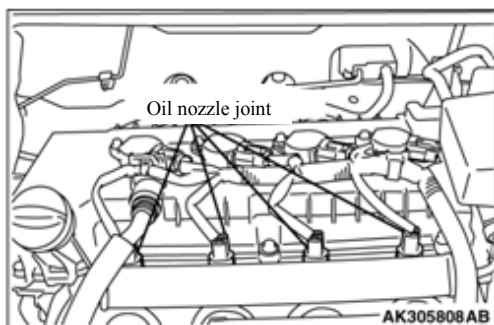
13. Install and tighten the valve cover to $9.0 \pm 1.0 \text{ Nm}$

14. Install ignition coil.



Overhaul of Engine—Compression Pressure Inspection

Compression Pressure Inspection



1. Set the vehicle to pre-inspection state before the inspection.
2. Remove all ignition coils and spark plug.
3. Remove all oil nozzle joint.

Notice

- The joint should be kept away from the spark plug bore in rocking-turn.
- When water, engine oil or fuel are used to measure the compression amount incurred by the rocking-turn of cylinder, they will be heated and erupted from the spark plug, which is very dangerous.

4. Cover the spark bore with a towel or the like. Inspect whether there is any foreign matter stuck to the towel after the rocking-turn of engine.
5. Place the compression pressure gauge on the spark plug bore.
6. Rotate the engine and measure compression pressure when the air damper is completely opened.

Standard value (engine speed 300 r/min): 1,550 kPa

Limit value (engine speed 300 r/min): 1,100 kPa

7. Measure the compression pressure of cylinder and inspect whether the pressure difference of the cylinder is lower than the limit value.

Limit value: maximum value 98 kPa

8. In case that the compression pressure or compression pressure differences of an cylinder exceeds limit value, drop a little engine oil via the spark plug and then repeat the step 5 to step 7.

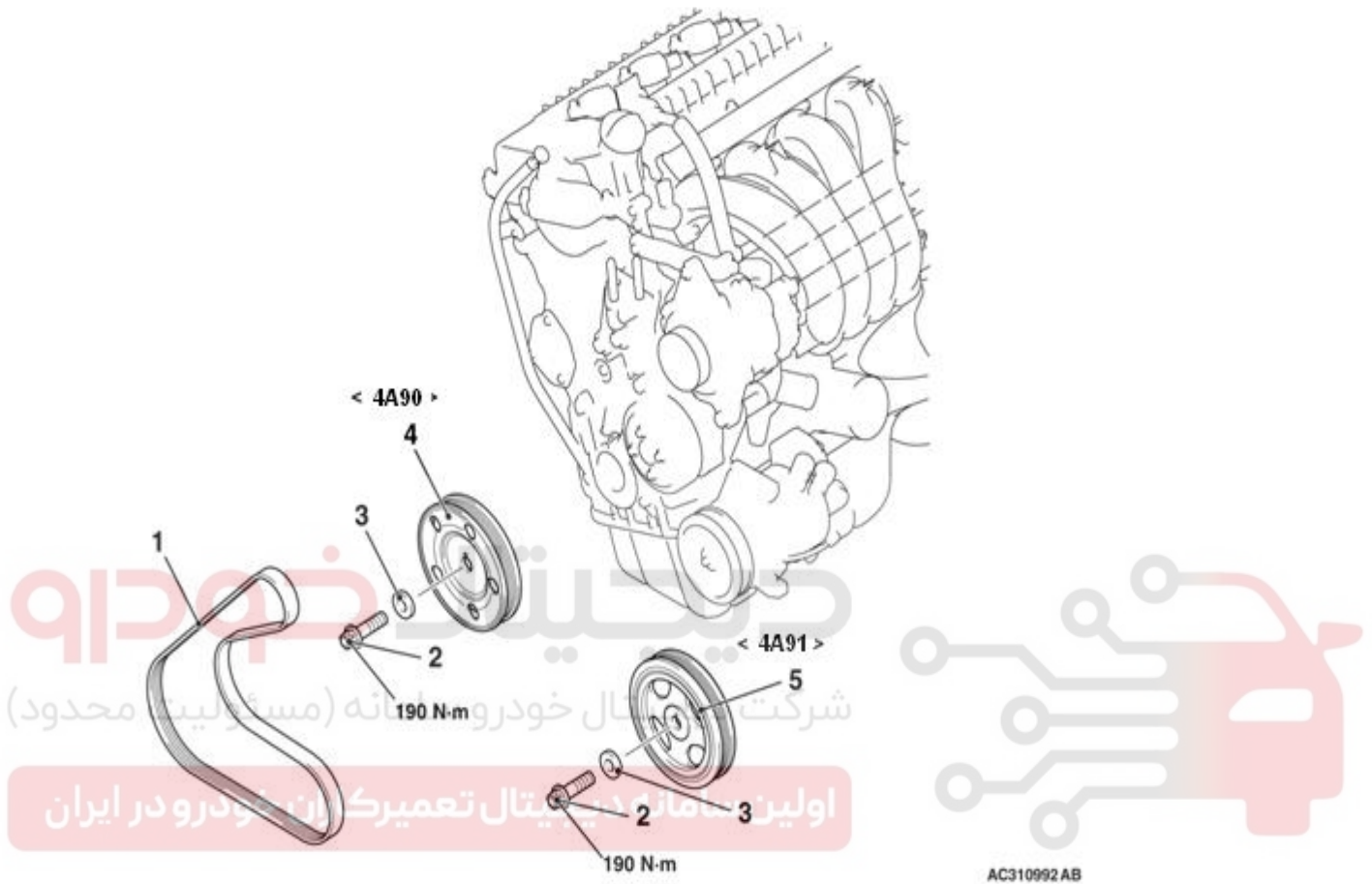
- (1) If the compression pressure rises after the addition of engine oil, the failure is caused by piston ring or internal surface abrasion or damage of cylinder.
- (2) If the compression pressure does not rise after the addition of engine oil, it is indicated that the valve seat is burnt out or is in bad condition or the pressure is leaked from the gasket.

9. Connect position sensor joint of crank shaft.
10. Install ignition coil and spark plug.
11. Use scanning tool to clean diagnostic trouble code.

Remarks

Disconnected oil nozzle joints will generate diagnostic trouble code.

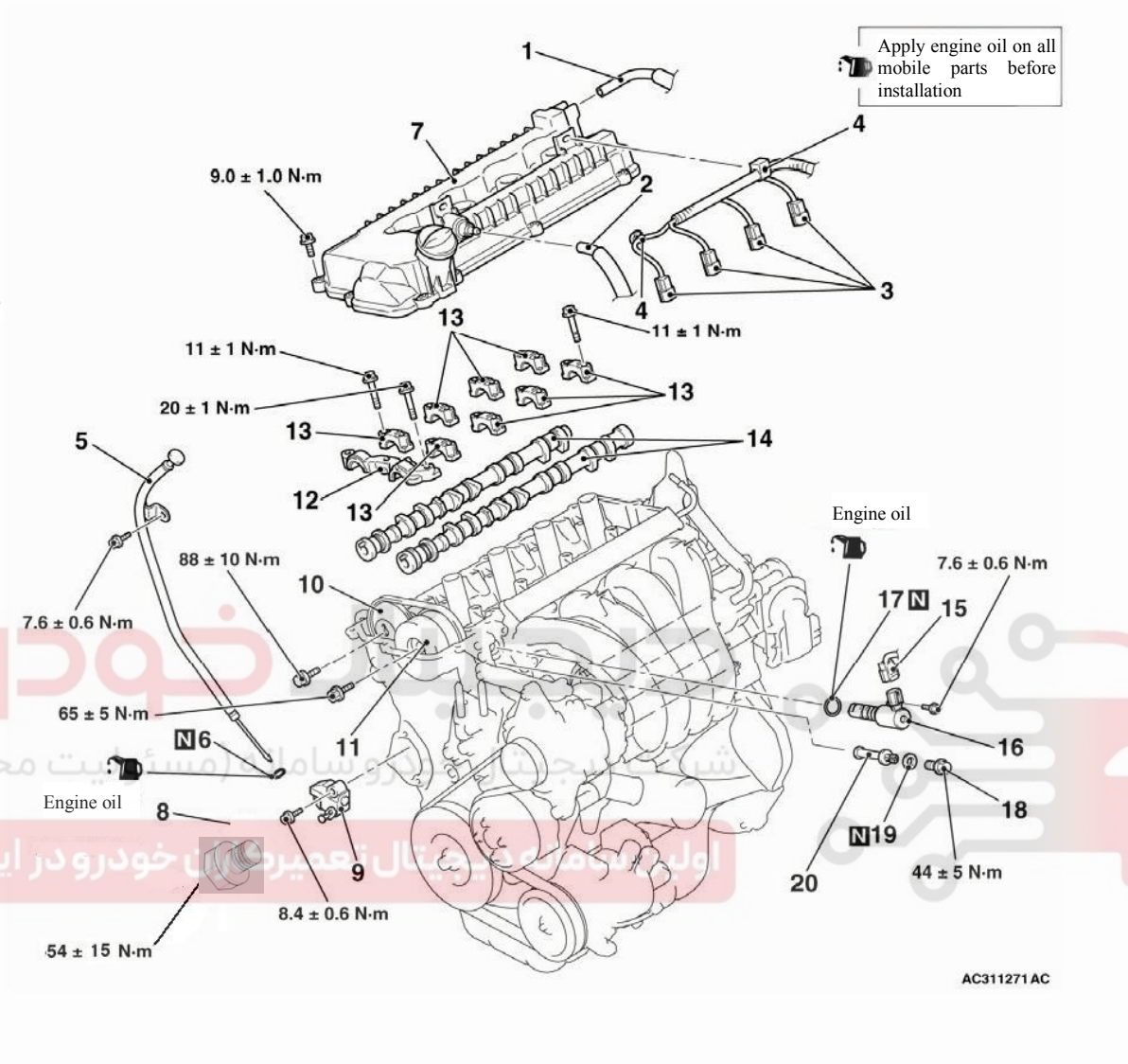
Disassembly and Installation of Crank Shaft Pulley



Disassembly steps			
<<A>>		1.	Driving belt
<>	>>A<<	2.	Bolt of crank shaft pulley
	>>A<<	3.	Washer of crank shaft pulley
	>>A<<	4.	Crank shaft pulley <4A90U>
	>>A<<	5.	Damping pulley of crank shaft <4A91/92U>

Overhaul of Engine—Disassembly and Installation of Crank Shaft Pulley

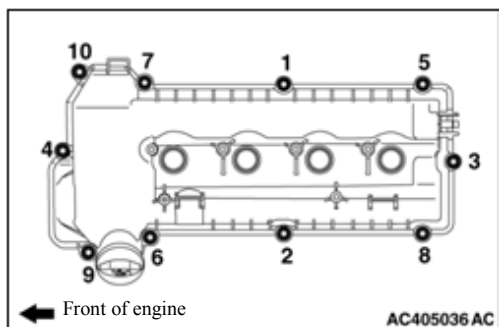
Disassembly and Installation of Camshaft



Overhaul of Engine—Disassembly and Installation of Crank Shaft Pulley

			Disassembly steps of camshaft
		·	Air cleaner and intake hose
		·	Ignition coil
		1.	Venting hose
		2.	PCV hose
		3.	Oil nozzle joint
		4.	Control harness lathedog
		5.	Assembly of oil rule and conduit
		6.	O-ring
<<A>>	>>E<<	7.	Assembly of valve cover
			Valve clearance adjustment <only refers to installation)
	>>D<<	8.	Timing chain tensioner screw
		9.	Timing chain tensioner
<>	>>C<<	10.	Chain wheel of camshaft
<>	>>C<<	11.	V.V.T. chain wheel assembly
<>	>>C<<	12.	Front bearing cover of camshaft
<>	>>C<<	13.	Bearing cover of camshaft
<>	>>C<<	14.	Camshaft
			Disassembly step of oil control valve
		15.	Oil control valve joint
<<C>>	>>B<<	16.	Oil control valve
	>>B<<	17.	O-ring
		18.	Bolt on cleaner of oil control valve
		19.	Seal ring
<<C>>	>>A<<	20.	Cleaner of oil control valve

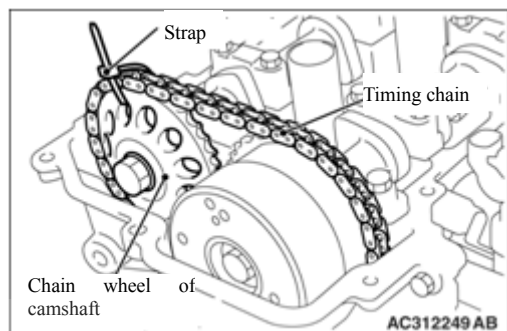
Overhaul of Engine—Disassembly and Installation of Crank Shaft Pulley



Key points of disassembly and maintenance

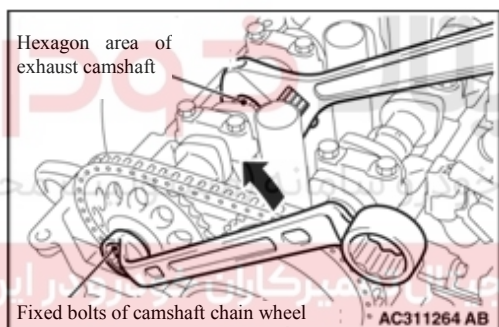
<<A>> Disassembly of valve cover assembly

Unscrew the fixed bolt of the valve cover assembly according to the sequence in the drawing.

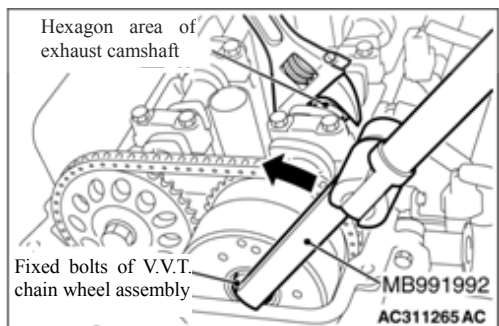


<> Disassembly of camshaft chain wheel/ V.V.T. chain wheel assembly/ front bearing cover of camshaft/ bearing cover of camshaft/ camshaft

1. Fix camshaft chain wheel or timing chain with lathedog or similar tool.

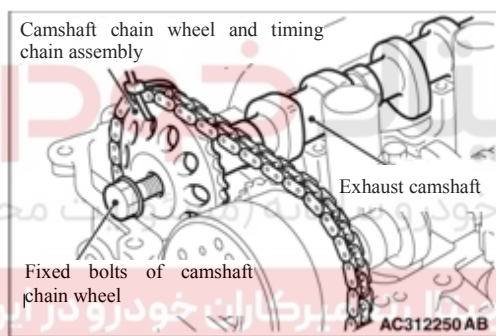
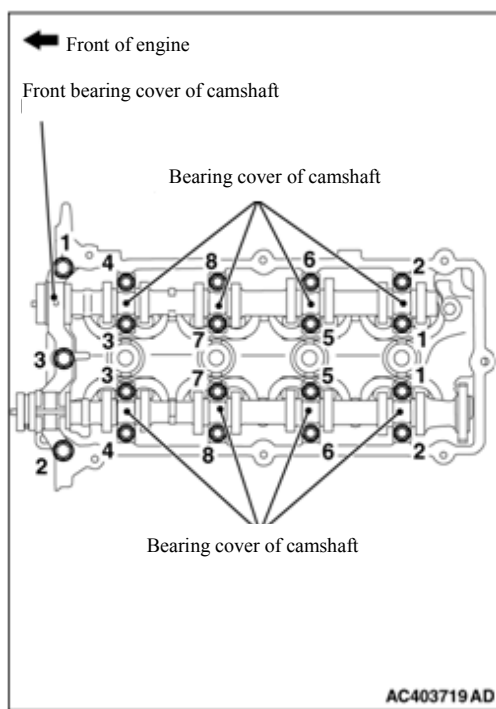


2. Fix hexagon area of exhaust camshaft with wrench or similar tools and unscrew fixed bolt of camshaft chain wheel



3. Fix hexagon area of exhaust camshaft with wrench or similar tools and unscrew the fixed bolt of V.V.T. chain wheel assembly with special tool—torque wrench joint (MB991992).

Overhaul of Engine—Disassembly and Installation of Crank Shaft Pulley



4. Unscrew fixed bolt of front bearing cover of camshaft and then loosen fixed bolts of front bearing cover of camshaft one by one according to the order in the drawing. Remove the front bearing cover of camshaft and the bearing covers of each camshaft.

5.

Notice	Never rotate crank shaft when removing the camshaft chain wheel assembly with timing chain.
---------------	---

Raise the exhaust camshaft with camshaft chain wheel and timing chain on the cylinder slightly, remove the fixed bolts of camshaft chain wheel and remove the camshaft chain wheel and timing chain assembly from the exhaust camshaft.

6. Remove the V.V.T. chain wheel assembly and timing chain assembly on the exhaust camshaft, as the step 5 shows.

7.

Notice	Remove the camshaft chain wheel and V.V.T. chain wheel assembly (with timing chain) on the camshaft. Never misplace the camshaft chain wheel, V.V.T. chain wheel assembly and timing chain.
---------------	---

Place the camshaft chain wheel and timing chain assembly, V.V.T. chain wheel assembly and timing chain assembly on the assembly of timing chain case after disassembly.

<<C>> Disassembly of engine oil control valve/ cleaner of engine oil control valve

Notice	Prevent dust or other matter entering the engine oil circuit of cylinder cover after removing the engine oil control valve and the cleaner of engine oil control valve.
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Key points of installation and maintenance

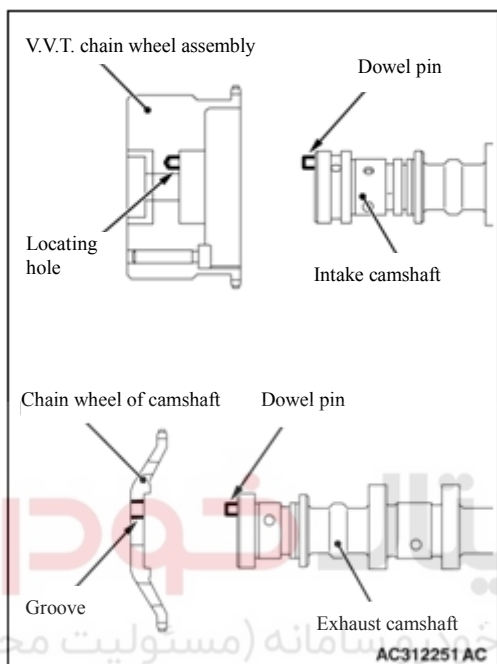
>>A<< Installation of cleaner of engine oil control valve

Notice	Avoid foreign matters from sticking to the cleaner and avoid the damage / transformation of cleaner when installing the cleaner of engine oil control valve.
---------------	--

>>B<< Installation of O-ring/ engine oil control valve

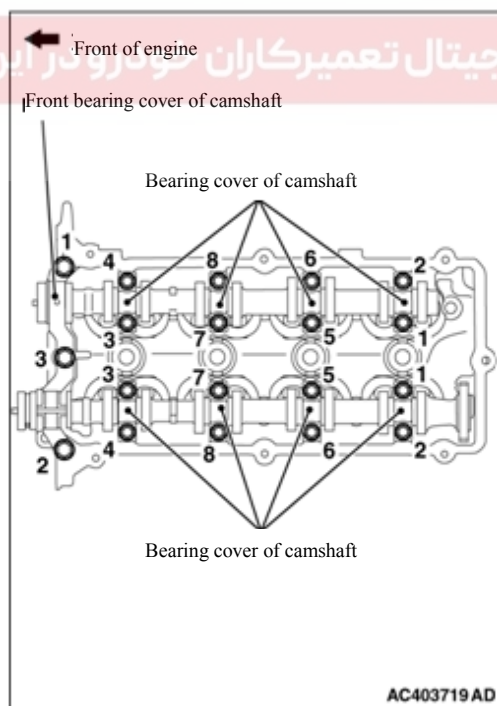
Overhaul of Engine—Disassembly and Installation of Crank Shaft Pulley

1. Cover the engine oil sump of oil control valve with paperboard.
2. Apply engine oil to the O-ring and install the ring onto the engine oil control valve. Don't damage O-ring.
3. Apply engine oil to the O-ring and install the engine oil control valve onto the cylinder cover. Don't damage O-ring.



>>C<< Installation of camshaft/ bearing cover of camshaft/ front bearing cover of camshaft/ V.V.T. chain wheel assembly / camshaft chain wheel

1. Raise the V.V.T. chain wheel assembly and timing chain assembly of camshaft chain wheel. After that, align the dowel pin of admission camshaft with the bore on the V.V.T. chain wheel assembly, fit the admission camshaft and V.V.T. chain wheel assembly together and tighten fixed bolts temporarily.
2. Raise the chain wheel, V.V.T. chain wheel assembly and timing chain assembly of camshaft. And then align dowel pin on exhaust camshaft with the groove of the camshaft chain wheel, fit exhaust camshaft and camshaft chain wheel. Tighten fixed bolts temporarily.
3. Place the admission camshaft and exhaust camshaft on the installation place of cylinder cover.
4. Tighten the bolts on the bearing cover of each camshaft to standard torque and then tighten the fixed bolts on the front bearing cover of camshaft.



