

ENGINE 4J SERIES

SECTION 6A1

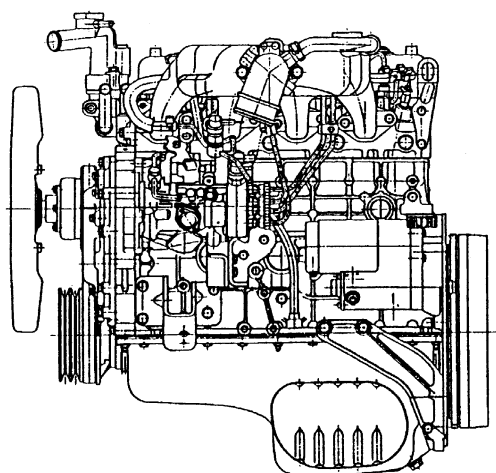
4JB1/4JB1-TC/4JG2/4JH1-TC - ENGINE

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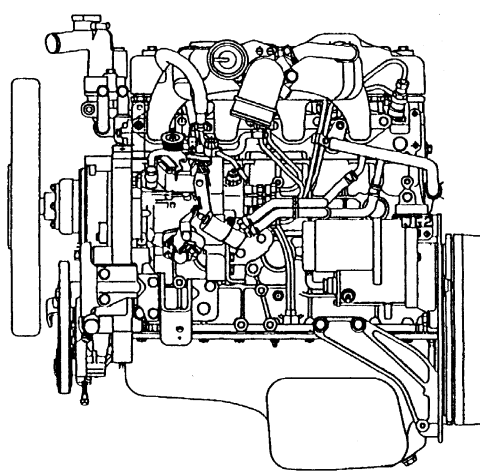
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GENERAL DESCRIPTION

4JB1, 4JG2



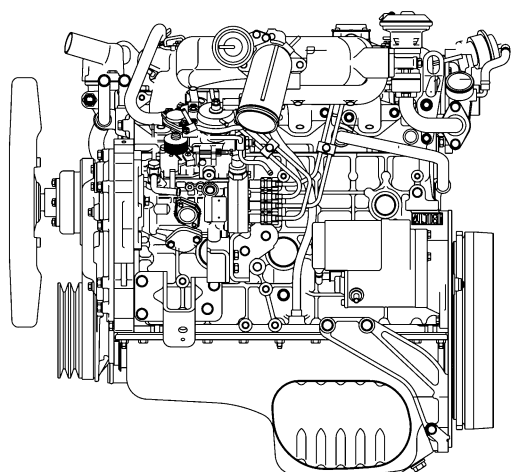
4JB1



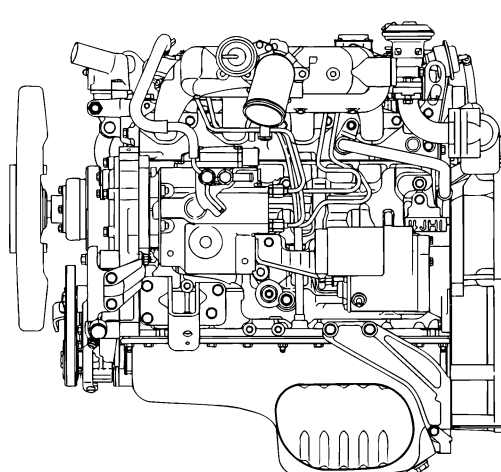
4JG2

N6A3220E

4JB1-TC, 4JH1-TC



4JB1-TC



4JH1-TC

N6A3221E

The 4JB1 Model engine employs a square troidal type combustion chamber provided with a fence around it. These designs employed allow a superior fuel economy over a wide range of driving conditions.

The 4JG2 Model engine employs, for its combustion chamber, the RECARD Comet V Type swirl combustion chamber which provides a superior driving performance, fuel economy and silent combustion over a wide range of driving conditions.

For the cylinder head gasket steel sheets, laminated steel sheets are employed.

Three grades of the gaskets according to the piston head projection measured from the cylinder block are employed to minimize the fluctuation of the engine compression ratio.