Tightening torque:

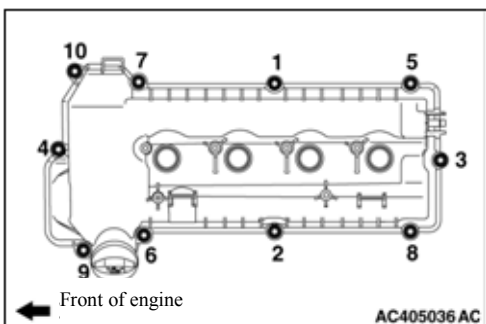
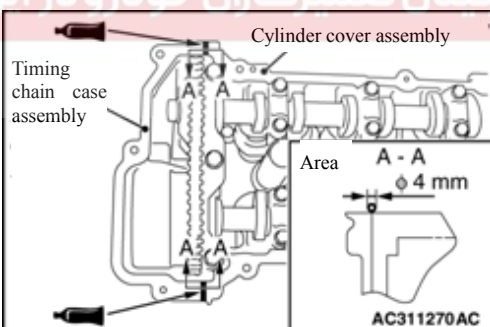
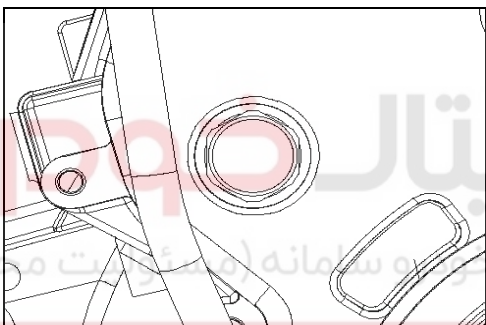
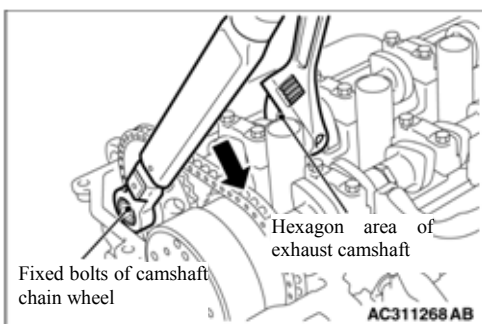
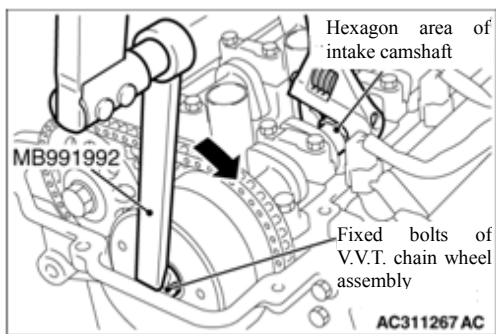
11 ± 1 N m

(Fixed bolts of bearing cover of camshaft)

20 ± 1 N m

(Fixed bolts of front bearing cover of camshaft)

Overhaul of Engine—Disassembly and Installation of Crank Shaft Pulley



5. Fix hexagon area of exhaust camshaft with wrench or similar tools and tighten the fixed bolts of V.V.T. chain wheel assembly to standard torque with special tool, torque wrench joint. Calculate the tightening torque as per the following formula for fixed bolts of V.V.T. chain wheel assembly are tightened with special tool (MB991992).

Tightening torque: $(65 \pm 5) \times \{L \div (L + 150)\} \text{ N m}$

65 ± 5: V.V.T. tightening torque of fixed bolts of chain wheel assembly (Unit: N m)

L: distance between the center of a torque wrench and the center of its handle (Unit: mm)

150: length of special tool (Unit: mm)

6. Fix the hexagon area of exhaust camshaft with wrench or similar too and tighten the fixed bolts of camshaft to standard torque.

Tightening torque: 88 ± 10 N m

>>D<< Installation of timing chain tensioner screw

Apply standard sealant on the screw

Install timing chain tensioner screw onto the timing chain case assembly

Tighten it to standard torque.

Tightening torque: 54 ± 15 N m

>>E<< Installation of Valve Cover

Assembly

1. Remove sealant from the marked area of valve cover, valve cover assembly and timing chain case assembly.
2. Apply standard sealant on the marked area of valve cover assembly and timing chain case assembly and then install the valve cover assembly onto the cylinder cover assembly within 3 min.

Specification of sealant: LOCTITE 5971 or accurate equivalent.

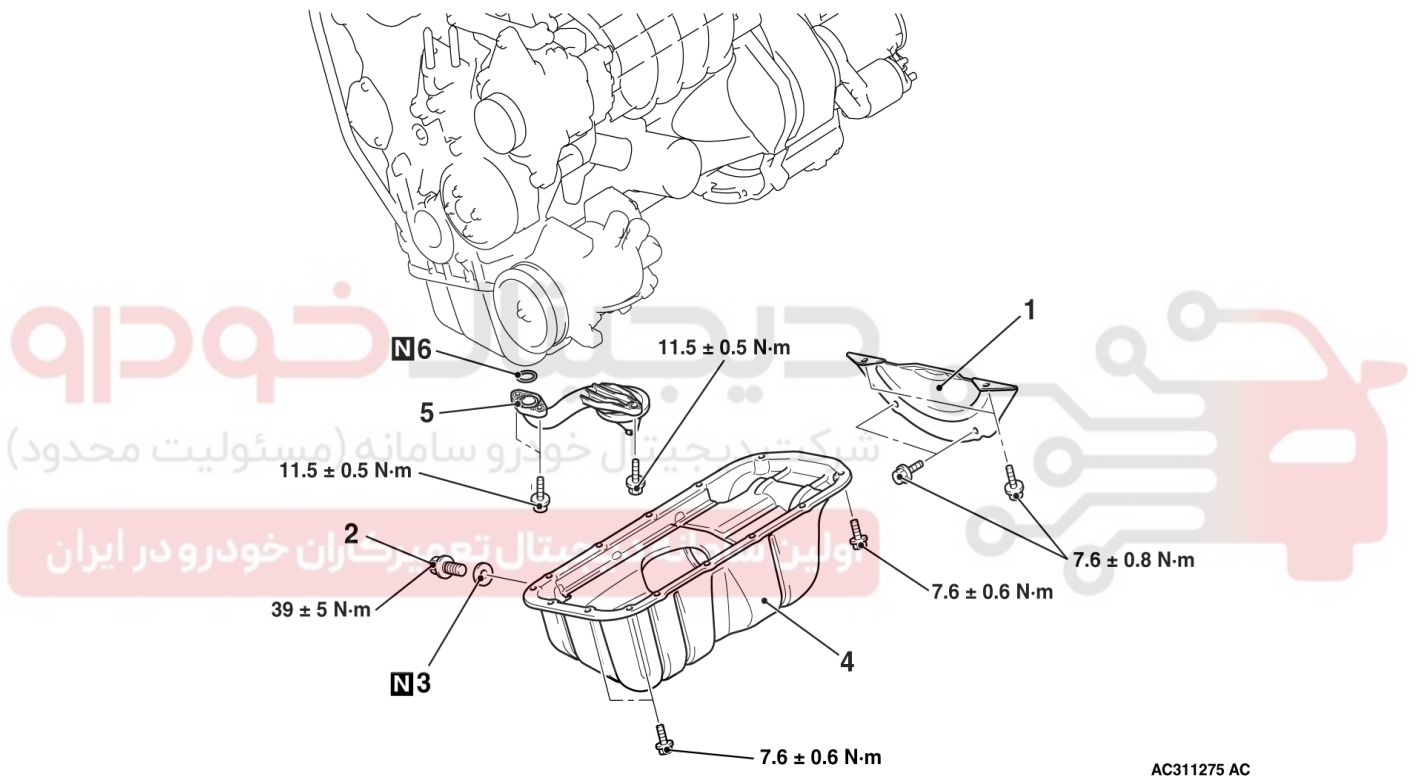
3. Tighten fixed bolts of valve cover assembly to standard torque according to the order in the drawing.

Standard torque: 9.0 ± 1.0 N m

Overhaul of Engine — Disassembly and Installation of Oil Pan

Disassembly and Installation of Oil Pan

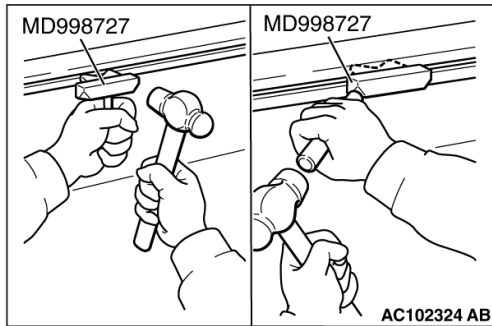
Before disassembly	After installation
<ul style="list-style-type: none"> • Drain engine oil • Disassemble damping pulley of crank shaft 	<ul style="list-style-type: none"> • Install damping pulley of crank shaft • Re-inject engine oil



AC311275 AC

Disassembly steps		
		Engine oil gauge
	1.	Bell-shaped shell cover
	2.	Oil drainer of oil pan
	3.	Oil drainer gasket of oil pan
<<A>>	>>B<<	4. Oil pan
	>>A<<	5. Oil filter
	>>A<<	6. O-ring

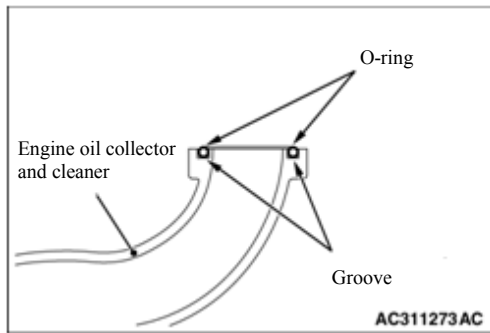
Overhaul of Engine — Disassembly and Installation of Oil Pan



Key points of disassembly and maintenance

<<A>> Disassembly of oil pan

1. Disassemble the fixed bolts of oil pan.
2. Remove the oil pan with special tool, remover of oil pan (MD998727).



Key points of installation and maintenance

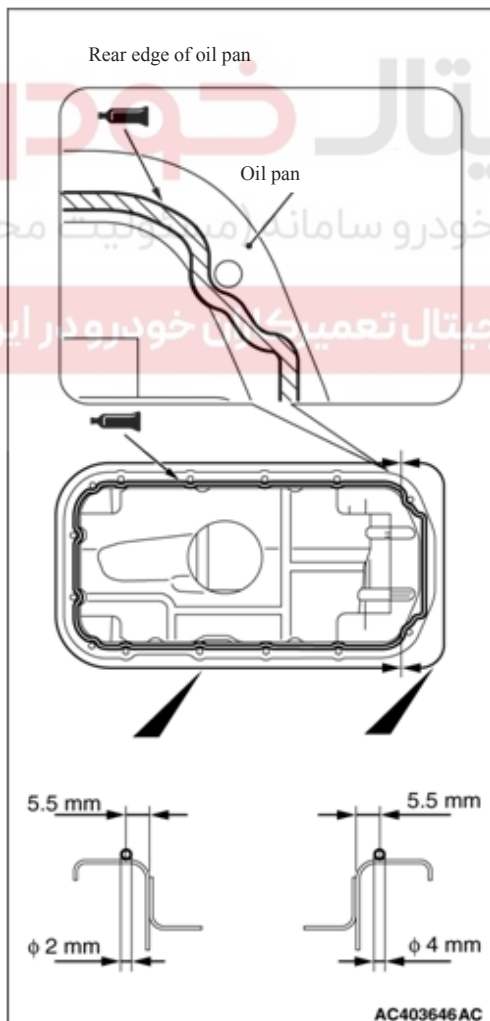
>>A<< Installation of O-ring/ engine oil collector and cleaner

Confirm O-ring is safely fixed in the groove of engine oil collector and cleaner without any twist or damage and then install it on the engine oil collector and cleaner.

>>B<< Installation of oil pan

1. Remove sealant from the oil pan and cylinder block surface.
- 2.

Notice Engine oil may leak from the both ends of the oil pan of engine, thus standard sealant should be applied, as the drawing shows.



Apply continuous beaded standard sealant on the flange of oil pan and then install the oil pan on the cylinder block within 3 min.

Specification of sealant: LOCTITE 5971 or equivalent.

- 3.

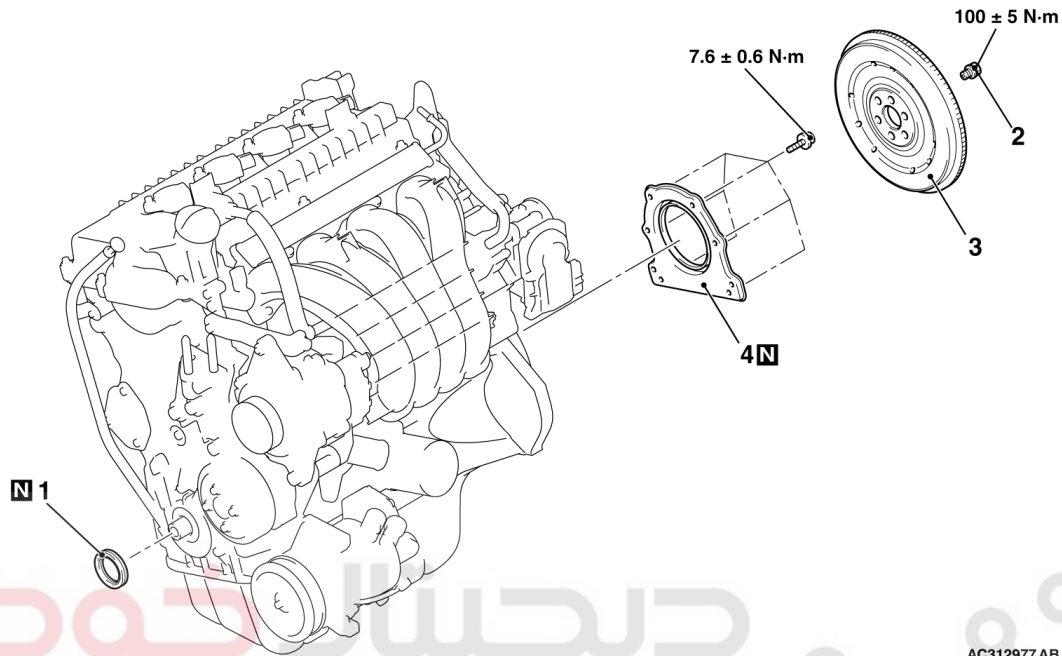
Notice The engine should not be started and engine oil or cooling liquid should be contact with the surface within at least one hour.

Tighten fixed bolts of oil pan to standard torque.

Tightening torque: 7.6 ±0.6 N m

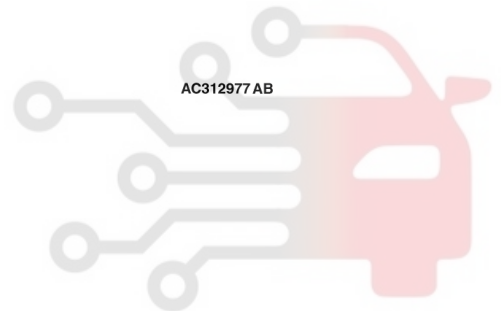
Overhaul of Engine—Disassembly and Installation of Oil Seal of Crank Shaft

Disassembly and Installation of Oil Seal of Crank Shaft



شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

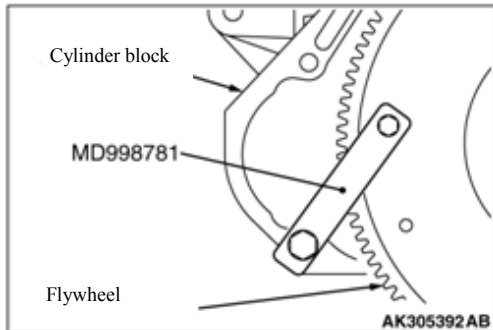


			Disassembly steps of front oil seal of crank shaft
		·	Damping pulley of crank shaft
	>>C<<	1.	Front oil seal of crank shaft
			Disassembly steps of rear oil seal of crank shaft
		·	Clutch cover and disk
		·	Oil pan
<<A>>	>>B<<	2.	Flywheel bolt
	>>B<<	3.	Flywheel assembly
	>>A<<	4.	Assembly of rear oil seal housing of crank shaft

Overhaul of Engine—Disassembly and Installation of Oil Seal of Crank Shaft

Key points of disassembly and maintenance

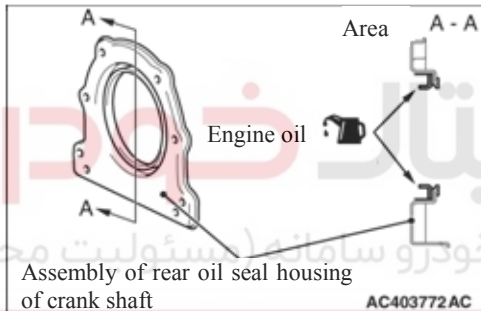
<<A>> Disassembly of flywheel bolt



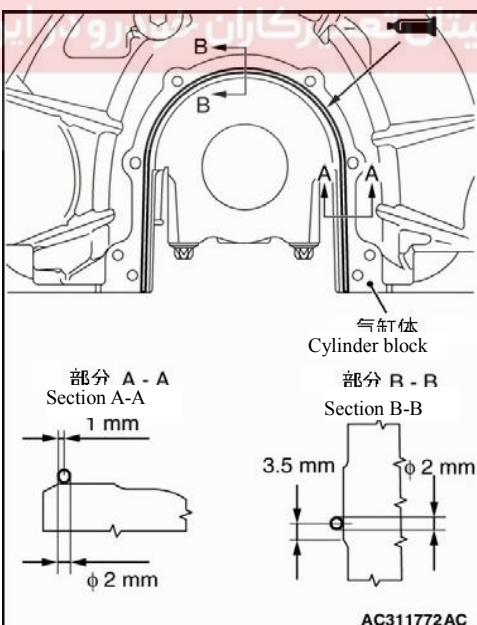
1. Fix the flywheel assembly with special tool – flywheel stopper (MD998781)
2. Remove the flywheel bolts.

Key points of installation and maintenance

>>A<< Installation of assembly of rear oil seal housing of crank shaft



1. Remove sealant on the surface of cylinder.
2. Apply a little engine oil on the area surrounding oil seal.



3. Apply continuous beaded standard sealant on the matching surface of rear oil seal housing assembly of crank shaft and cylinder.

Specification of sealant: LOCTITE 5971 or equivalent.

4.

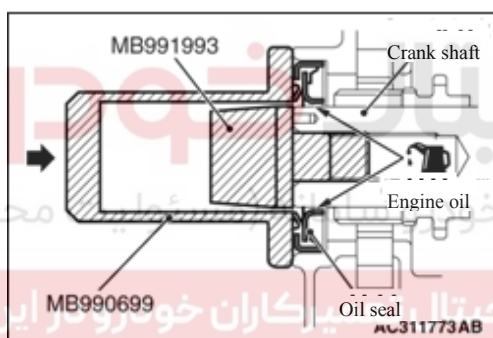
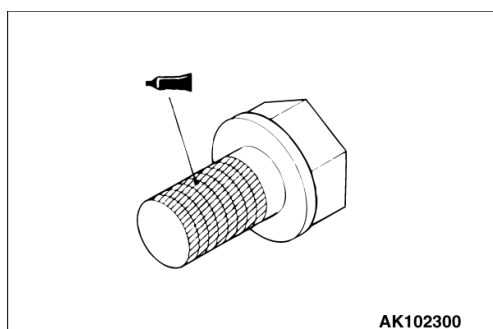
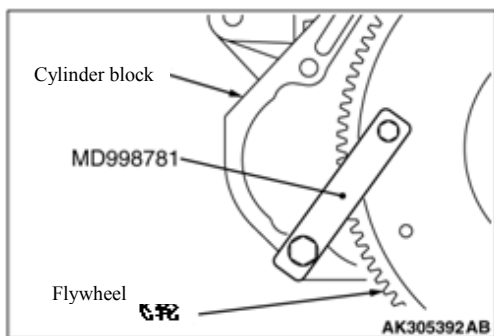
Notice Install rear oil seal housing assembly of crank shaft without damage of rear oil seal of crank shaft.

Install rear oil seal housing assembly of crank shaft onto cylinder and tighten fixed bolts to standard torque within 3 min after standard sealant is applied.

Tightening torque: 7.6 ±0.6 N m

>>B<< Installation of flywheel

Overhaul of Engine—Disassembly and Installation of Oil Seal of Crank Shaft



assembly / flywheel bolt

1. Remove sealant, engine oil and other attached matters from installation surface of flywheel assembly, bolt bore of crank shaft and flywheel bolt.
2. Install flywheel assembly onto the crank shaft.
3. Fix the flywheel assembly with special tool – flywheel stopper (MD998781) in the same manner with disassembly.
4. Apply a little engine oil on the bolt surface of flywheel and bolt bore of crank shaft.
5. Apply standard sealant on the screw thread of bolts of the flywheel.

Specification of sealant: LOCTITE 2701 or equivalent.

6. Tighten flywheel bolts to standard torque.

Tightening torque: 100 ± 5 N m

>>C<< Installation of front oil seal of crank shaft

1. Apply a little engine oil around the conduit of front oil seal of crank shaft (special tool) (MB991993) and install the conduit on the crank shaft.
2. Apply a little engine oil on the whole inner ring around the oil seal.
- 3.

Notice	Don't damage front oil seal of crank shaft before installing it.
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Push the oil seal to the assembly of timing chain case with special tool, installer of oil seal of crank shaft (MB990699).