The Angular Tightening Method is employed to tighten the cylinder head fixing bolts, connecting rod fixing bolts and flywheel fixing bolts.

The chrome-plated steel dry type (Chromard) cylinder liners provide the highest durability.

Auto-thermic pistons with cast steel struts are used to reduce thermal expansion and resulting engine noise experienced while the engine is cold.

The tufftrided crankshaft has a long service life. Because it is tufftrided, it cannot be reground.

The crankshaft main bearings and the connecting rod bearings are of aluminum alloy. These bearings are especially vulnerable to foreign materials such as metal scraps. It is very important to keep the oil ports and other related surfaces clean and free of foreign materials.

The tufftriding treatment (nitriding treatment) of the crankshaft for the increased strength eliminates the re-grinding of crankpins and journals.

An oiling jet device for piston cooling is provided in the lubricating oil circuit which runs through the check valve from the cylinder block oil gallery.

Take care not to damage the oiling jet when removing or installing the piston and the connecting assembly.

The 4JG2 engine use a single spring pintle type injection nozzle.

The 4JB1 Model employs a direct injection type engine provided with a nozzle with four holes, which makes it possible to obtain an excellent mixing ratio of intake air and fuel spray.

4JB1-TC engine has two springs injection nozzle system for efficient control.

The turbocharger increase air intake efficiency, the results in increased engine power, reduced fuel consumption and minimal engine noise.

Turbocharger rotating parts operate at very high speeds and temperatures. The parts materials have been carefully selected and machined to extremely high precision.

The 4JB1 Model engine employs the QOS II preheating system which features a quick-on glow to control the glow time and the afterglow time by the thermometer.

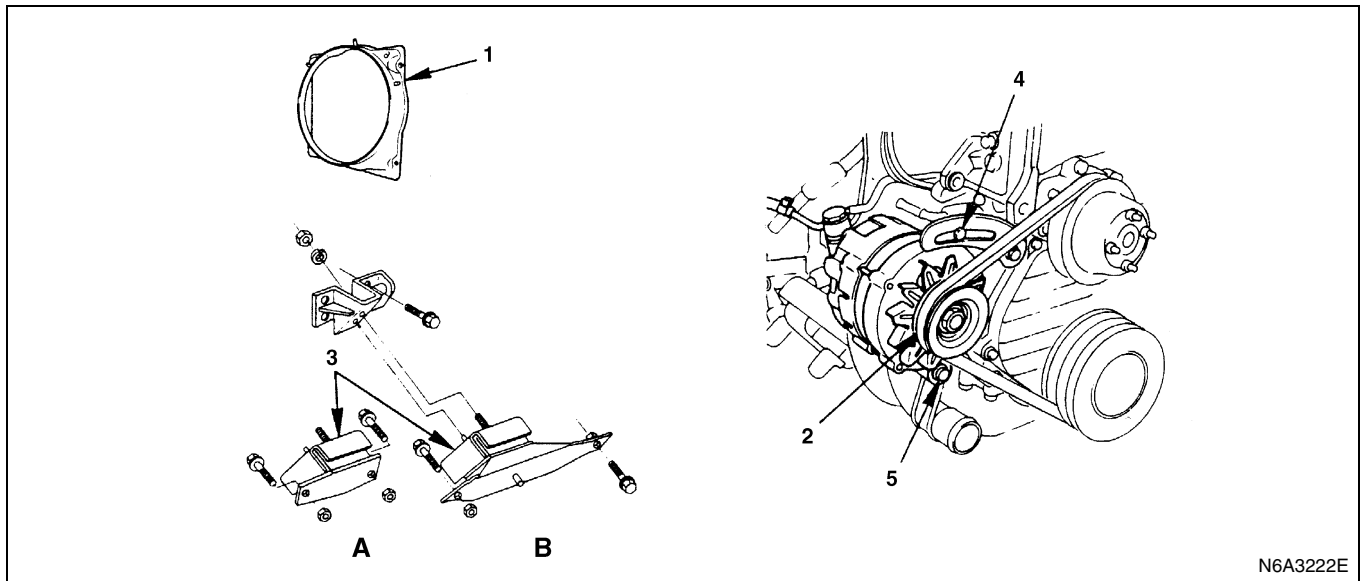
The 4JG2 engine employs the QOS III system which allows the most suitable starting conditions for the glow time to change according to the engine water temperature, and the optimum for the glow time to change according to the engine water temperature, and the

optimum changes according to the water temperature immediately after the start of the engine.