Major Overhaul of Engine—Maintenance Specifications

Section II Major Overhaul of Engine

Maintenance Specifications

Item			Standard value	Limit value
Timing chain				
Valve clearance mm	Intake		0.22	-
	Exhaust		0.30	-
Camshaft				
Height of camshaft mm	Intake	4A92U	44.71	44.21
	Exhaust	4A92U	44.28	43.78
Cylinder cover and valve				
Flatness of back surface of cylinder cover mm			0.03 max.	0.2
Grinding limit of lower surface of cylinder cover (total grinding amount of cylinder cover and cylinder block)			-	0.2
Total height of cylinder cover mm			112.9 - 113.1	-
Thickness of valve (border) mm	Intake		1.35	0.85
	Exhaust		1.85	1.35
External diameter of valve stem	Intake		4.965 - 4.980	-
	Exhaust		4.955 - 4.970	-
Plane angle			45° - 45.5°	-
Radial clearance of valve and conduit	Intake		0.020 - 0.047	0.10
	Exhaust		0.030 - 0.057	0.15
Valve length mm	Intake		89.61	89.11
	Exhaust		90.94	90.44
Protrusion of valve stem mm	Intake		38.46	38.96
	Exhaust		38.49	38.99
Free length of valve spring mm			43.1	42.1
Loan of valve spring/ installation length N/mm			152/33.4	-
Deflection of valve spring			2° max.	4°
Valve contact width of valve seat mm			1.1 - 1.5	-
Internal diameter of valve conduit mm			5	-
Installation height of valve conduit mm			7.7 - 8.3	-
Piston and connecting rod				

Major Overhaul of Engine—Maintenance Specifications

External diameter of piston mm		75	-
Item		Standard value	Limit value
Edge clearance of piston ring mm	No. 1	0.03 - 0.07	0.1
	No. 2	0.02 - 0.06	0.1
Terminal opening of piston ring mm	No. 1	0.15 - 0.30	0.8
	No. 2	0.30 - 0.50	0.8
	Oil ring	0.10 - 0.40	1.0
External diameter of piston pin mm		18	-
Pressing-in load of piston pin (room temperature) of piston pin N		5,000 - 11,000	-
Oil film clearance of crank pin mm		0.014 - 0.059	0.1
Big-end clearance of connecting rod mm		0.10 - 0.35	0.4
Crank shaft and cylinder block			
End-to-end backlash of crank shaft mm		0.09 - 0.27	0.3
External diameter of crank shaft journal		46	-
External diameter of crank shaft pin mm		40	-
Oil film clearance of crank shaft journal mm		0.014 - 0.034	0.1
Flatness of upper surface of cylinder block mm		0.05	0.1
Grinding limit of upper surface of cylinder cover (total grinding amount of cylinder cover and cylinder block)		-	0.2
Total height of cylinder block mm		280	-
Internal diameter of cylinder block mm		75	-
Cylindricity of cylinder hole mm		0.007 max.	-
Clearance of piston and cylinder mm		0.010 - 0.035	-

c

Major Overhaul of Engine—Specification of Tightening Torque

Specification of Tightening Torque

Item	N m
Generator and ignition system	
Spark plug	25 ± 5
Bolts of ignition coil	8.4 ± 0.6
Bolts of damping pulley of crane shaft	190
Bolt of water pump pulley	8.4 ± 0.65
Adjusting bolts	5.0 ± 1.0
Bolts of generator support bracket	36.0 ± 3.6
Nuts of generator (M8)	20 ± 2
Nuts of generator (M10)	40 ± 3
Bolts of conduit of engine oil gauge	7.6 ± 0.6
Parts of fuel and waste gas emission	
Bolts of exhaust pipe and fuel injector assembly	18.4 ± 1.4
Bolts of absolute pressure (MAP) sensor of manifold	6.0 ± 0.5
Bolts of throttle body	6.0 ± 0.5
Bolts of magnetic valve	7.6 ± 0.6
Bolts of engine support bracket	18.4 ± 1.4
Intake manifold	
Bolts of inlet pipe	10 ± 2
Bolts of accessories of water inlet	10 ± 2
Temperature sensor of engine coolant	29.4 ± 9.8
Bolts of angle sensor of crank shaft	8.4 ± 0.6
Position bolts of camshaft	8.4 ± 0.6
Bolts of knock sensor	20.0 ± 1.6
Bolts of engine oil pressure switch	10 ± 2
Bolts of intake manifold bracket	18 ± 1
Bolts of intake manifold	18 ± 1
Exhaust manifold	
Bolt A of support seat of exhaust manifold	20 ± 1
Bolt B of support seat of exhaust manifold	35 ± 6
Nuts of exhaust manifold	35 ± 2
Bolts of thermostat	6.0 ± 1.0
Item	N m

Major Overhaul of Engine—Specification of Tightening Torque

Oil pan and timing chain case	
Bolts of timing chain case (M10)	39.5 ± 3.0
Bolts of timing chain case (M6)	8.4 ± 0.6
Water pump bolts	8.4 ± 0.6
Bolts of engine oil collector and cleaner	11.5 ± 1.1
Oil pan bolts	7.6 ± 0.6
Support of engine oil cleaner	20±8
Valve cover bolts	9.0 ± 1.0
Discharge cock	39 ± 5
Timing chain	
V.V.T. chain wheel bolts	64.5 ± 5.5
Bolts of camshaft chain wheel	88 ± 10
Bolts of tensioner lever assembly	23.5 ± 4.5
Bolts of chain guide rail assembly	10 ± 2
Plug screw	54 ± 15
Bolts of timing chain tensioner assembly	8.4 ± 0.6
Camshaft	
Bolts of oil control valve (OCV)	7.6 ± 0.6
Bolts on cleaner of oil control valve (OCV)	44 ± 5
Bolts of bearing cover of camshaft (M6)	11 ± 1
Bolts of bearing cover of camshaft (M8)	20 ± 1
Cylinder cover and valve	
Cylinder cover bolts	24.5 ± 2.0 → +180° to 184°
Piston and connecting rod	
Bolts of connection rod cap	15 ± 2 → +90° to 94°
Crank shaft and cylinder block	
Screw of induction ring of crank shaft	9.0 ± 1.0
Bolts of bearing cover	35 ± 2 → +60° to 64°
Bolts of oil seal housing	7.6 ± 0.6
Bolts of bell-shaped shell cover	7.6 ± 0.8
Flywheel bolts	100 ± 5

Major Overhaul of Engine—Sealing

Sealing

Key points	Specification of sealant
Clamping surface of rear oil seal of cylinder block	LOCTITE 5971 or equivalent
Plug screw	LOCTITE 5971 or equivalent
Oil pan	LOCTITE 5971 or equivalent
Valve cover	LOCTITE 5971 or equivalent
Timing chain case	LOCTITE 5971 or equivalent
Clamping surface of angle sensor of crank shaft of the cylinder block	LOCTITE 5971 or equivalent
Flywheel bolts	LOCTITE 2701 or equivalent
Engine oil pressure switch	LOCTITE 565 or equivalent
Temperature sensor of engine coolant	LOCTITE 262 or equivalent

Sealant (FIPG)

Use sealant on many parts of the engine. Please be careful in using sealant to ensure the suitability of sealant.

The most important points are the dimension of bead-shaped sealant, continuity and position. Too little sealant may lead to leakage and too much sealant may incur oil circuit blocking or narrowing. Therefore, in order to avoid leakage of joint surface, it is necessary to apply proper amount of continuous beaded sealant evenly without any disconnection.

FIPG in engine may harden due to the reaction with moisture in atmosphere, therefore it is generally used on the metal end face.

Disassembly

Parts assembled by FIPG can be easily disassembled without any special methods. But in certain conditions, a mallet or similar tool should be used to slightly knock the part and break down the sealant on the mating surface, or a smooth and thin sealant scraper should be used to cut into the mating surface slightly; make sure that the mating surface should not be damaged.

Sealing surface cleanup

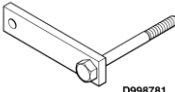


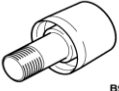






Clean the sundries on the sealing surface with sealant scraper or wire brush; ensure that the FIPG surface is smooth without any grease or foreign matter; don't forget to remove the sealant used on the screw hole.

Main points of sealant applying

Apply continuous beaded FIPG of standard dimension without crack. Enclose screw hole with continuous beaded sealant. Remove the sealant having not hardened. Install the part on specified position when the sealant is wet (within 3 min). Prevent sealant from contacting with any other unnecessary place in installation. Neither apply oil on the parts applied with sealant nor wet or start the engine within sufficient time (about 2 hours). Apply sealant on different positions according to the steps specified.

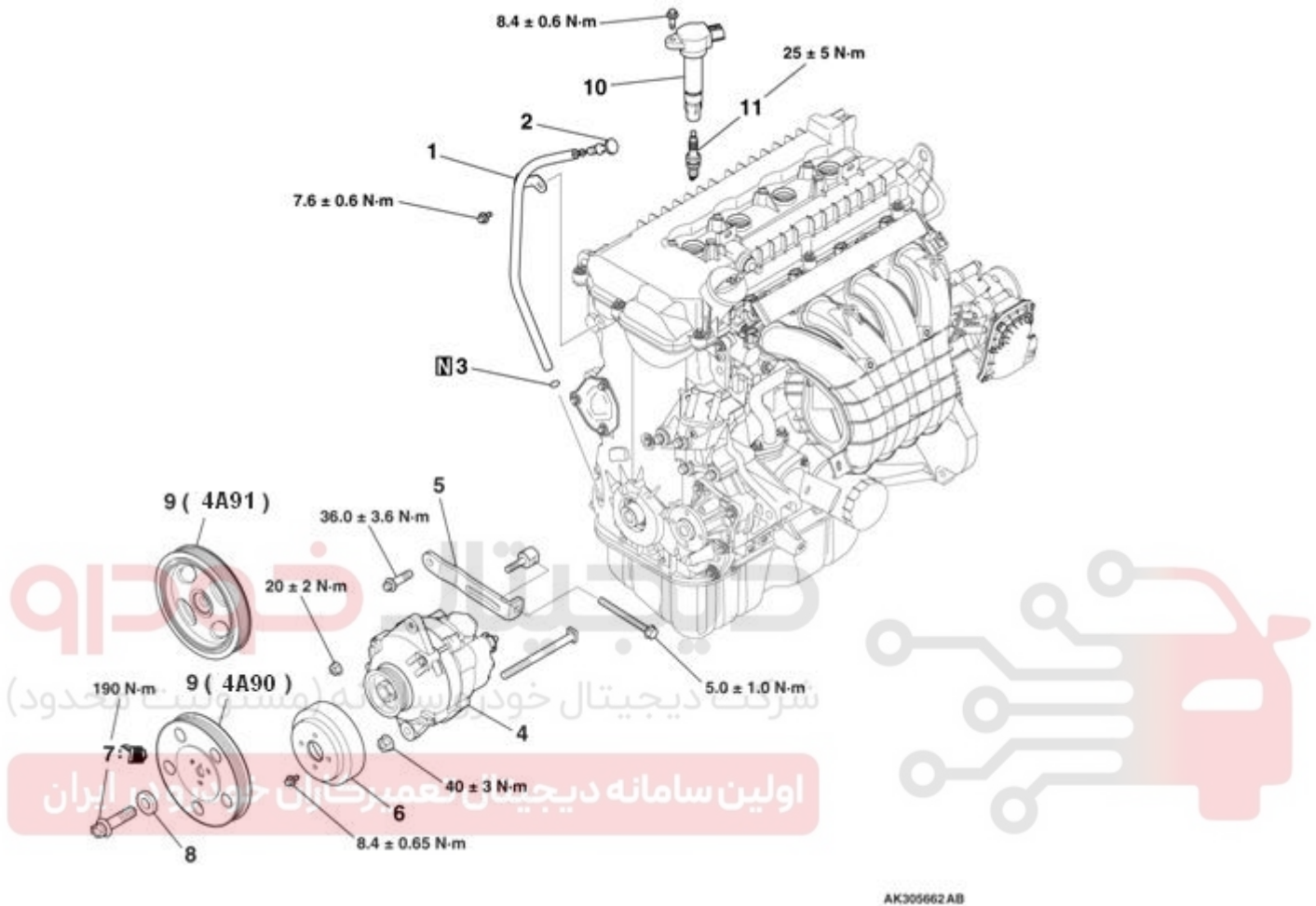
Major Overhaul of Engine—Special Tools

Special Tools

Tool	Number	Name	Use
 D998781	MD998781	Flywheel stopper	Fix flywheel
 D998727	MD998727	Oil pan remover	Disassemble oil pan
	MB990699	Installer of front oil seal of crank shaft	Install front oil seal
 B991993	MB991993	Front oil sealing conduit of crank shaft	Install chain case
 B992000	MB992000	Guide sleeve of crank shaft	Rotate crank shaft
 D999597	MD999597	Compressor of valve spring	Compress valve spring
 MB991994	MB991994	Installer of valve stem oil seal	Install valve stem oil seal (use special tools stamped with "MB991994A")
	MD998780	Installation tool of piston	Install/ disassemble piston pin
	MB991659	Conduit D	
 MB991614	MB991614	Angle gauge	Tighten bolts of bearing cover of cylinder block

Major Overhaul of Engine--Disassembly and Installation of Engine and Ignition System

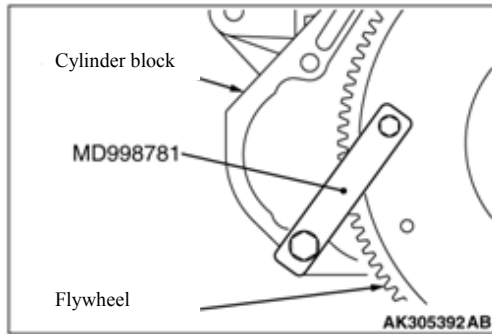
Disassembly and Installation of Engine and Ignition System



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			Disassembly steps
		1.	Conduit of engine oil gauge
		2.	Engine oil gauge
		3.	O-ring
		4.	Generator
		5.	Generator support bracket
		6.	Water pump pulley
<<A>>	>>A<<	7.	Bolt of crank shaft pulley
	>>A<<	8.	Seal ring
	>>A<<	9.	Damping pulley of crank shaft
		10.	Ignition coil
		11.	Spark plug

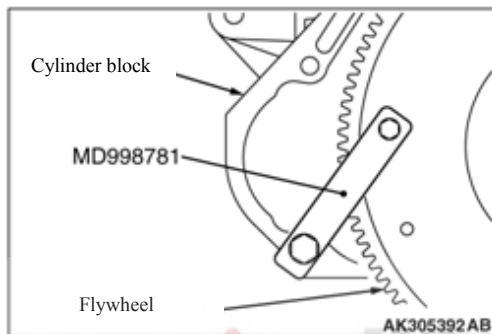
Major Overhaul of Engine--Disassembly and Installation of Engine and Ignition System



Key points of disassembly and maintenance

<<A>> Disassembly of bolts of crank shaft chain wheel

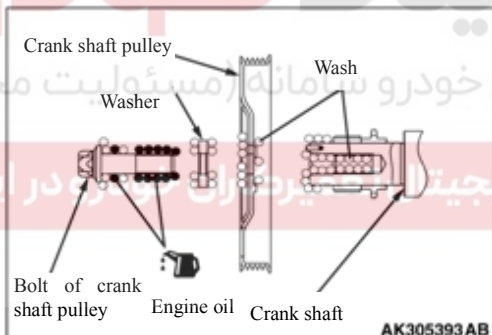
1. Fix the flywheel with special tool – flywheel stopper (MD998781).
2. Remove the crank shaft bolts.



Key points of installation and maintenance

>>A<< Installation of crank shaft chain wheel/ seal ring/ bolts of crank shaft chain wheel

1. Fix the flywheel with special tool – flywheel stopper (MD998781).
2. Clean up the screw hole of crank shaft.
3. Clean up crank shaft chain wheel.

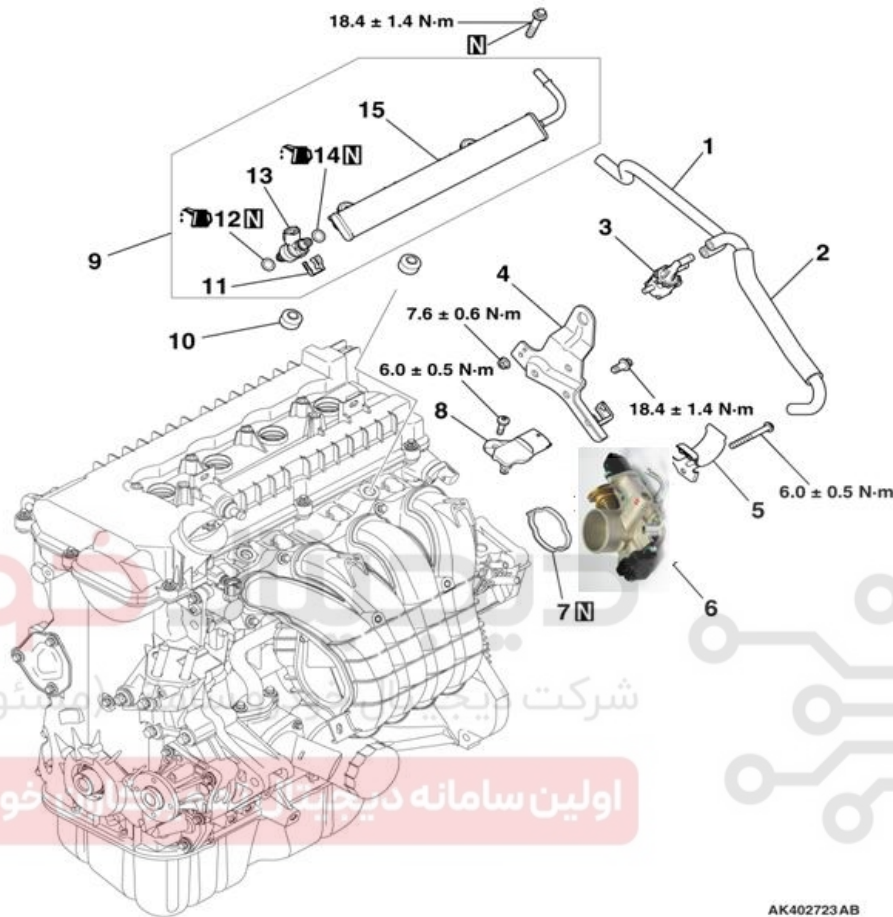


Remarks	Remove the oil stain when necessary to avoid the reduction of the friction between the chain wheel belt surface.
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4. Install crank shaft chain wheel.
5. Apply a little engine oil on the screw thread section.
6. Clean the seal ring.
7. Tighten bolts of crank shaft to tightening torque: 190 N·m.

Major Overhaul of Engine--Disassembly and Installation of Fuel Injection Parts

Disassembly and Installation of Fuel Injection Parts



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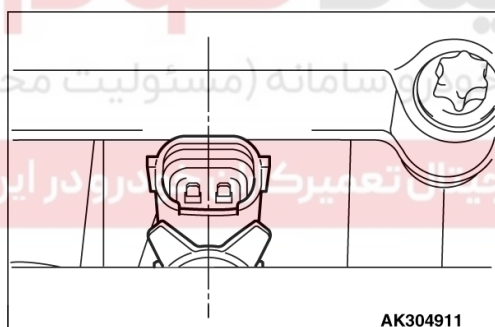
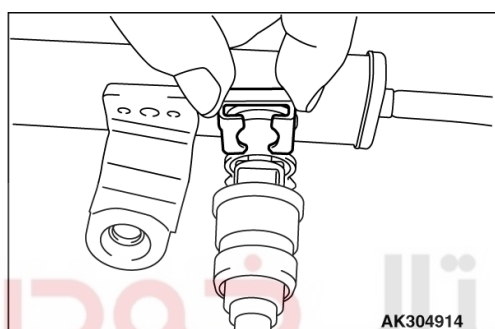
	Disassembly steps			
	1.	Vacuum rubber pipe	10.	Insulator
	2.	Vacuum rubber pipe	11.	Fuel injector support
	3.	Electromagnetic valve	12.	O-ring
	4.	Engine lifting bracket	13.	Oil nozzle
	5.	Supper hose clamp of radiator	14.	O-ring
>>D<<	6.	Throttle body	15.	Fuel oil distributing pipe
>>C<<	7.	Gasket of throttle body		
>>B<<	8.	Absolute pressure (MAP) sensor of manifold		
>>A<<	9.	Fuel oil distributing pipe assembly		

Major Overhaul of Engine--Disassembly and Installation of Fuel Injection Parts

Key points of installation and maintenance**>>A<< Installation of Fuel Oil Distributing Pipe Assembly****Notice**

Prevent engine oil from flowing into the fuel oil distributing pipe.

1. Apply new engine oil to the O-ring of oil nozzle slightly. Insert the oil nozzle to the fuel oil distributing pipe slightly other than aslant.
2. Ensure stable rotation of oil nozzle. If it fails, remove the oil nozzle to confirm whether the O-ring is damaged. Replace the oil nozzle if necessary. After that, re-install the oil nozzle and verify whether the oil nozzle rotates smoothly.
3. Install oil nozzle support.



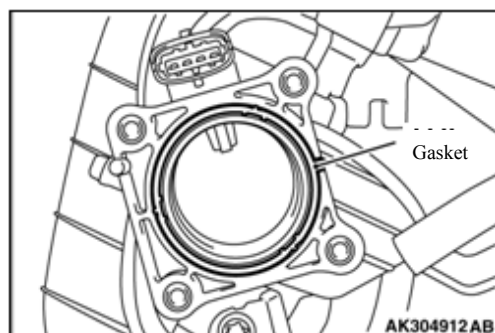
4. Install fuel oil distributing pipe assembly onto the cylinder cover. Ensure stable rotation of oil nozzle. If it fails, remove the oil nozzle to confirm whether the O-ring is damaged. Replace the oil nozzle if necessary. After that, re-install the oil nozzle and verify whether the oil nozzle rotates fluently. Align the center of oil nozzle of fuel oil distributing pipe with the projection section.
5. Align the oil nozzle with the projection section by rotating the nozzle.
6. Tighten fuel oil distributing pipe assembly to tightening torque: $18.4 \pm 1.4 \text{ N}\cdot\text{m}$.

>>B<< Installation of absolute pressure sensor of manifold**Notice**

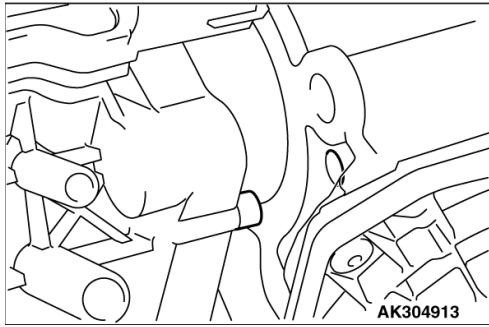
- Prevent the MAP sensor from shocking in installation.
- Use a new MAP sensor if the MAP sensor falls to the floor.

>>C<< Installation of throttle body gasket

Install throttle body gasket to make the projection section located in the position in the drawing.



Major Overhaul of Engine--Disassembly and Installation of Fuel Injection Parts



>>D<< Installation of throttle body

Install throttle body on the manifold by connecting the groove of throttle body with the projection of manifold.

دیجیتال خودرو

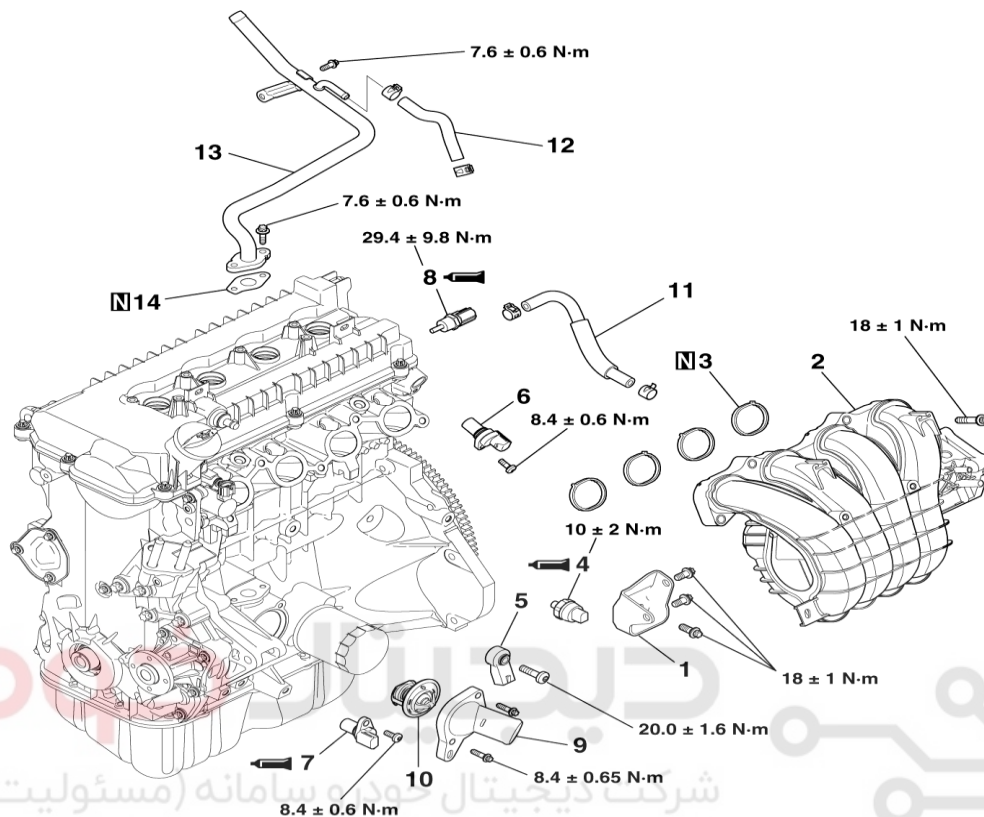
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Major Overhaul of Engine--Disassembly and Installation of Intake Manifold

Disassembly and Installation of Intake Manifold



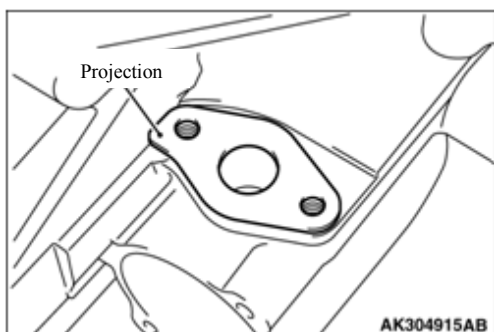
Disassembly steps

>>F<<	1.	Support seat of intake manifold
	2.	Intake manifold
	3.	Gasket of intake manifold
>>E<<	4.	Engine oil pressure switch
	5.	Knock sensor
	6.	Position sensor of camshaft
>>D<<	7.	Angle sensor of crank shaft
>>C<<	8.	Temperature sensor of engine coolant
	9.	Accessories of water inlet
>>B<<	10.	Temperature saver
	11.	Water pipe
	12.	Water pipe
>>A<<	13.	Water pipe assembly
	14.	Gasket of water pipe assembly

Major Overhaul of Engine--Disassembly and Installation of Intake Manifold

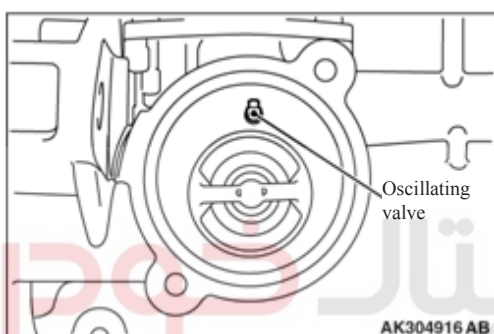
Key points of installation and maintenance

>>A<< Installation of gasket of water pipe assembly



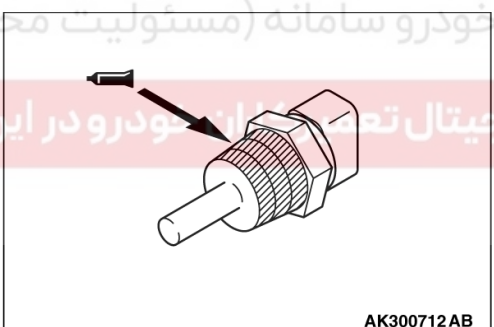
Install gasket of water pipe assembly on the cylinder block with the projection in the direction shown in the drawing

>>B<< Installation of temperature saver



Install the temperature saver on the cylinder block with the oscillating valve on the upper position.

>>C<< Installation of temperature sensor of engine coolant



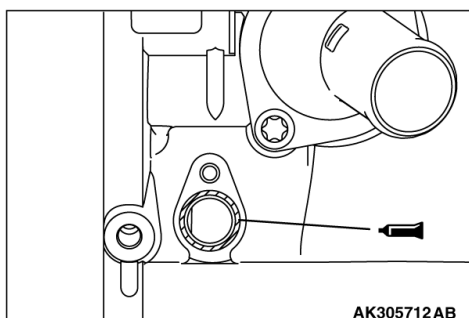
1. Remove the residual sealant (if any) on the temperature sensor of engine coolant or screw hole of cylinder cover.

Notice	• Use tools carefully. Never damage the connecting parts (made of resin) of the sensor.
	• Do not overly tighten the sensor

2. Apply sealant on the screw thread (as the drawing shows) of the sensor.

Specification of sealant: LOCTITE 262 or equivalent.

>>D<< Installation of angle sensor of crank shaft



1. Remove any residual sealant (if any) on the angle sensor or the installation surface of cylinder block.

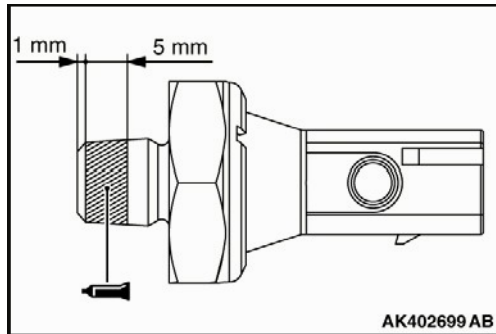
Notice	• Apply sealant properly to prevent sealant from being squeezed out from screw holes.
	• Do not overly tighten the sensor

2. Apply continuous beaded sealant with the diameter of 1.7 ± 0.5 mm on the cylinder block as the drawing shows.

Specification of sealant: LOCTITE 5971 or equivalent.

3. Install angle sensor of crank shaft on the cylinder block and tighten it to the specified torque: 8.4 ± 0.6 N·m.

Major Overhaul of Engine--Disassembly and Installation of Intake Manifold



>>E<< Installation of engine oil pressure switch

1.

Notice

- Apply sealant properly to prevent sealant from being squeezed out from the end of screw hole.
- Do not overly tighten the sensor

Remove any residual sealant (if any) on engine oil pressure switch or the screw hole of cylinder block.

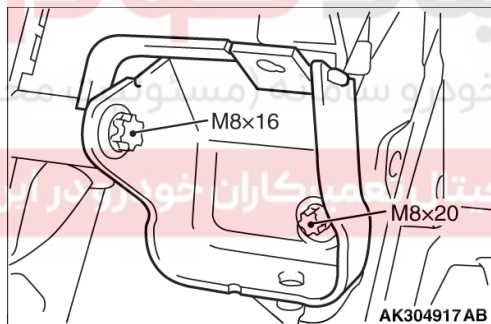
2. Apply sealant on the screw thread of engine oil pressure switch, as the drawing shows.

Specification of sealant:

LOCTITE 565 or equivalent

3. Install engine oil pressure switch on the cylinder block and tighten it to the torque: $10 \pm 2 \text{ N m}$.

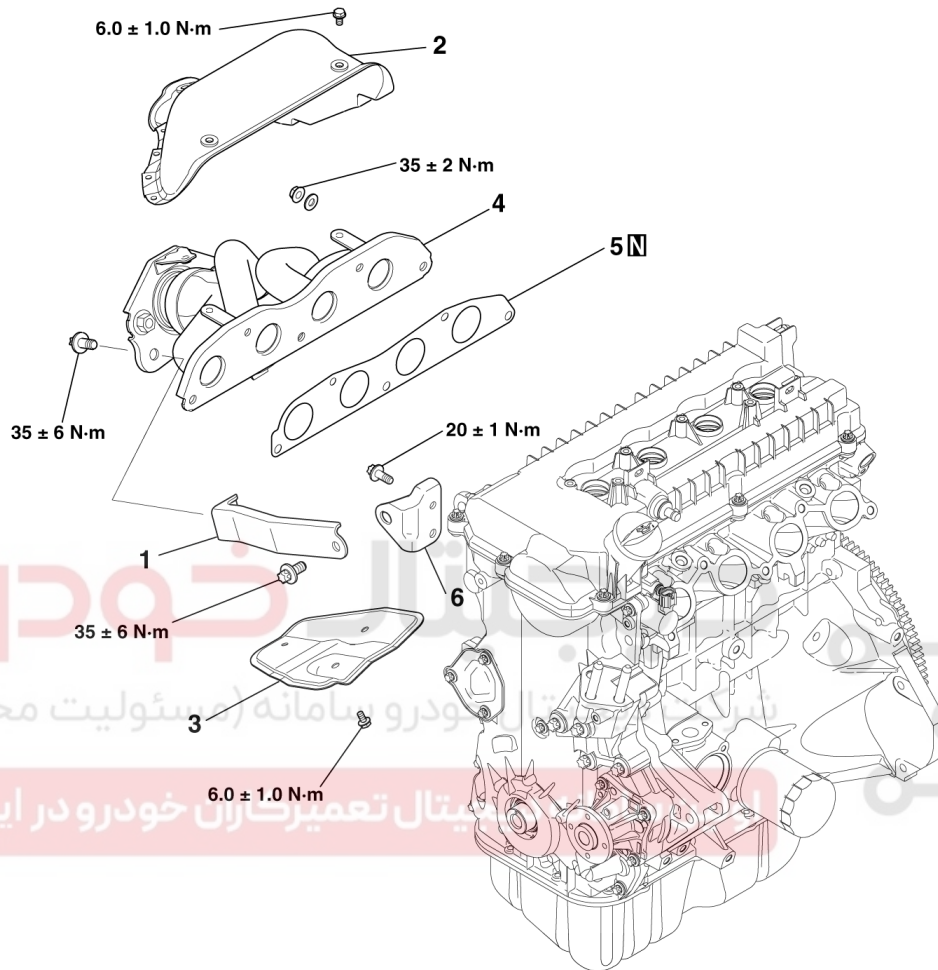
>>F<< Installation of Support Seat of Intake Manifold



Inspect and confirm the support seat of intake manifold closely contacts with intake manifold and cylinder block before installation and then install the support seat of intake manifold and tighten it to the torque: $18 \pm 1 \text{ N m}$

Major Overhaul of Engine—Disassembly and Installation of Exhaust Manifold

Disassembly and Installation of Exhaust Manifold



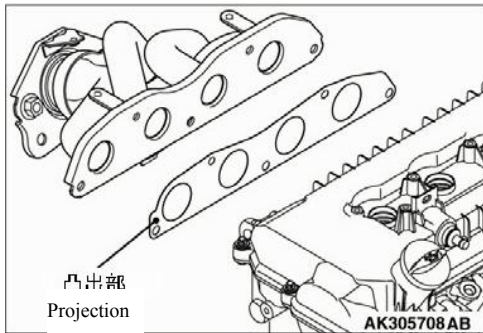
AK305663AB

		Disassembly steps
>>B<<	1.	Support B of exhaust manifold
	2.	Exhaust manifold cover
	3.	Heat insulating pad
	4.	Exhaust manifold
>>A<<	5.	Gasket of exhaust manifold
	6.	Support A of exhaust manifold

Major Overhaul of Engine—Disassembly and Installation of Exhaust Manifold

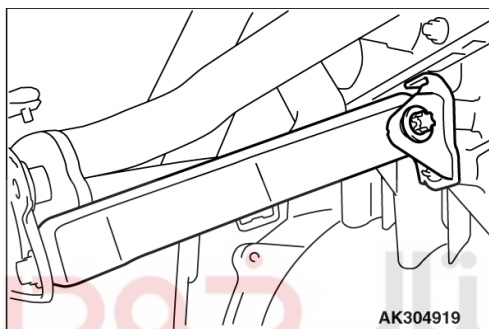
Key points of installation and maintenance

>>A<< Installation of gasket of exhaust manifold



Install the gasket of exhaust manifold with the projection in the direction shown in the drawing.

>>B<< Installation of support B of exhaust manifold



Inspect and confirm that support B of exhaust manifold closely contacts with the exhaust manifold and support A of exhaust manifold and then install support B and lock it to the torque: **35 ± 6 N m.**

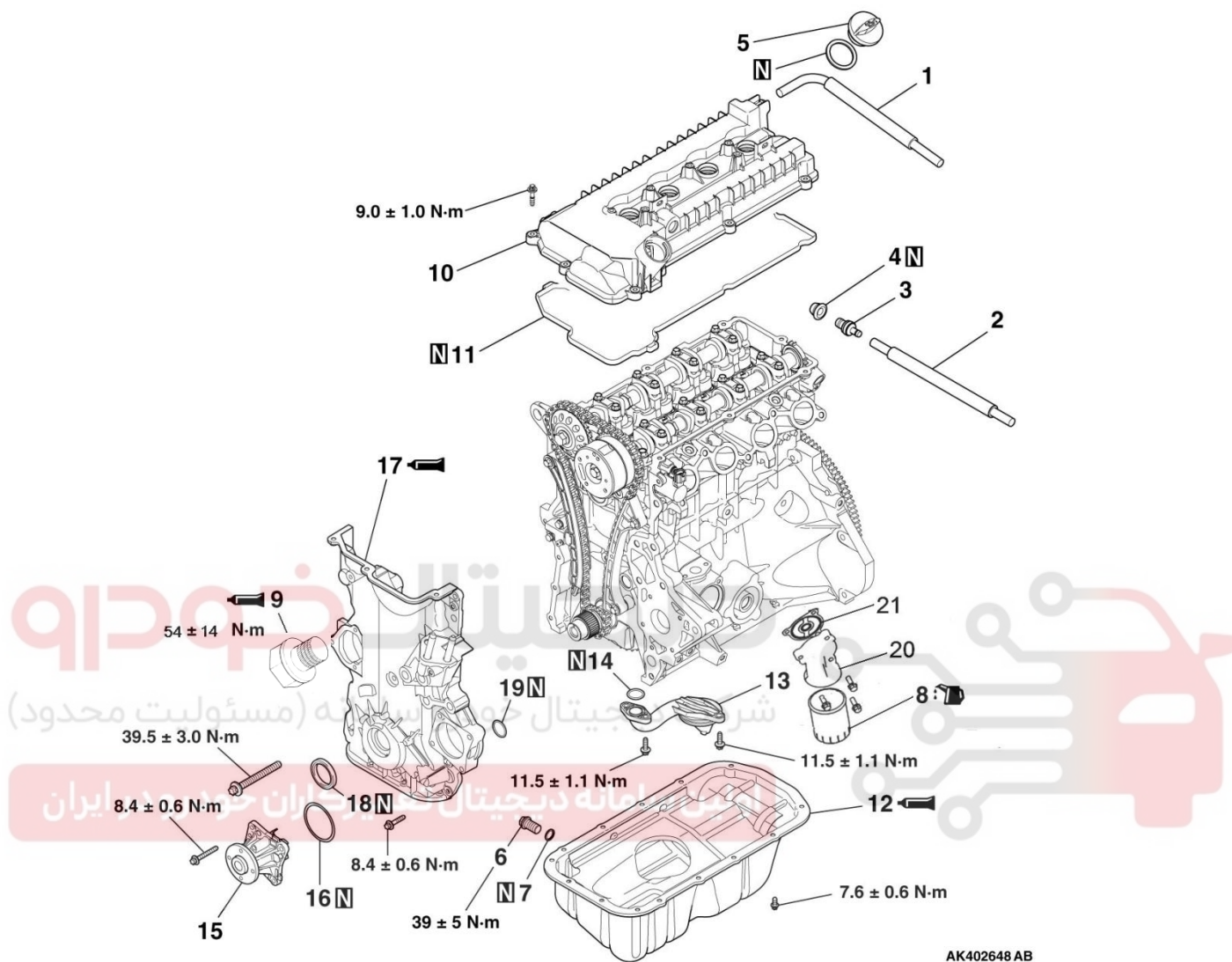
دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)



اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Major Overhaul of Engine—Disassembly and Installation of Oil Pan and Timing Chain Case

Disassembly and Installation of Oil Pan and Timing Chain Case



AK402648 AB

Disassembly steps

1.	Venting hose	<<A>>	>>F<<	8.	Engine oil cleaner
2.	PCV hose		>>E<<	9.	Plug screw
3.	PCV valve		>>D<<	10.	Valve cover
4.	PCV valve washer			11.	Valve cover gasket
5.	Engine oil filling cover	<>	>>C<<	12.	Oil pan
6.	Oil drainer			13.	Engine oil collector and cleaner
7.	Oil drainer gasket			14.	Gasket of engine oil cleaner
				15.	Water pump
				16.	O-ring
			>>B<<	17.	Timing chain case

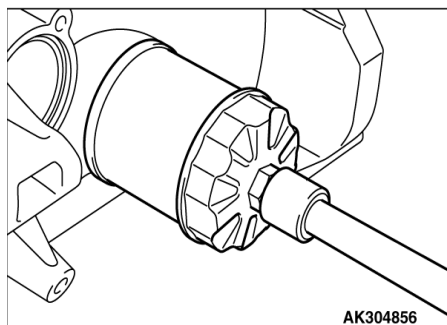
Major Overhaul of Engine—Disassembly and Installation of Oil Pan and Timing Chain Case

		>>A<<	18.	Front oil seal
			19.	O-ring
			20.	Support of engine oil cleaner
			21	Support gasket of engine oil cleaner

Key points of disassembly and maintenance

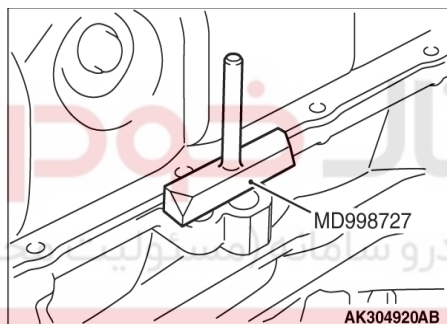
<<A>> Disassembly of cleaner

Disassemble the cleaner with cleaner wrench



<> Disassembly of oil pan

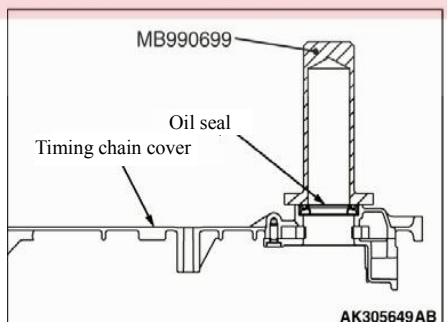
1. Disassemble bolts of oil pan
2. Use special tool—oil pan remover ((MD998727) between the oil pan and cylinder block.



Key points of installation and maintenance

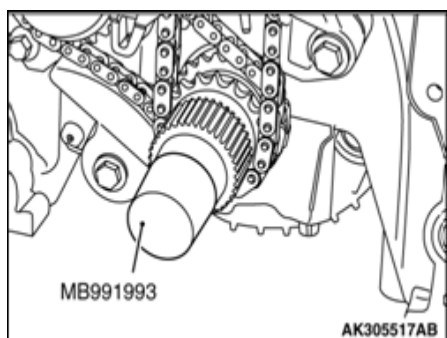
>>A<< Installation of front oil seal

Install front oil seal in the timing chain case with the special tool, oil seal installer of crank shaft (MB990699).

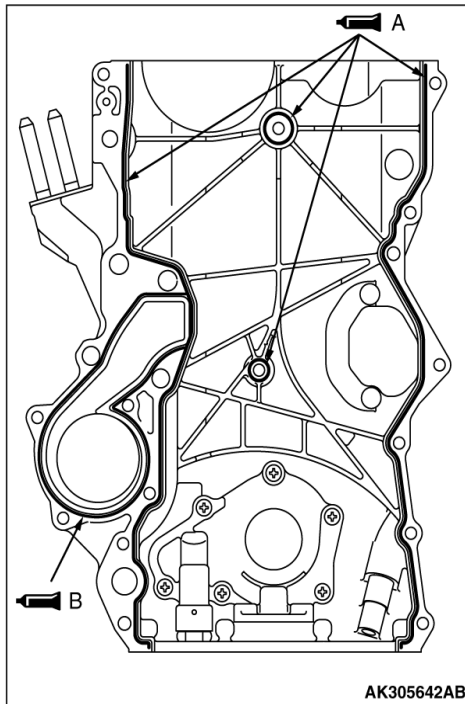


>>B<< Installation of timing chain case

1. Remove the sealant residue on the timing chain case, cylinder block and cylinder cover.
2. Install the special tool, oil seal conduit (MB991993) on the crank shaft.



Major Overhaul of Engine—Disassembly and Installation of Oil Pan and Timing Chain Case



3.

Notice

Complete the installation of timing chain case within 3 minutes after liquid sealant is used.

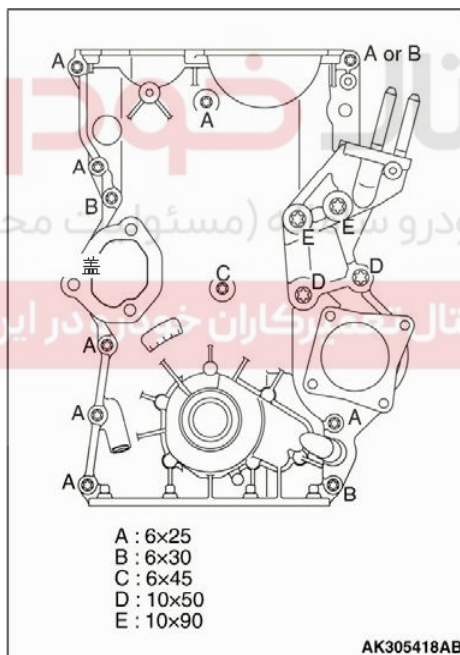
Apply continuous beaded liquid sealant ($\Phi 2.0 \pm 0.5$ mm) on the position A on timing chain case and apply continuous beaded liquid sealant ($\Phi 1.5 \pm 0.5$ mm) on the position B, as the drawing shows.

Specification of sealant: LOCTITE 5971 or equivalent.

4. Install timing chain case

Remarks

Tightening bolts vary in length. Please ensure bolts are properly used on each position.



5. Tighten the bolts of timing chain case to standard torque.

Tightening torque:

M6 8.4 ± 0.6 N m

M6 8.4 ± 0.6 N m

M10 (support bracket) 39.5 ± 3.0 N m

M10 (pillar) 36 ± 3.6 N m

>>C<< Installation of oil pan

1. Remove the sealant residue on the timing chain case, cylinder block and oil pan.

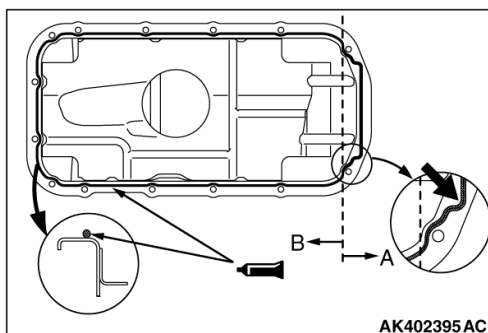
Notice

Complete the installation of oil pan within 3 min after liquid sealant is applied.