The belt-driven type timing drive belt of the 4JG2 Model engine is a very important functional part, and requires the specified maintenance.

ENGINE MOUNT (RH)

Component



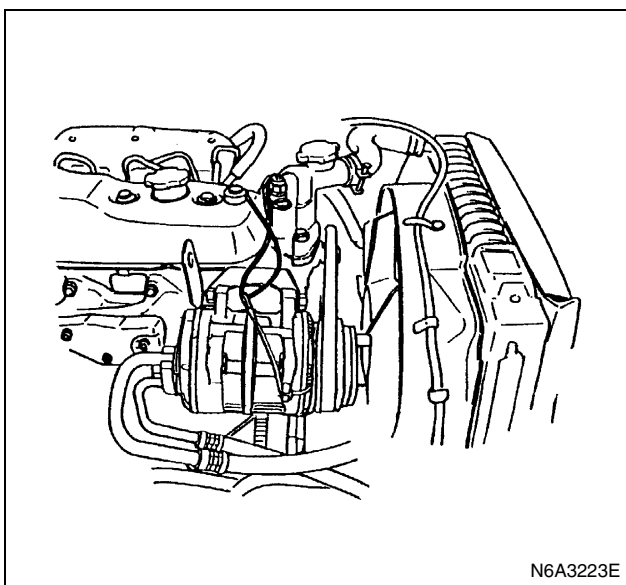
Legend

- | | |
|---------------------------|-----------------------------|
| A. Rigid suspension | 3. Support rubber |
| B. Independent suspension | 4. Lock bolt |
| 1. Fan shroud | 5. AC generator fixing bolt |
| 2. Fan belt | |

Removal

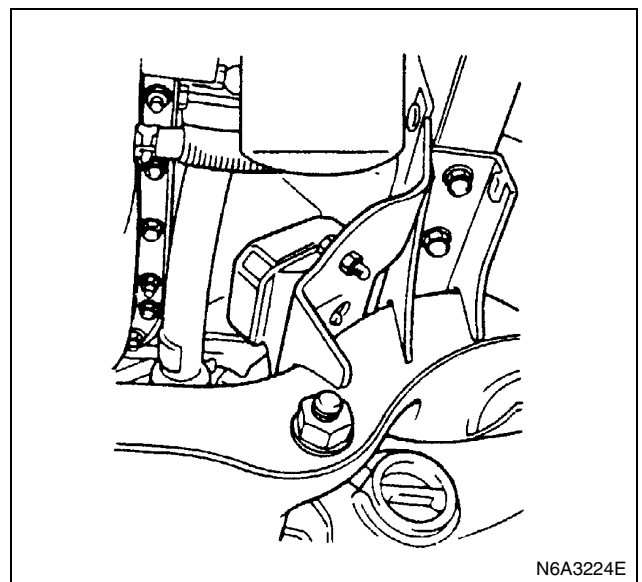
Preparation

- Disconnect battery ground cable.
- 1. Fan Shroud
 - Remove reservoir tank hose and fan shroud.

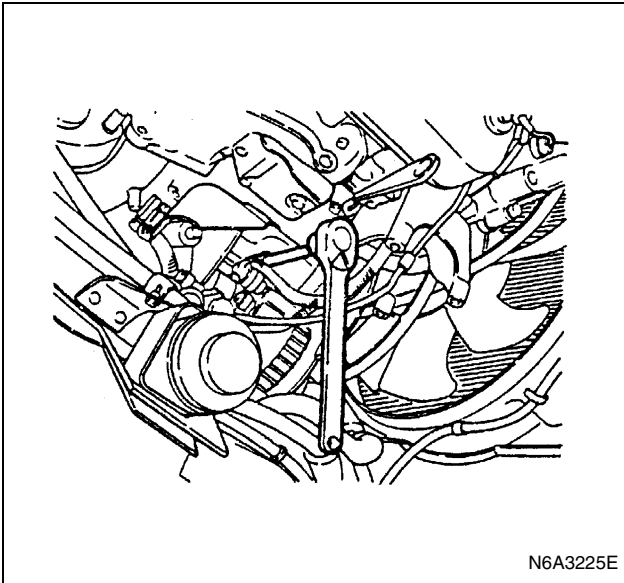


- 2. Fan Belt
 - Remove adjust plate lock bolt.
 - Loosen generator fixing bolt then remove fan belt.