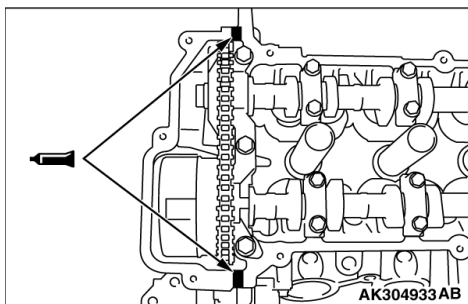
2. Apply continuous beaded liquid sealant ($\Phi 4.0 \pm 0.5$ mm) on the position A on oil pan and apply continuous beaded liquid sealant ($\Phi 2.0 \pm 0.5$ mm) on the position B, as the drawing shows.

Specification of sealant: LOCTITE 5971 or equivalent.

3. Tighten bolts to the torque: 7.6 ± 0.6 N·m.



Major Overhaul of Engine—Disassembly and Installation of Oil Pan and Timing Chain Case

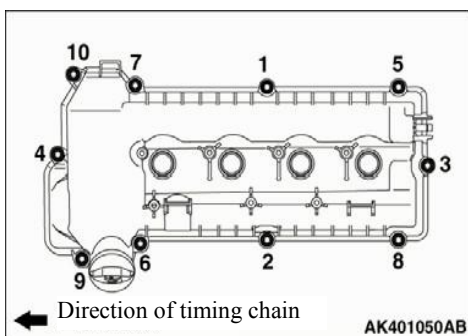


>>D<< Installation of valve cover

1. Clean away the residual liquid sealant on the valve cover, timing chain case and air cylinder.
2. Apply $\Phi 4$ mm continuous beaded liquid sealant as the drawing shows.

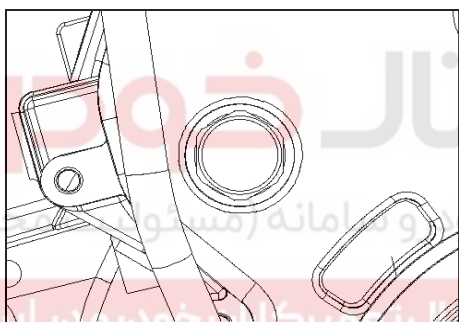
Specification of sealant: LOCTITE 5971 or equivalent.

Notice	Complete the installation of timing chain within 3 min after liquid sealant is used.
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3. Tighten the bolts of valve cover to 9.0 ± 1.0 N·m according to the steps in the drawing.

>>E<< Installation of plug screw

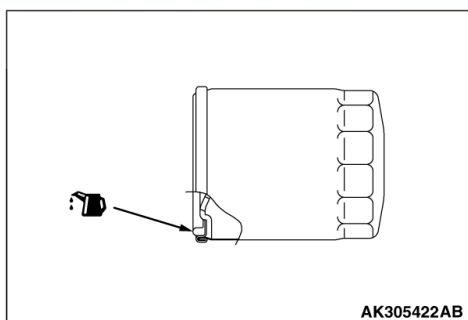


Install timing chain tensioner screw onto the timing chain case assembly

Tighten it to standard torque.

Tightening torque: 54 ± 15 N m

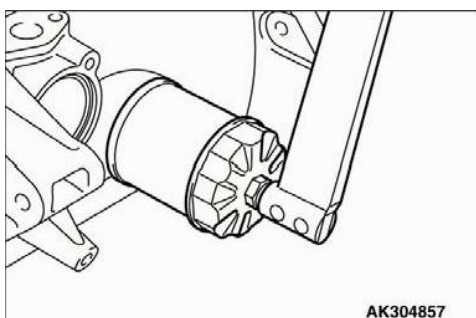
>>F<< Installation of engine oil cleaner



1. Clean the installation surface of the cleaner on the cylinder block.
2. Apply engine oil on the gasket of engine oil cleaner as the drawing indicates.

3.

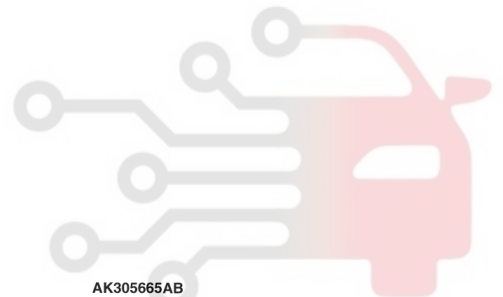
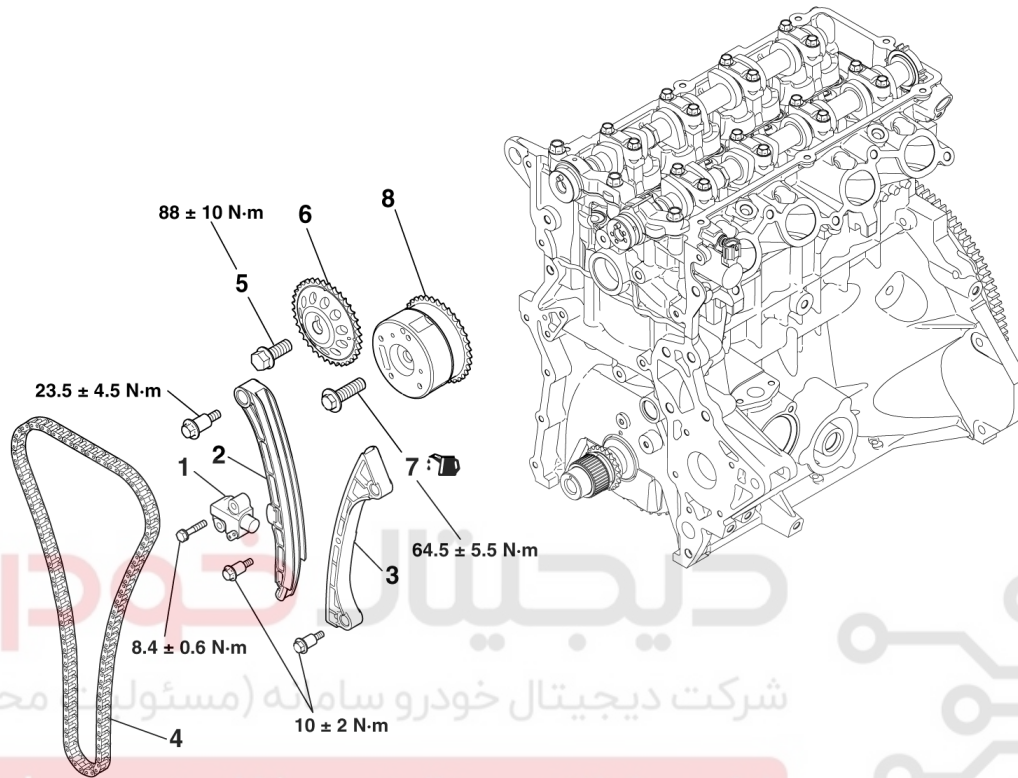
Notice	Tighten the engine oil cleaner with cleaner wrench. Oil leakage may occur if the cleaner is tightened manually because the specified torque cannot be achieved.
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Tighten engine oil cleaner until the O-ring contacts with the installation surface. Rotate the cleaner for 3/4 ring or to the torque of 11 ± 1 N·m with cleaner wrench.

Major Overhaul of Engine—Disassembly and Installation Inspection of Timing Chain

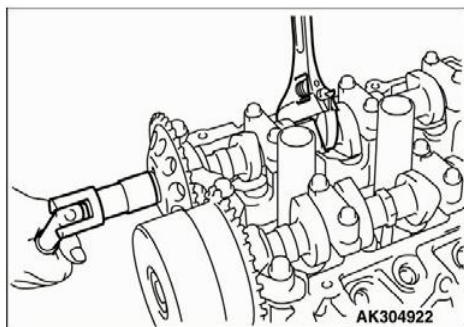
Disassembly and Installation Inspection of Timing Chain



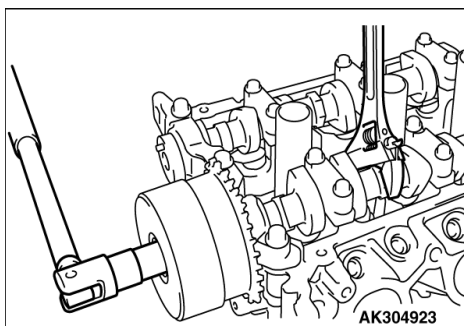
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دیجیتال خودرو (مسئولیت محدود)
 شرکت دیجیتال خودرو سامانه تعمیرکاران خودرو در ایران

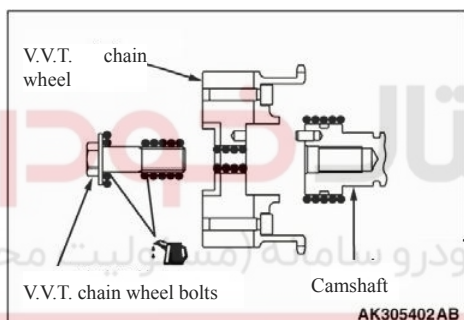
Disassembly steps		
>>D<<	1.	Assembly of timing belt chain tensioner
	2.	Assembly of tension regulating stem
	3.	Assembly of chain guide rail
>>C<<	4.	Timing chain
<<A>>	>>B<<	5. Bolts of camshaft chain wheel
	6.	Chain wheel of camshaft
<>	>>A<<	7. V.V.T. chain wheel bolts
	8.	V.V.T. chain wheel assembly

Major Overhaul of Engine—Disassembly and Installation Inspection of Timing Chain**Key points of disassembly and maintenance****<<A>> Disassembly of bolts of camshaft chain wheel**

Screw the hexagon parts of the camshaft with a wrench to remove the bolts of camshaft chain wheel.

**<> Disassembly of bolts of V.V.T. chain wheel**

Screw the hexagon parts of the camshaft with a wrench to remove the bolts of V.V.T. chain wheel.

Key points of installation and maintenance**>>A<< Installation of bolts of V.V.T. chain wheel**

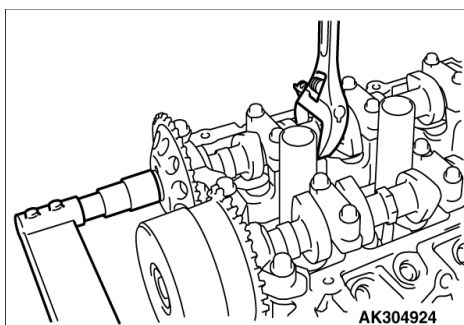
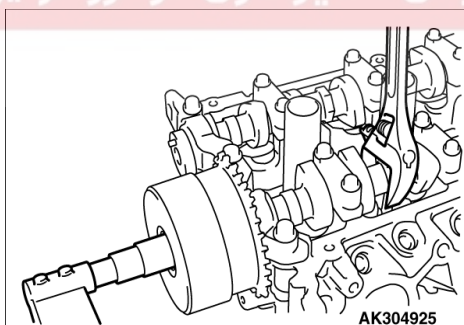
1. Apply small amount of engine oil on the following positions.

- End of camshaft
- Patchhole of V.V.T. chain wheel (internal and external surface)
- Screw thread and nuts of bolts of V.V.T. chain wheel
- Bearing surface of bolts of V.V.T. chain wheel

2. Install V.V.T. chain wheel on the camshaft.

3. Ensure that the V.V.T. chain wheel is installed on the camshaft. Screw the hexagon parts of the camshaft with a wrench to check whether V.V.T. chain wheel rotates.

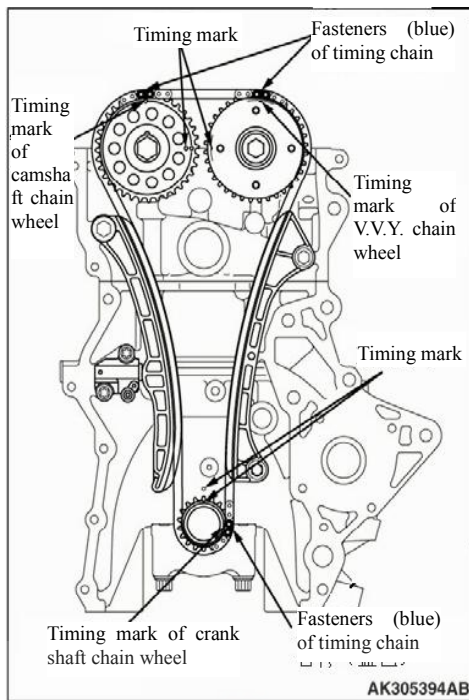
4. Screw the hexagon parts of the camshaft with a wrench tightly to tighten the bolts of camshaft chain wheel to the torque: **64.5 ± 5.5 N m.**

**>>B<< Installation of bolts of camshaft chain wheel**

Screw the hexagon parts of the camshaft with a wrench tightly to tighten the bolts of camshaft chain wheel to the torque: **88 ± 10 N m.**

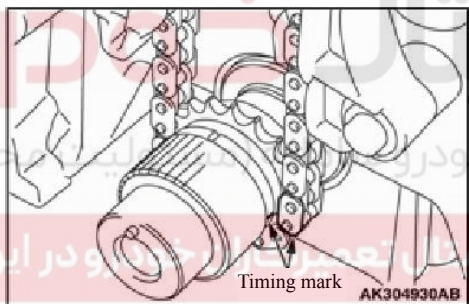
Major Overhaul of Engine—Disassembly and Installation Inspection of Timing Chain

>>C<< Installation of timing chain

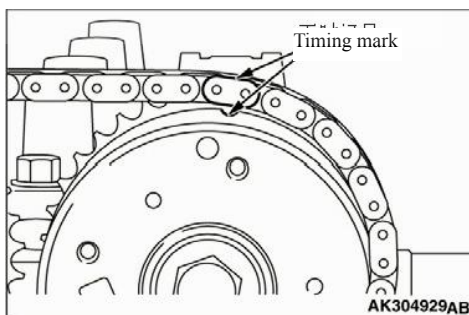


1. Install the timing chain with the two close blue fasteners of timing chain located in the upper parts and the other blue fastener of timing chain which is far from the other two aligning with the side of crank shaft.

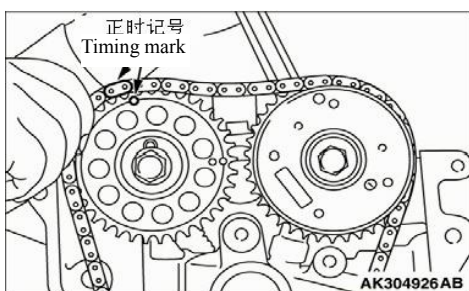
As the drawing shows



2. Install timing chain on the crank shaft chain wheel and align the blue fastener with the mark on the chain wheel

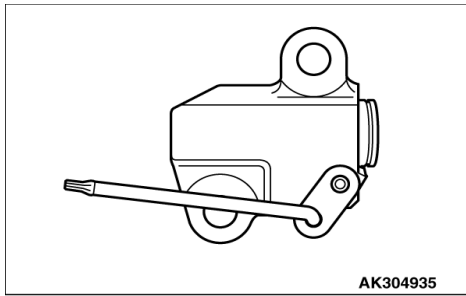


3. Install timing chain on the V.V.T chain wheel and align the blue fastener with the mark on the chain wheel



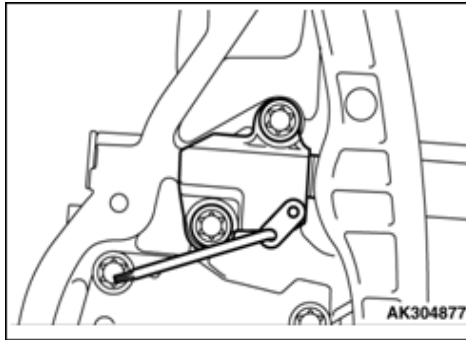
4. Install a chain on the camshaft chain wheel and align the blue fastener with the mark on the chain wheel
- At this time, rotate one or two gears of V.V.T. chain wheel or camshaft chain wheel to align the blue fastener with the mark on the chain wheel.
5. Confirm the three groups of timing marks are aligned
6. Install chain guide rail and tensioner lever

Major Overhaul of Engine—Disassembly and Installation Inspection of Timing Chain



>>D<< Installation of timing chain tensioner

1. Insert a pin to lock the plunger when pressing the plunger of timing chain tensioner, as the drawing shows.
2. Install timing chain tensioner on the cylinder block.
3. Remove the pin from the tensioner. Tighten the timing chain through the tensioner lever.



دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

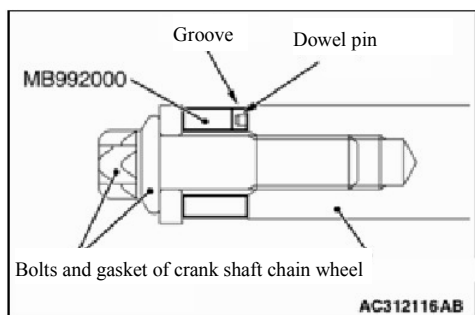
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Major Overhaul of Engine—Disassembly and Installation Inspection of Timing Chain

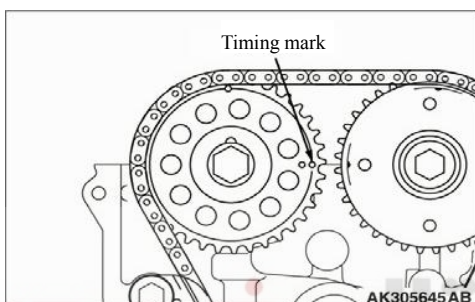
Inspection

Measurement of valve clearance



Measure the valve clearance as the drawing shows.

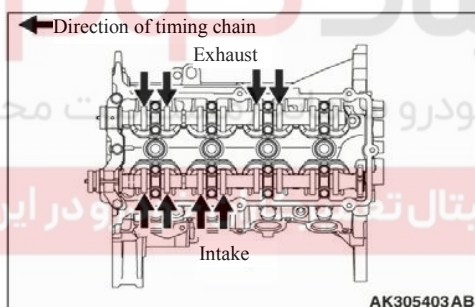
Install the bolts and washer of damping pulley of crank shaft with a special tool, guide sleeve of crank shaft (MB992000).



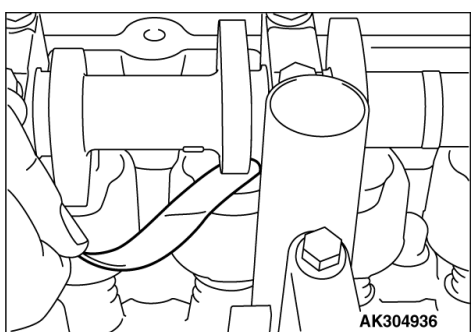
1.

Notice Crank shaft should keep rotating clockwise.

Rotate the crank shaft clockwise until the mark on the camshaft chain wheel is aligned with the mark on the upper surface of cylinder cover (place No.1 cylinder on the upper dead center of compression stroke).



2. Measure the clearance of the valve indicated by the arrow.



3. Measure the clearance between the base circle of the camshaft and the valve lifter.

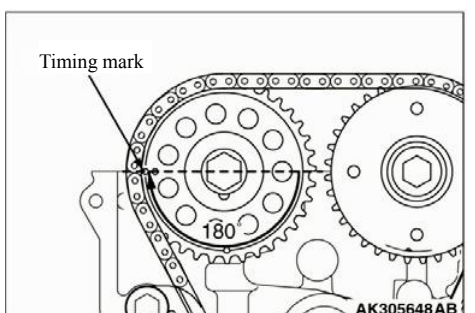
Standard value (cooling state):

Intake valve 0.22 ± 0.04 mm

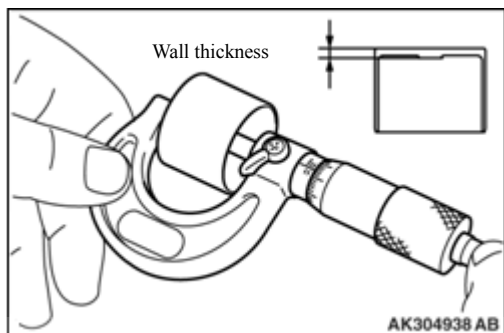
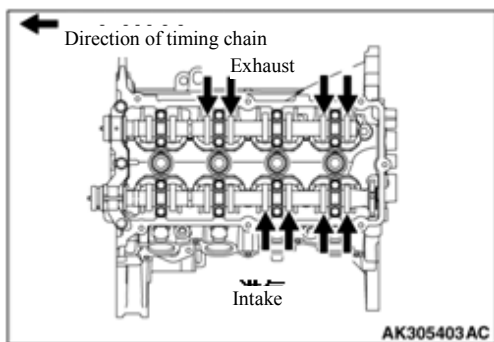
Exhaust valve 0.30 ± 0.04 mm

4. Record the measured value if it fails to comply with the standard value.

5. Rotate crank shaft clockwise until the timing mark on the camshaft chain wheel is rotated to the position in the drawing. At this time, No. 4 cylinder is on the upper dead center of the compression stroke.



Major Overhaul of Engine—Disassembly and Installation Inspection of Timing Chain



6. Measure the clearance of the valve indicated by the arrow.
7. Record the measured value if it fails to comply with the standard value.
8. Replace valve lifter if the valve clearance exceeds the standard value.

Remarks	There are 31 groups of dimension of valve lifter. The interval of the dimension from 2.70-3.30 mm is 0.02 mm.
----------------	---

9. Select valve lifter in the following method.
 - (1) Remove valve lifter and measure its thickness.
 - (2) Calculate correct thickness of new valve lifter according to the following method to meet standard valve clearance.

A: Thickness of the new valve lifter

B: Thickness of the old valve lifter

C: Measured valve clearance

Equation:

Intake valve: $A = B + (C - 0.22 \text{ mm})$

Exhaust valve: $A = B + (C - 0.30 \text{ mm})$

دیجیتال خودرو

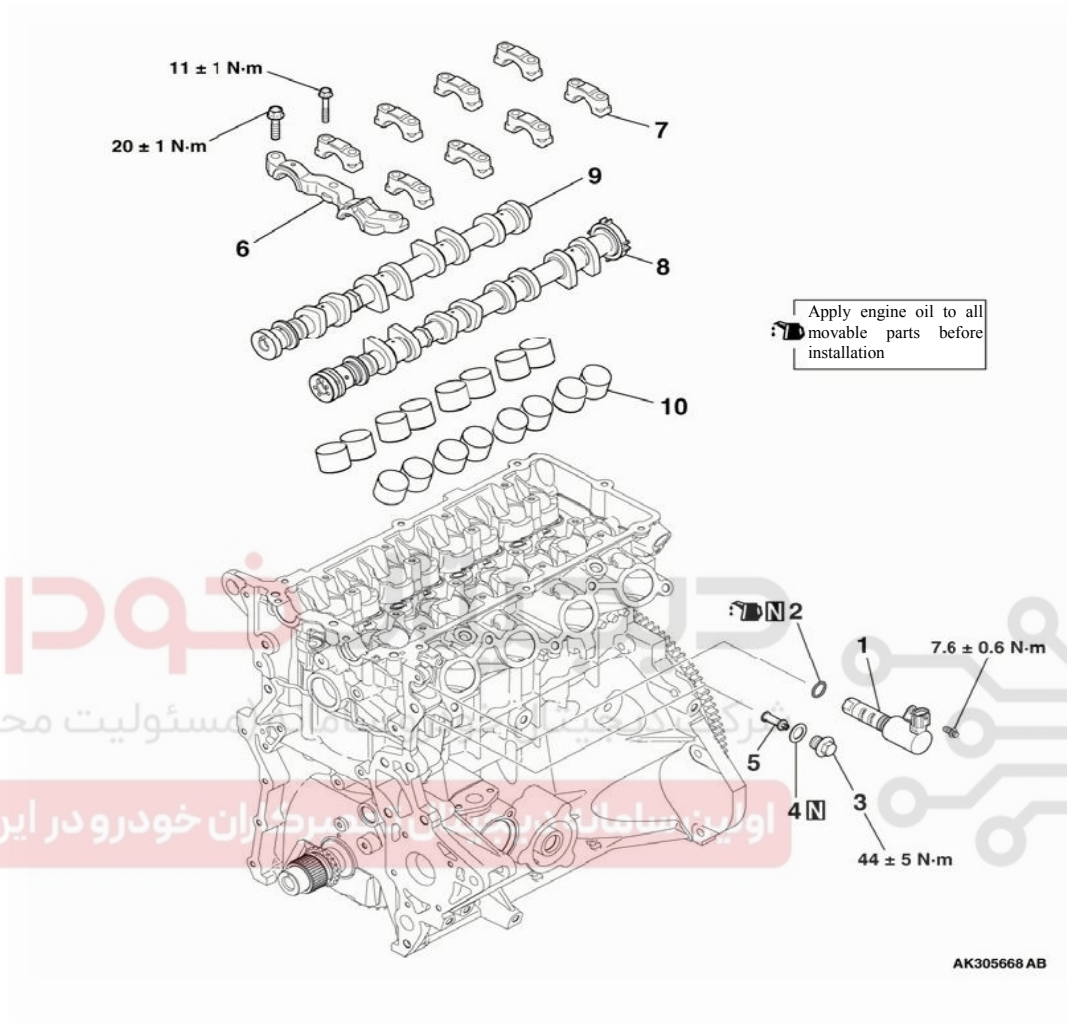
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Major Overhaul of Engine--Disassembly and Assembly Inspection of Camshaft

Disassembly and Assembly Inspection of Camshaft

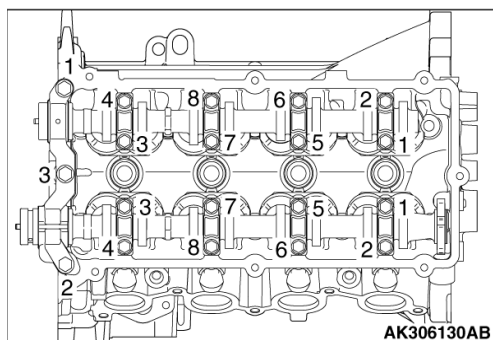


			Disassembly steps
	>>D<<	1.	Oil control valve (OCV)
	>>D<<	2.	O-ring
		3.	Bolt on filter of oil control valve
		4.	Washer
	>>C<<	5.	Filter of oil control valve
<<A>>	>>B<<	6.	Front bearing cover of camshaft
<<A>>	>>B<<	7.	Bearing cover of camshaft
	>>B<<	8.	Intake camshaft
	>>B<<	9.	Exhaust camshaft
<>	>>A<<	10.	Valve lifter

Major Overhaul of Engine--Disassembly and Assembly Inspection of Camshaft

Key points of disassembly and maintenance

<<A>> Disassembly of front bearing cover of camshaft/ bearing cover of camshaft



Remove the front bearing cover of camshaft first and then remove the fixed bolts on the bearing cover of each camshaft in the order indicated in the drawing.

<> Disassembly of valve lifter

Add a tag to each removed valve lifter to indicate the position so as to help re-installation.

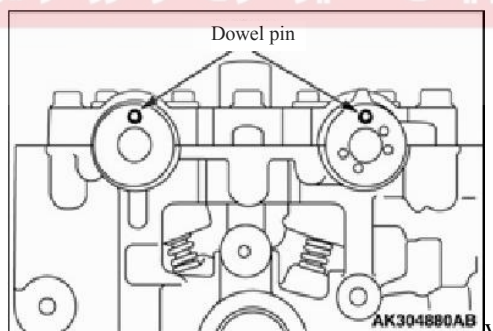
Key points of installation and maintenance

>>A<< Installation of valve lifter

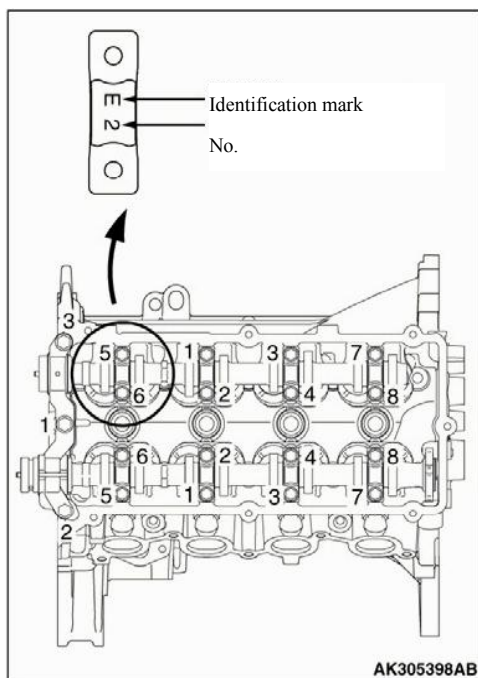
Install valve lifter on the correct position indicated on the tag.

>>B<< Installation of camshaft / bearing cover of camshaft

1. Install each camshaft and confirm that the dowel pin is in the direction indicated in the drawing.



Major Overhaul of Engine--Disassembly and Assembly Inspection of Camshaft



- No. 2 to No. 5 bearing covers of intake and exhaust camshaft have different shape. Install them correctly according to relevant identification marks.

Identification marks (attach marks to No. 2 and No. 5 bearing covers)

I: Intake

E: Exhaust

- Tighten bolts of bearing cover of each camshaft first according to the number sequence in the drawing and then tighten bolts of front bearing cover of the camshaft.

>>C<< Installation of filter of oil control valve

Notice	Check whether there is any attached foreign matter, flaw or transformation and then install filter of oil control valve.
---------------	--

>>D<< Installation of oil control valve



- | | |
|---------------|--|
| Notice | <ul style="list-style-type: none"> Don't reuse O-ring. Wrap the oil circuit of oil control valve with soft gummed tape before installation of O-ring to protect the ring from being damaged. Damaged O-ring may incur oil leakage. |
|---------------|--|

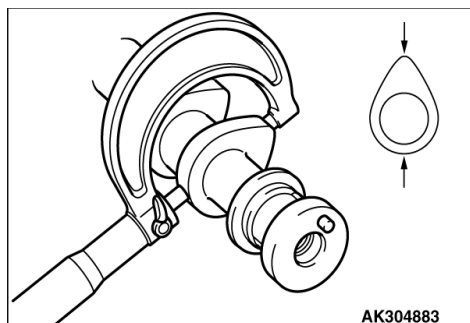
Apply a little engine oil on the O-ring of oil control valve.

- Install oil control valve on the cylinder cover.
- Tighten oil control valve to standard torque: **7.6 ±0.6 N m.**

Major Overhaul of Engine--Disassembly and Assembly Inspection of Camshaft

Inspection

Camshaft



Measure the height of camshaft. Replace the camshaft if the measured height exceeds limit value.

Standard value:

Intake: 44.71 mm

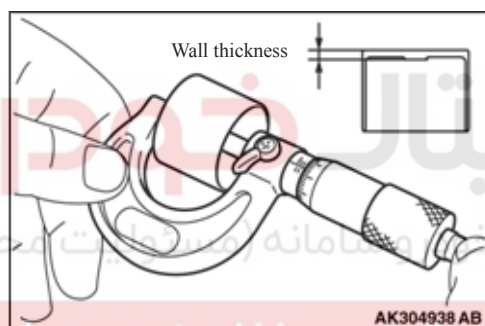
Exhaust: 44.28 mm

Limit value:

Intake: 44.21 mm

Exhaust: 43.78 mm

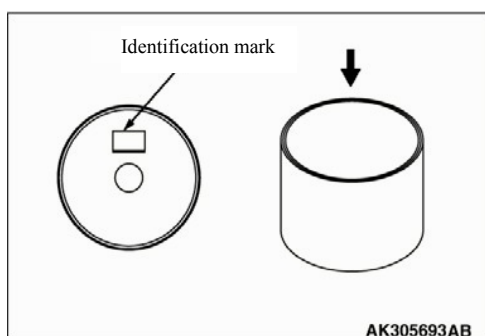
Valve lifter



1. Measure valve lifter (as the drawing shows). Replace the valve lifter according to the identification marks and the following table if the measure value is not coincident with the specified value.

2. Each valve lifter is provided with an identification mark attached on the position shown in the drawing.

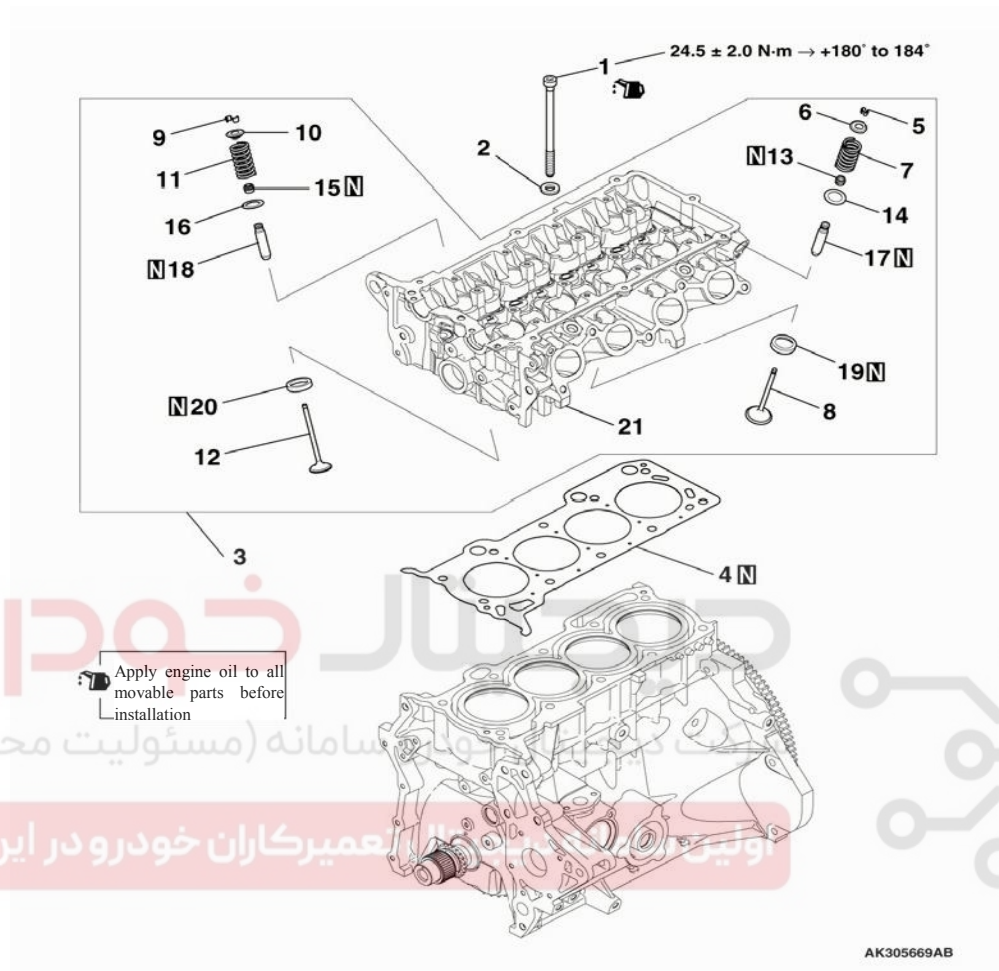
There are 31 groups of dimension of valve lifter. The interval of the dimension from 2.70-3.30 mm is 0.02 mm, as the following table shows.



Thickness mm	Recognition mark	Thickness mm	Recognition mark	Thickness mm	Recognition mark
2.70	70	2.92	92	3.14	14
2.72	72	2.94	94	3.16	16
2.74	74	2.96	96	3.18	18
2.76	76	2.98	98	3.20	20
2.78	78	3.00	00	3.22	22
2.80	80	3.02	02	3.24	24
2.82	82	3.04	04	3.26	26
2.84	84	3.06	06	3.28	28
2.86	86	3.08	08	3.30	30
2.88	88	3.10	10		
2.90	90	3.12	12		

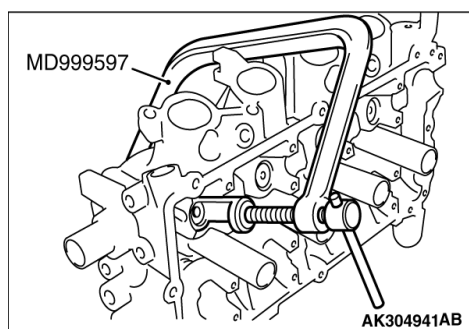
Major Overhaul of Engine--Disassembly and Installation Inspection of Cylinder Cover and Valve

Disassembly and Installation Inspection of Cylinder Cover and Valve



Disassembly steps	
>>C<<	1. Cylinder cover bolts
	2. Bolt washer of cylinder cover
	3. Cylinder cover assembly
	4. Cylinder gasket
<<A>>	>>B<<
	5. Valve locker
	6. Fixer of valve spring
	7. Valve spring
	8. Intake valve
<<A>>	>>B<<
	9. Valve locker
	10. Fixer of valve spring
	11. Valve spring
	12. Exhaust valve
>>A<<	13. Valve oil seal
	14. Spring seat of valve
>>A<<	15. Valve oil seal
	16. Spring seat of valve
	17. Valve conduit
	18. Valve conduit
	19. Intake valve seat
	20. Exhaust valve seat
	21. Cylinder cover
	22. Exhaust valve

Major Overhaul of Engine--Disassembly and Installation Inspection of Cylinder Cover and Valve

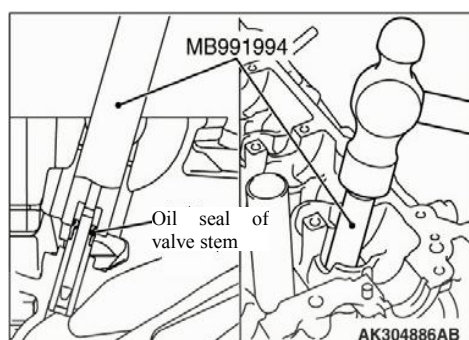


Key points of disassembly and maintenance

<<A>> Disassembly of valve locker

Compress the valve springs and remove valve locker with the special tool, compressor of valve spring (MD999597).

Remarks Valve springs and other disassembled parts should be placed orderly and marked to help re-installation.



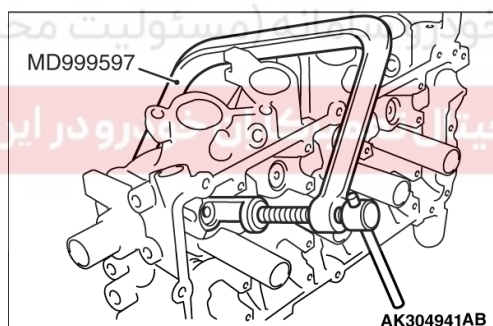
Key points of installation and maintenance

>>A<< Installation of valve oil seal

1. Install spring seat of valve.
2. Apply engine oil on the valve oil seal.

Notice

- Don't reuse valve oil seal.
- Install new valve oil seal correctly with a special tool to prevent engine oil from seeping into the combustion chamber.

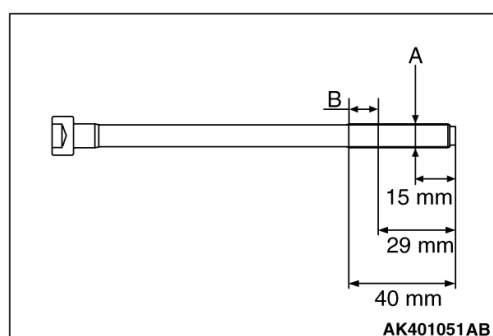


3. Push new valve oil seal into the valve conduit with the special tool—installer of valve oil seal.

Remarks Use the special tool with the part number of MB991994A

>>B<< Installation of valve locker

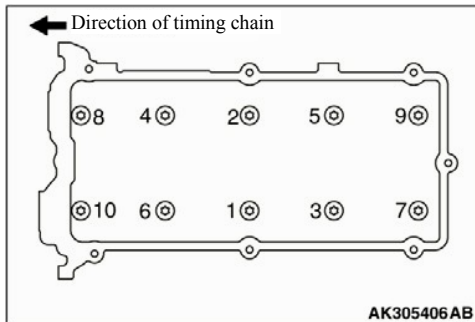
Compress the valve springs and install valve locker with the special tool, compressor of valve spring (MD999597).



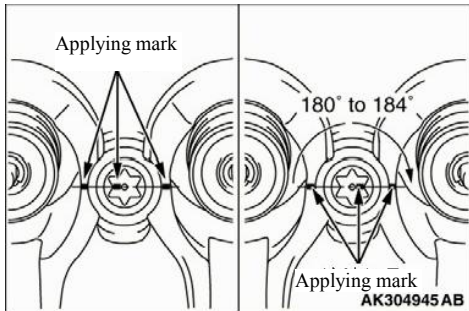
>>C<< Installation of bolts of cylinder cover

1. Inspect all reused bolts of cylinder cover according to the following steps.
 - (1) Measure the external diameter of the position indicated in the drawing (arrow "A").
 - (2) Measure the smaller external diameter of the position indicated in the drawing (arrow "B").
 - (3) Replace the bolts of cylinder cover if the difference between the external diameters (arrow "A" and "B"). of the two positions exceeds standard value. **Standard value: 0 - 0.15 mm.**
2. Install bolts of cylinder cover and washer assembly on the cylinder cover.

Major Overhaul of Engine--Disassembly and Installation Inspection of Cylinder Cover and Valve



3. Tighten the bolts to standard torque: **24.5 ± 2 N m** as per the installation order.
4. Ensure the bolts meet standard torque.



5. Make applying marks on the bolt caps and the cylinder, as the drawing indicates.
- 6.

Notice

- Bolts of cylinder cover may loosen if they are screwed by less than 180°. Thus, please screw bolts correctly.
- Loosen the bolts of cylinder cover completely and re-screw as per specified steps if they are screwed by over 184°.

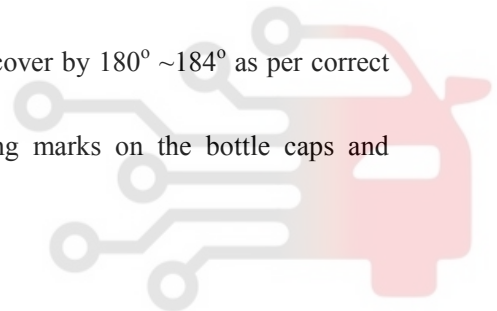
دیجیتال خودرو

اولین سامانه تعمیرکاران خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Screw the bolts of cylinder cover by 180° ~184° as per correct order.

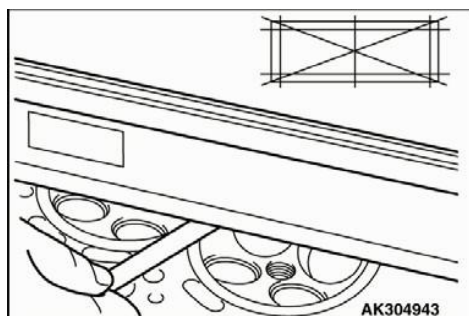
Inspect whether the applying marks on the bottle caps and cylinder cover are aligned.



Major Overhaul of Engine--Disassembly and Installation Inspection of Cylinder Cover and Valve

Inspection

Cylinder cover



1. Check whether the coolant or exhaust gas in the cylinder cover leaks or whether there is any damage before cleaning.
2. Remove oil, furr, sealant, carbon deposit and other residue. Clean and blow the oil circuit with compressed air.
- 3.

Notice

The combined grinding limit value of cylinder cover and cylinder block is 0.2mm.

Measure the flatness of bottom surface of the cylinder cover with straight scale and thickness gauge. Correct the flatness through grinding if it exceeds the limit value.

Distortion of bottom surface

Standard value: maximum 0.03 mm

Limit value: 0.2mm

Grinding limit value: 0.2mm

Height of cylinder cover

(standard value of new parts): 113.0 mm

1. Finish the valve seat with tools if the surface of valve seat is not flat or continuous.
2. Measure the valve edge. Replace new valve if the measured value exceeds limit value.

Standard value:

Intake: 1.35 mm

Exhaust: 1.85 mm

Limit value:

Intake: 0.85 mm

Exhaust: 1.35 mm E

3. Measure the total length of valve. Replace the valve if the measured value exceeds limit value.

Standard value:

Intake: 89.61 mm

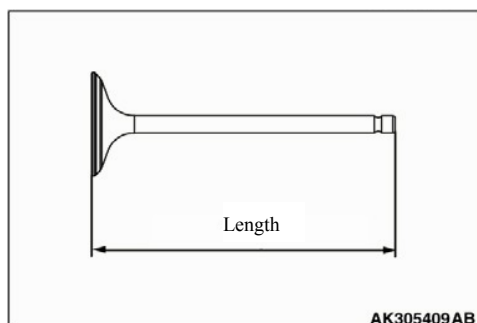
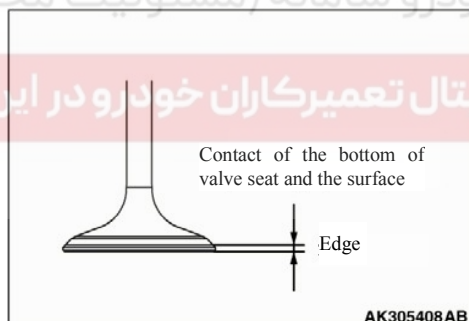
Exhaust: 90.94 mm

Limit value:

Intake: 89.11 mm

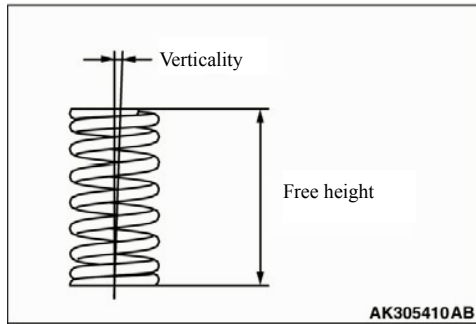
Exhaust: 90.44 mm

Valve



Major Overhaul of Engine--Disassembly and Installation Inspection of Cylinder Cover and Valve

Valve spring



1. Measure the free height of the valve spring. Replace the spring if the measured value exceeds limit value.

Standard value: 43.1 mm

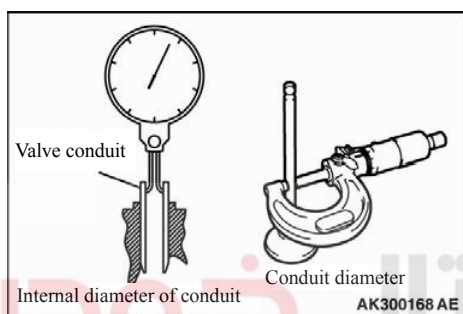
Limit value: 42.1 mm

2. Measure the verticality of the valve spring. Replace the spring if the measured value exceeds limit value.

Standard value: less than 2 °

Limit value: 4 °

Valve conduit



Measure the clearance between the valve conduit and valve lifter. Replace the valve conduit or/ and the valve if the measured value exceeds the limit value.

Standard value:

Intake 0.020 - 0.047 mm

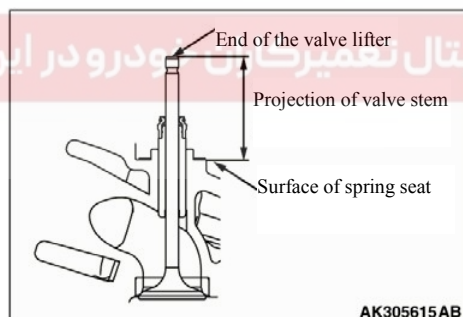
Exhaust 0.030 - 0.057 mm

Limit value:

Intake: 0.10 mm

Exhaust: 0.15 mm

Valve seat



Combine the valves and measure the projection of valve lifter between the end of valve lifter and the surface of spring seat. Replace the cylinder cover assembly if the measured value exceeds the limit value.

Standard value:

Intake: 38.46 mm

Exhaust: 38.49 mm

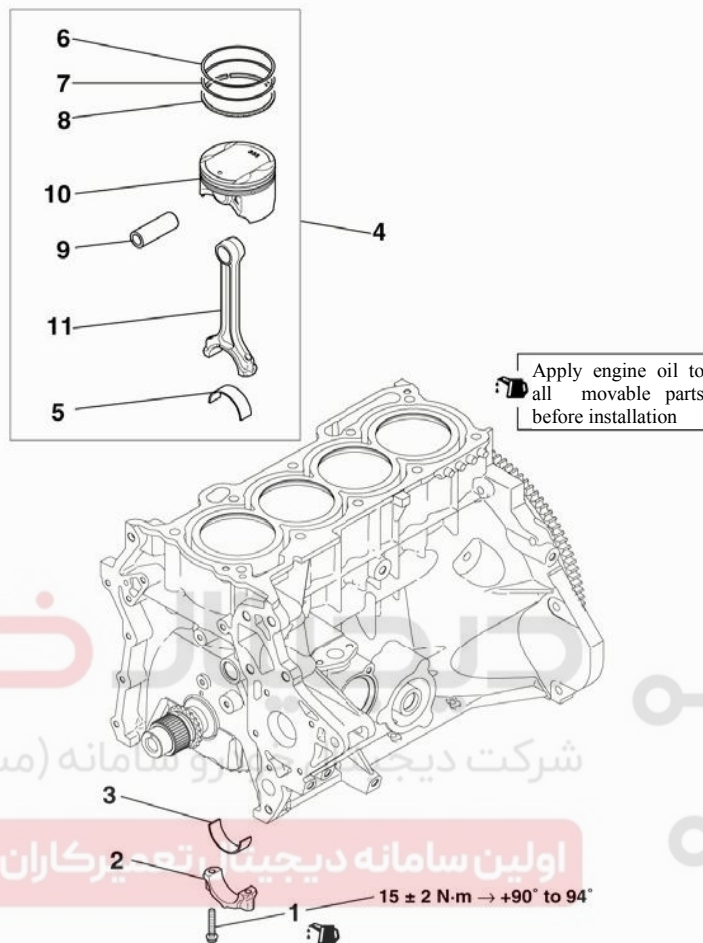
Limit value:

Intake: 38.96 mm

Exhaust: 38.99 mm

Major Overhaul of Engine--Disassembly and Installation Inspection of Piston and Connecting Rod

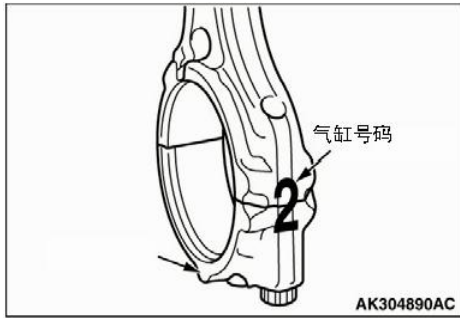
Disassembly and Installation Inspection of Piston and Connecting Rod



AK305670AB

Disassembly steps			
	>>G<<	1.	Bolts of connection rod cap
<<A>>	>>F<<	2.	Connecting rod cap
	>>E<<	3.	Connecting rod bearing
	>>D<<	4.	Piston and connecting rod assembly
	>>E<<	5.	Connecting rod bearing
	>>C<<	6.	No.1 piston ring
	>>C<<	7.	No.2 piston ring
	>>B<<	8.	Oil ring
<>	>>A<<	9.	Piston pin
		10.	Piston
		11.	Connecting rod

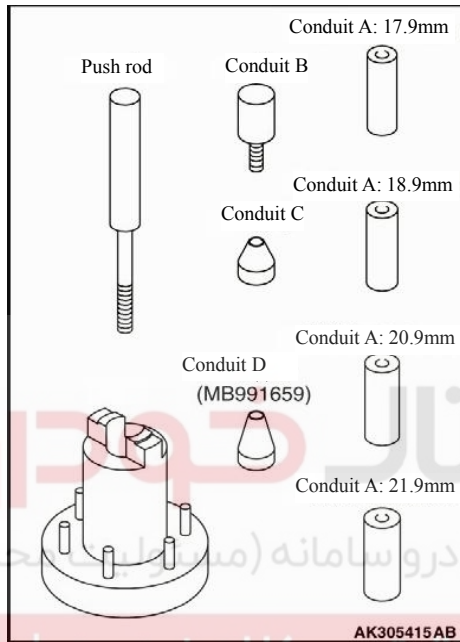
Major Overhaul of Engine—Disassembly and Installation Inspection of Piston and Connecting Rod



Key points of disassembly and maintenance

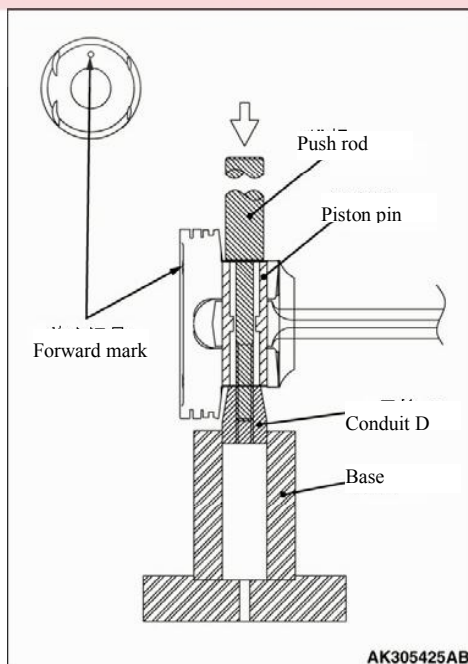
<<A>> Disassembly of connecting rod cap

Mark corresponding cylinder number on the side of the connecting rod to ensure correct installation.



<> Disassembly of piston pin

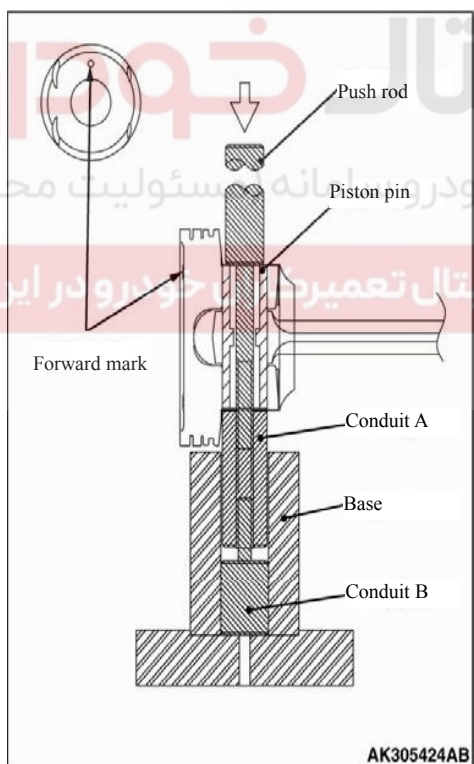
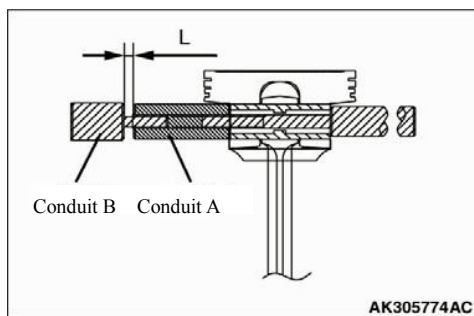
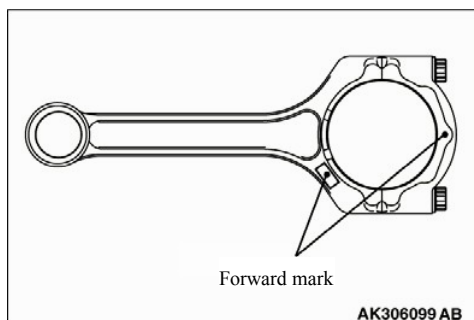
Setting means of piston pin (MD998780), a special tool, consists of the parts in the drawing. The special tool--conduit D (MB991659) can also be used for disassembling.



1. Insert the push rod (special too) into the piston from the side with forward mark of the piston bottom. Install conduit D on the other side.
2. Install the piston and connecting rod assembly on the piston pin base (special tool) with a tool and ensure that the forward mark of the piston is upward.
3. Disassemble the piston pin with pressure.

Remarks	Place the disassembled piston, piston pin and connecting rod as per the cylinder number.
----------------	--

Major Overhaul of Engine—Disassembly and Installation Inspection of Piston and Connecting Rod



Key points of installation and maintenance

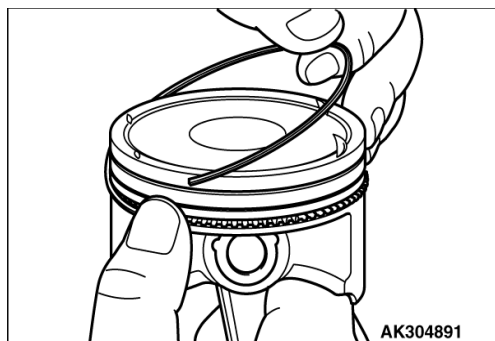
>>A<< Installation of piston pin

1. Insert the special tool (push rod) into the piston pin and then install conduit A.
2. Install the piston and connecting rod together and confirm their forward marks are aligned.
3. Paint engine oil around the piston pin.
4. Insert the combined piston pin in step 1 into the piston pin seat. The end of conduit A of piston pin should be inserted to the forward mark of the pin seat.
5. Insert conduit B into conduit A with the clearance L of 2.25 mm.
6. Insert the piston and connecting rod assembly on the piston pin base (special tool) with a tool and ensure that the forward mark of the piston is upward.
7. Press in the piston pin with pressure. Replace the piston pin (piston assembly) or/and connecting rod if the pressure is lower than the standard value.

Standard value: 5,000 - 11,000 N

>>B<< Installation of oil ring

Major Overhaul of Engine—Disassembly and Installation Inspection of Piston and Connecting Rod



1. Install the main ring of oil ring into the groove of piston ring and then install upper and lower doctor blade.

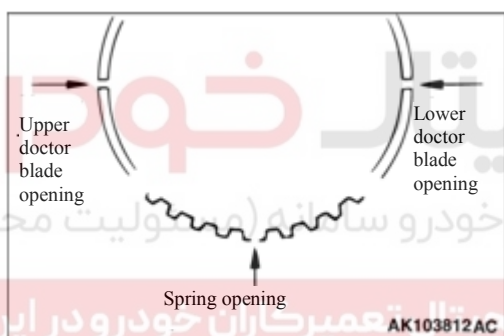
Remarks	Distinguish new main ring and doctor blade as per the following identification colors:
----------------	--

Dimensions	Identification color
Standard	No mark
0.25 mm oversize	Dual blue

2.

Notice	Don't use the expander of piston ring in installing doctor blade, or the doctor blade may be damaged.
---------------	---

Insert one end of the doctor blade into the piston groove and then press the doctor blade into the correct position with fingers.

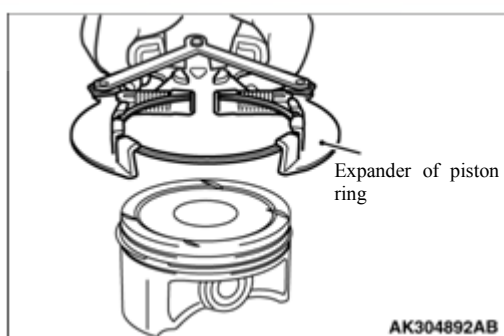


3. Install the doctor blade on the piston and check whether the doctor blade can move flexibly in both directions.

4. The opening of the doctor blade should be set on the position indicated in the drawing.

>>C<< Installation of No.2 piston ring/ No.1 piston ring

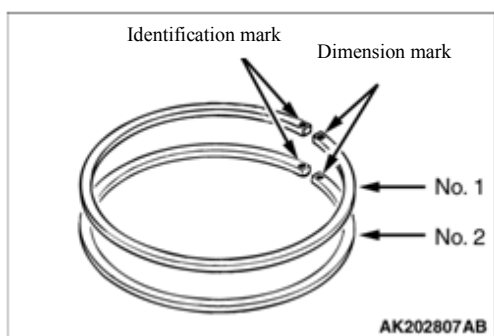
Install No.1 and No.2 piston rings with the expander of piston ring. The identification mark of piston ring should be upward.



Identification mark: No. 1 ring: R No.2 ring: 2R

Dimension mark of piston ring is as follows:

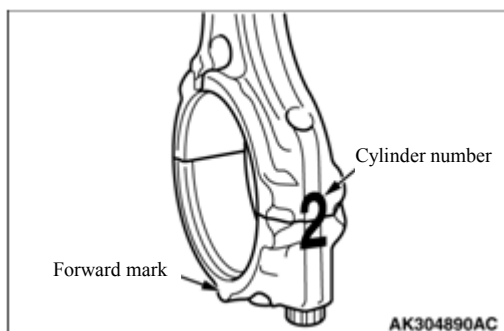
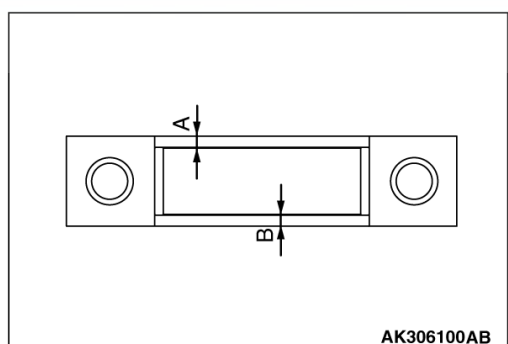
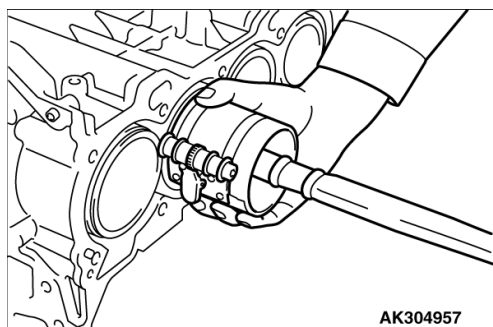
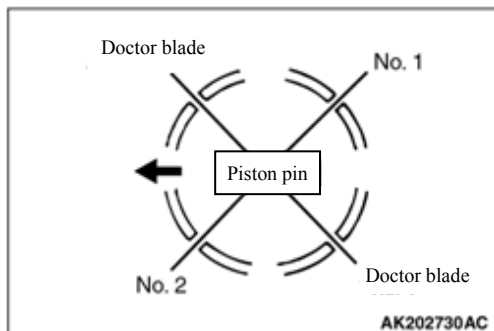
Dimensions	Dimension mark	
Standard	No. 1 ring	No mark
	No. 2 ring	No mark
0.25 mm oversize		25



>>D<< Installation of piston and connecting rod assembly

1. Paint engine oil around the piston, piston ring and

Major Overhaul of Engine--Disassembly and Installation Inspection of Piston and Connecting Rod



- oil ring.
- Arrange piston ring and oil ring opening as the drawing indicates (doctor blade and oil ring)
- Insert the piston and connecting rod assembly into the cylinder hole and ensure that the forward mark on the top of the piston faces the camshaft chain wheel.
-

Notice Never knock piston and connecting rod assembly fiercely, otherwise, the piston ring may be easily damaged.

Fix piston ring with compression tools of piston ring and then install the piston and connecting rod assembly into the cylinder block.

>>E<< Installation of connecting rod bearing

- The identification mark of connecting rod bearing is made on the position indicated in the drawing. Select connecting rod bearing as per the following table.

Connecting rod bearing	
Upper bearing	Lower bearing
Blue	Red
Red	Blue
Yellow	Yellow

For example: if upper bearing is blue, the lower bearing should be red.

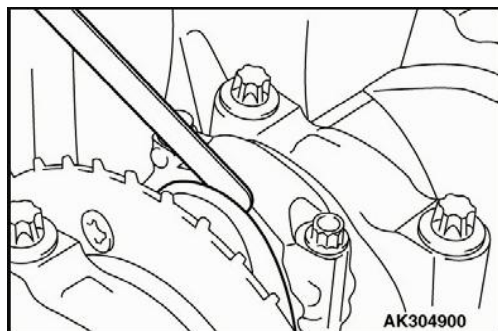
- Install selected bearing on the big end of the connecting rod and the bearing cover.
- Measure the position indicated in the drawing. The error should be less than 0.5 mm.

>>F<< Installation of connecting rod cap

- Install correct bearing cover on corresponding connecting rod as per the marks made in disassembly.
- Confirm that the side clearance of the big end of connecting rod complies with specified values.

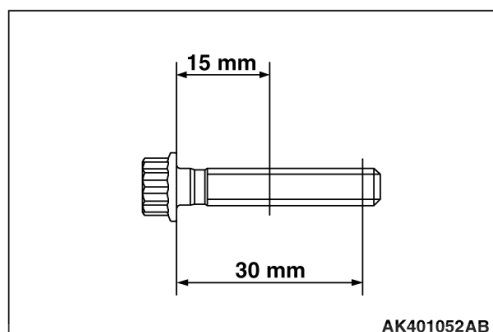
Standard value: 0.10 - 0.35 mm

Major Overhaul of Engine--Disassembly and Installation Inspection of Piston and Connecting Rod



Limit value: 0.4 mm

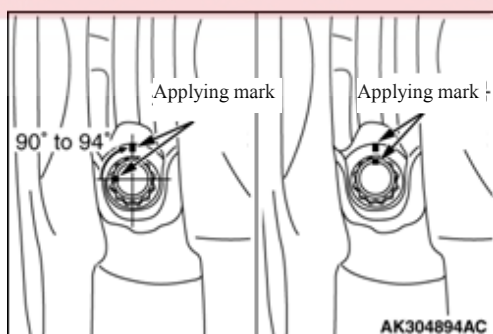
>>G<< Installation of bolts of connecting rod cap



1. Inspect all reused bolts of connecting rod according to the following steps.
 - (1) Measure the external diameters on the positions 15 mm/30mm from the end of the bolts of connecting rod in the drawing.
 - (2) Replace the bolt of connecting rod if the difference between the external diameters (measured value on the position 15mm/30mm from the end) exceeds the standard value.

Standard value: 0 - 0.1 mm

2. Paint engine oil on the screw thread and the bearing surface of nuts.
3. Install connecting rod cap correctly and screw the bolts loosely with fingers.
4. Tighten bolts to the standard torque: $15 \pm 2 \text{ N m}$ as per the steps.
5. Make painting marks on the front part of bolts as the drawing indicates.
6. Make another painting mark on the front part of bolts (from 90° to 94°) oriented from the first painting mark to the screwing direction.
- 7.



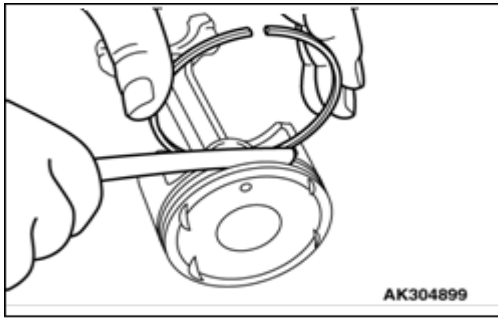
Notice

- Ensure bolts are correctly tightened because bolts may loosen if it is screwed less than 90° .
- Unscrew bolts completely and then repeat all the steps if they are tightened over 94° .

Tighten bolts 90° - 94° . The painting mark on the connecting rod should align with that on the bolts.

Major Overhaul of Engine—Disassembly and Installation Inspection of Piston and Connecting Rod

**Inspection
Piston Ring**



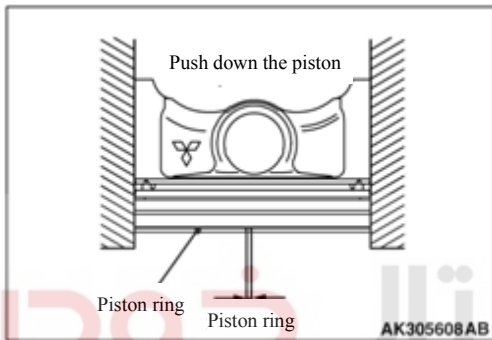
1. Measure the clearance between the piston ring and ring groove. If the measured value exceeds the limit value, the piston ring, or both of the piston ring and piston should be replaced.

Standard value:

No.1 Channel 0.03 - 0.07 mm

No.2 Channel 0.02 - 0.06mm

Limit value: 0.1mm



2. Insert the piston ring into the cylinder hole. Place the piston and push it down with piston head to ensure the correct angle between the ring and the cylinder wall. Measure the opening clearance with thickness gauge: if the measured value exceeds limit value, replace the piston ring.

Standard value:

No.1 Channel 0.15 - 0.30mm

No.2 Channel 0.30 - 0.50mm

Oil ring 0.10 - 0.40 mm

Limit value:

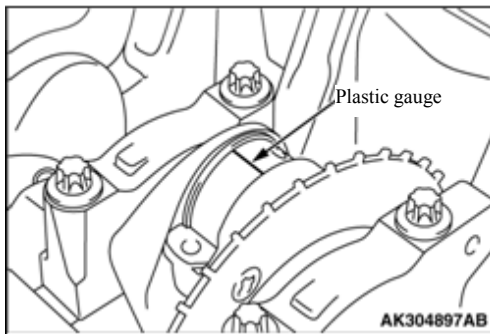
No.1 Channel 0.8 mm

No.2 Channel 0.8 mm

Oil ring 1.0mm



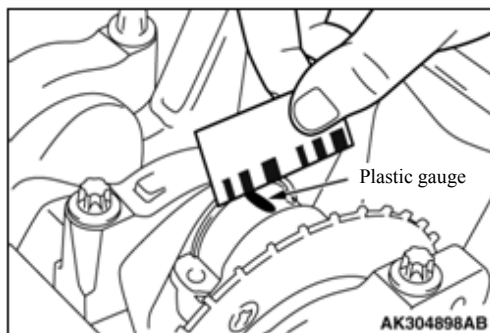
**Oil Film Clearance of Crank Pin
(In Plastic Gauge Materials)**



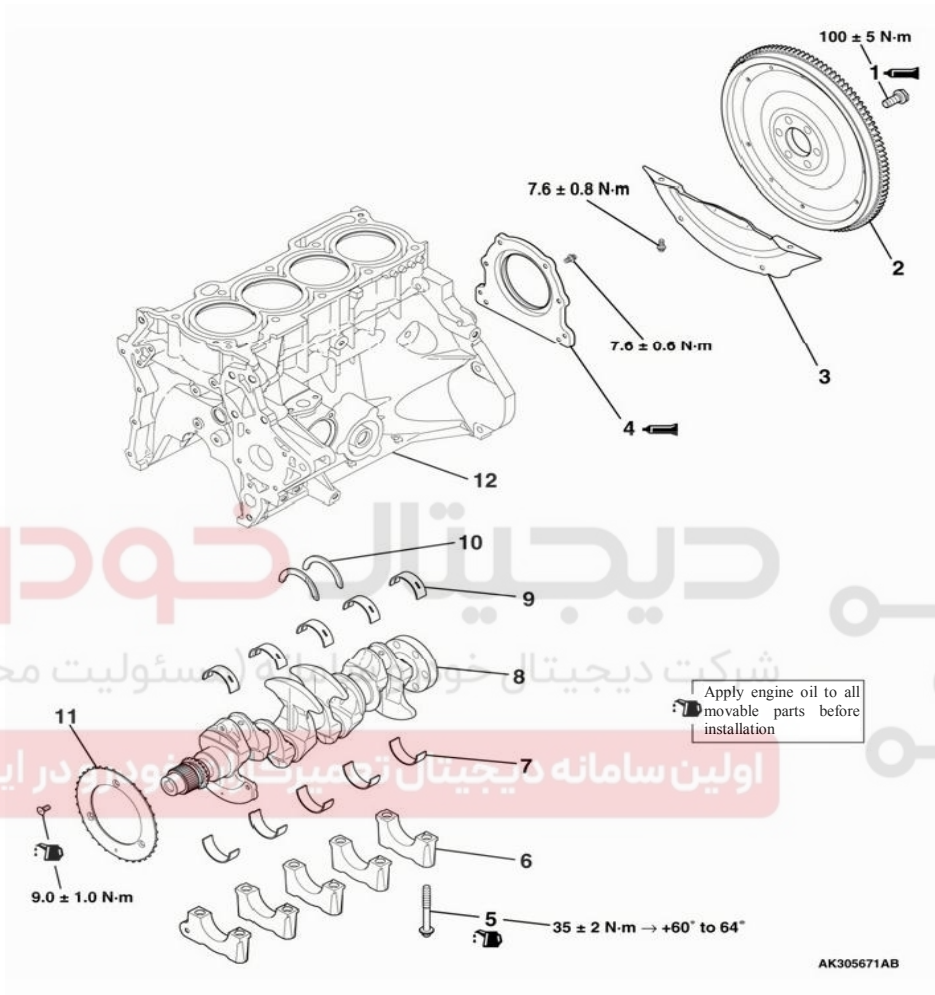
1. Clean the oil film between crank pin and connecting rod bearing.
2. Cut off the plastic gauge materials of the length equal to the width of the bearing and place it on crank pin in parallel.
3. Carefully install the connecting rod cap on the plastic gauge and screw down the bolt to $15 \pm 2 \text{ N}\cdot\text{m}$ $\rightarrow +90$ to 94 degree.
4. Remove the bolt and the connecting rod cap slowly.
5. Measure the width of the pressed part (the widest part) of the plastic gauge materials with the measure gauge printed on the package.

Standard value: 0.014 - 0.059 mm

Limit value: 0.1mm

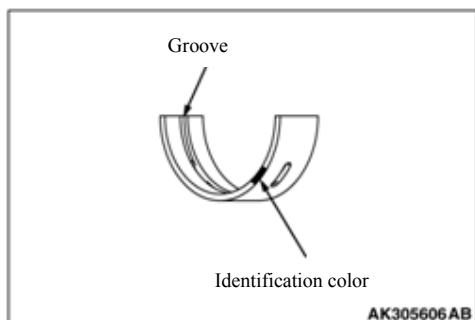
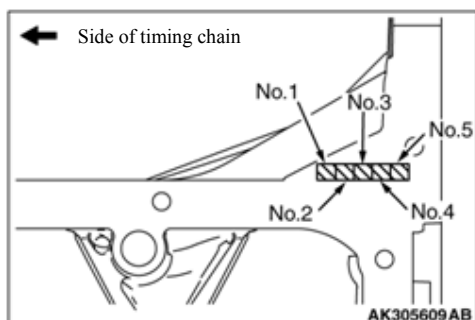
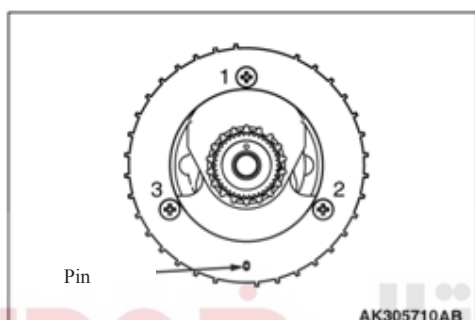
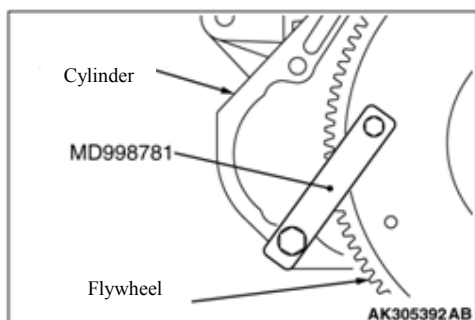


Disassembly and Installation Inspection of Crank Shaft and Cylinder Block



Disassembly steps			
<<A>>	>>G<<	1,	Flywheel bolt
		2,	Flywheel
		3,	Bell-shaped shell cover
	>>F<<	4,	Oil-seal housing
	>>E<<	5,	Bolt of crank shaft bearing cap
	>>E<<	6,	Crank shaft bearing cap
	>>D<<	7,	Crank shaft bearing, lower part
		8,	Crank shaft
	>>C<<	9,	Crank shaft bearing, upper part
	>>B<<	10,	Thrust bearing

>>A<<	11、	Induction ring of crank shaft
	12、	Cylinder



Key points of disassembly and maintenance

>>A<< Disassembly of flywheel bolt

1. Lock the flywheel with a special tool – flywheel stopper (MD998781)
2. Disassembly the flywheel bolt

Key points of installation and maintenance

>>A<< Installation of induction ring of crank shaft

1. Apply engine oil to the induction ring screw of crank shaft
2. Screw down the induction ring screw of crank shaft to **9.0 ± 1.0 N m** following the steps as indicated in the drawing.

>>B<< Installation of thrust bearing

1. Install thrust bearing on No.4 bearing on the cylinder. To facilitate the installation, engine oil may be applied on the thrust bearing.
2. The thrust bearing must be installed with its groove surface facing to the crank web of the crank shaft.

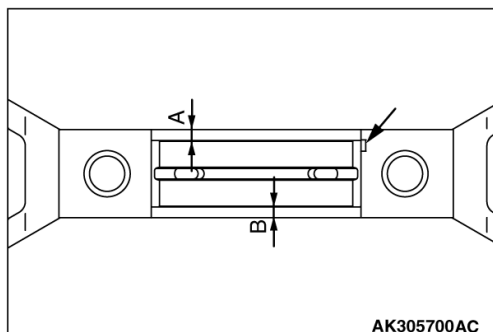
>>C<< Installation of crank shaft bearing (upper part)

1. Select crank shaft bearing (upper part) according to the identification mark on the bottom surface of cylinder and the table below.

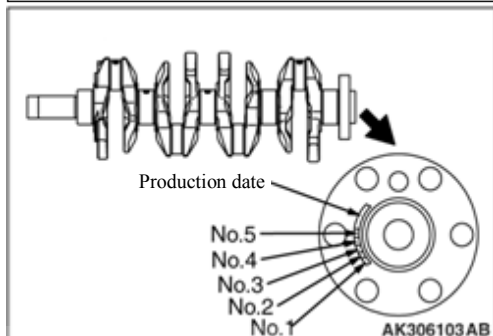
Distinguish each crank shaft bearing (upper part) according to the identification color as indicated in the drawing

Cylinder block		Identification color of crank shaft bearing
Identification mark	Journal diameter mm	
1	50.000 - 50.005	Blue
2	50.005 - 50.010	Yellow

3	50.010 - 50.015	Red
---	-----------------	-----



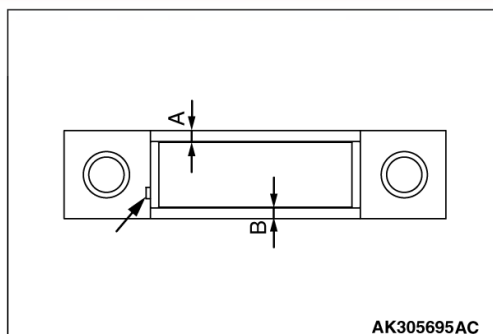
AK305700AC



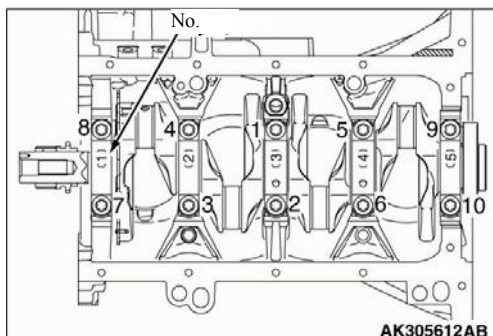
AK306103AB



AK305607AB



AK305695AC



AK305612AB

2. Select and install the crank shaft bearing (upper part) Install the working parts in the position as indicated in the drawing.

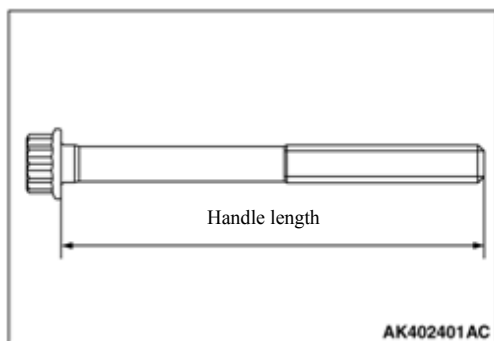
>>D<< Installation of crank shaft bearing (lower part)

1. Select the crank shaft bearing (lower part) according to the identification mark (see the drawing) on the flange (on the back of crank shaft) and the table below.
2. Distinguish each crank shaft bearing (lower part) according to the identification color as indicated in the drawing

Identification mark	Journal diameter mm	Identification color of crank shaft bearing
P	46.024 - 46.029	Blue
Y	46.019 - 46.024	Yellow
N	46.014 - 46.019	Red
W	46.009 - 46.014	White
B	46.004 - 46.009	Purple

3. Select and install the crank shaft bearing (lower part) Install the working parts in the position as indicated in the drawing.

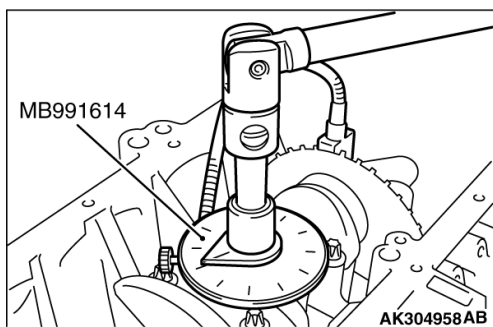
>>E<< Installation of crank shaft bearing cap/bolt



1. Install bearing cap as per the identification mark as indicated in the drawing.
2. Before the installation of bearing bolt, ensure that the length of the bolt is below the limit value; if not, replace the bolt.

Standard value: 75.3 mm

3. Apply engine oil to the screw thread and the bearing surface of the bolt.
4. Screw down the bearing cap bolt to the torque of 35 ± 2 N·m.

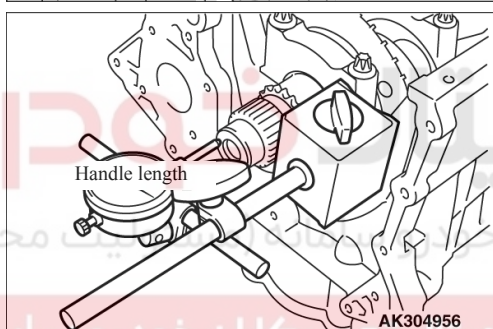


5.

Notice

- If the screw tightening of the bolt is less than 60 degrees, the bolt may be insecure. Ensure that the bolt is screwed down.
- If the screw tightening of the bolt exceeds 64 degrees, completely unscrew the bolt and then repeat the screwing steps.

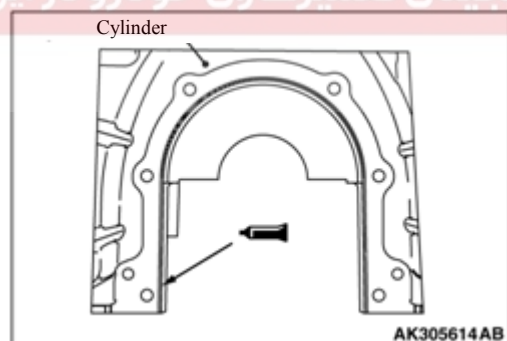
Screw down bearing cap bolt to 60-64 degrees in specified order with a special tool – angle gauge (MB991614).



6. Install bearing cap and inspect the clearance of crank shaft end. If the measured value exceeds the limit value, replace the crank shaft bearing.

Standard value: 0.09 - 0.27mm

Limit value: 0.30mm



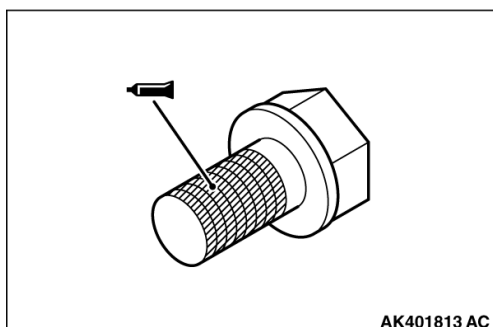
>>F<< Installation of oil-seal housing

1. Clean the sealant residue on the oil-seal housing and cylinder.
- 2.

Notice Oil-seal housing should be assembled within 3 min after liquid sealant is used.

Apply continuous beaded liquid sealant of $\Phi 2.0 \pm 0.5$ mm as indicated in the drawing. **Specification of the sealant: LOCTITE 5971 or equivalent.**

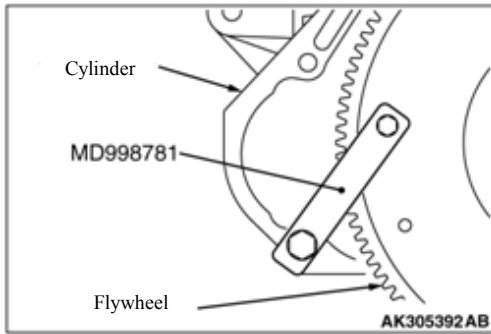
3. Install oil-seal housing and screw it down to the torque of 7.6 ± 0.6 N m.



>>G<< Installation of flywheel

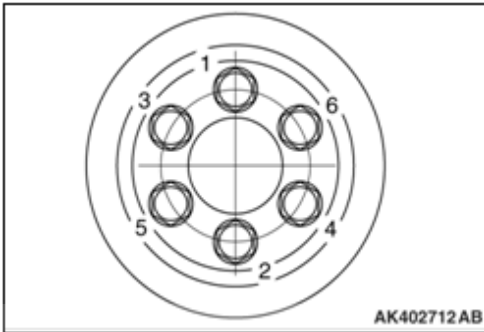
1. Clean up the sealant residue on the flywheel or the screwed hole of the crank shaft.
2. Apply sealant on the screwed part of flywheel bolt as indicated in the drawing.

Notice The sealant should be used correctly to prevent it from being squeezed out of the screw thread.



Specification of the sealant: LOCTITE 2701 or equivalent.

3. Fix the flywheel to a proper place with a special tool – flywheel stopper (MD998781).



4. Screw down the driver panel bolt to the specified torque of $100 \pm 5 \text{ N}\cdot\text{m}$.

دیجیتال خودرو

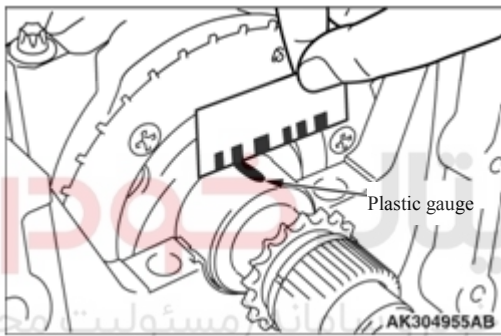
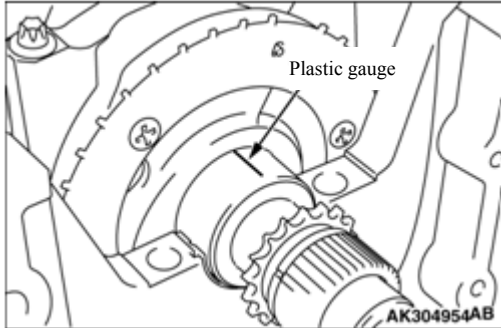
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Check

Oil Film Clearance of Crank Journal (By Plastic Gauge)



The film clearance can be easily measured with “plastic gauge”.

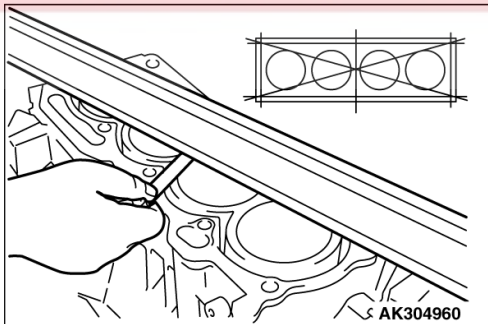
The “plastic gauge” can be used in the following way:

1. Remove the oil film from the surface of crank journal and the internal surface of bearing.
2. Install crank shaft.
3. Cut off the plastic gauge materials of the length equal to the width of the bearing and place it on the journal in parallel.
4. Place the main bearing cap and screw down the bolt to the specified torque.
5. Disassemble the bolt and the main bearing cap carefully.
6. Measure the width of the pressed part (the widest part) of the plastic gauge materials with the measure gauge printed on the package.

Standard value: 0.014 - 0.034mm

Limit value: 0.1mm

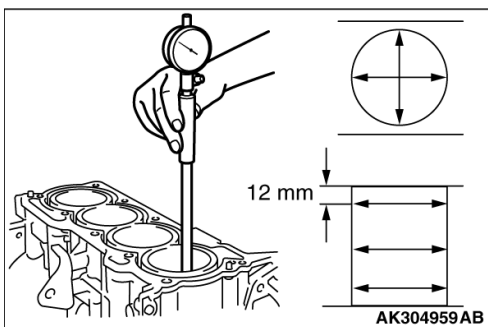
Cylinder block



1. Inspect scratch, rust and corrosion visually. Inspect crack with liquid detection agent. Replace the cylinder block if there is a crack.
2. Measure the upper surface of the cylinder block with a straight scale or thickness gauge. Ensure that

Standard value: 0.05mm

Limit value: 0.1mm



3. Inspect whether there are scratches or scrapes on the cylinder hole; replace it if there is any scratch or scrap.
4. Measure the cylindricity of cylinder hole with roundness gauge. If there is severe abrasion, replace the piston and piston ring.

Standard value:

Inner diameter of cylinder 75.0 mm

Cylindricity of cylinder diameter 0.007 mm