- 3. Support Rubber
 - Remove two fixing nuts at the crossmember side.



- Separate the generator from the engine.
- Remove the support rubber nut from engine foot side.
- Remove the support rubber while raising the engine.

**Legend**

1. A/C compressor drive belt
2. P/S oil pump drive belt

3. Fan Shroud

- Install the fan shroud and clip the reservoir tank hose.

Installation

1. Support Rubber

- Install the support rubber while raising the engine.
- Tighten the fixing nuts to the specified torque.

Tighten:

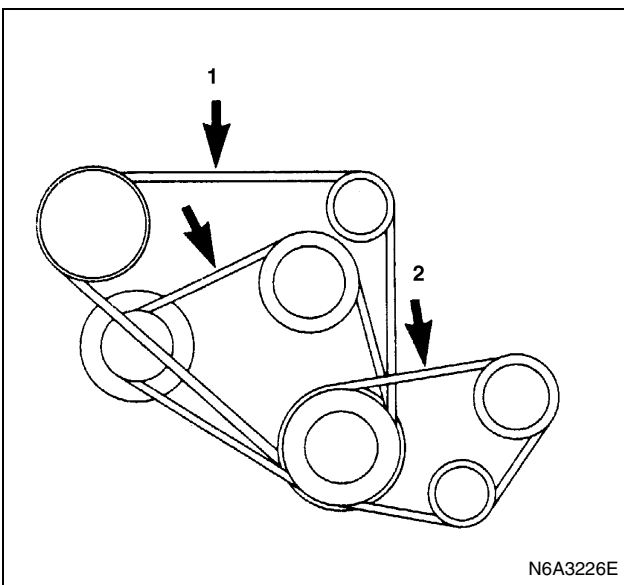
- Engine foot side to 82 N·m (8.4 kg·m / 61 lb·ft)
- Crossmember side to 40 N·m (4.1 kg·m / 30 lb·ft)

2. Fan Belt

- Install the fan belt.
- Depress the fan belt mid-portion with a 98 N (10 kg/ 22 lb) force.
- Tighten the fixing bolt to the specified torque.

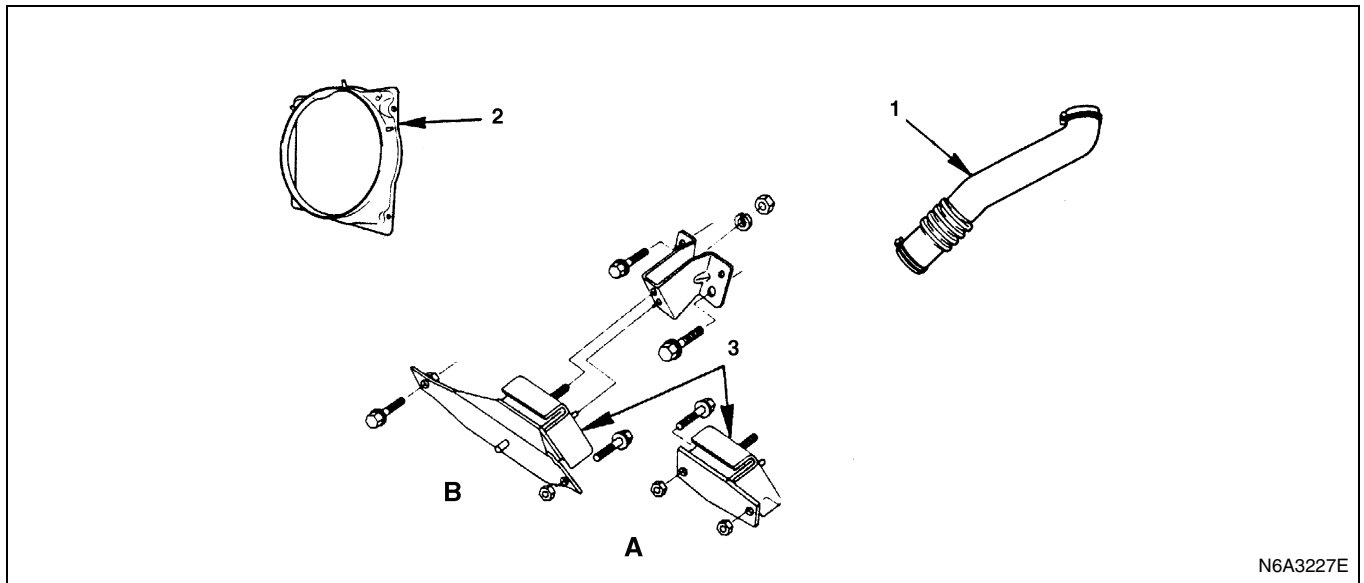
Tighten:

- Adjust plate lock bolt to 19 N·m (1.9 kg·m / 14 lb·ft)
- Generator fixing bolt to 40 N·m (4.1 kg·m / 30 lb·ft)



ENGINE MOUNT (LH)

Component



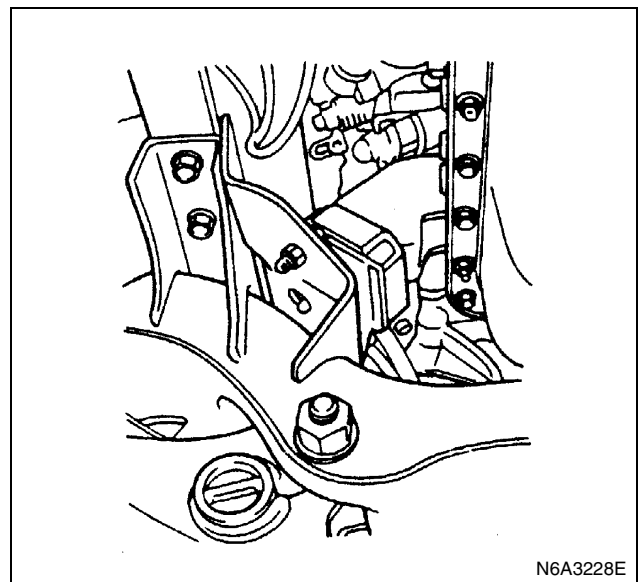
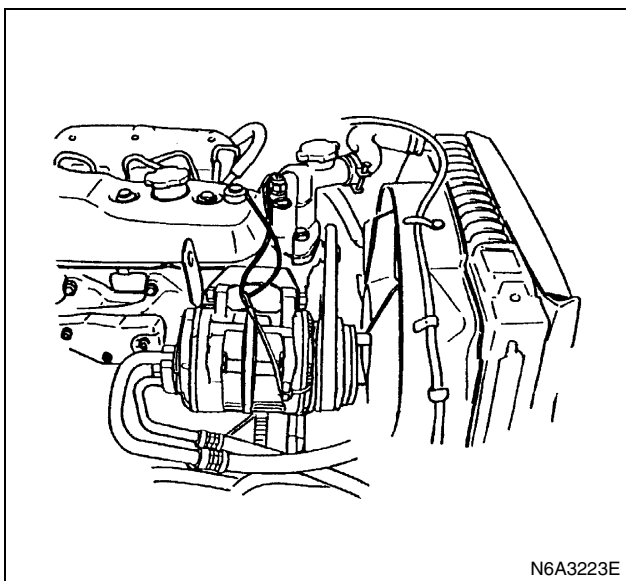
Legend

- | | |
|---------------------------|-------------------|
| A. Rigid suspension | 2. Fan shroud |
| B. Independent suspension | 3. Support rubber |
| 1. Air intake duct | |

Removal

Preparation

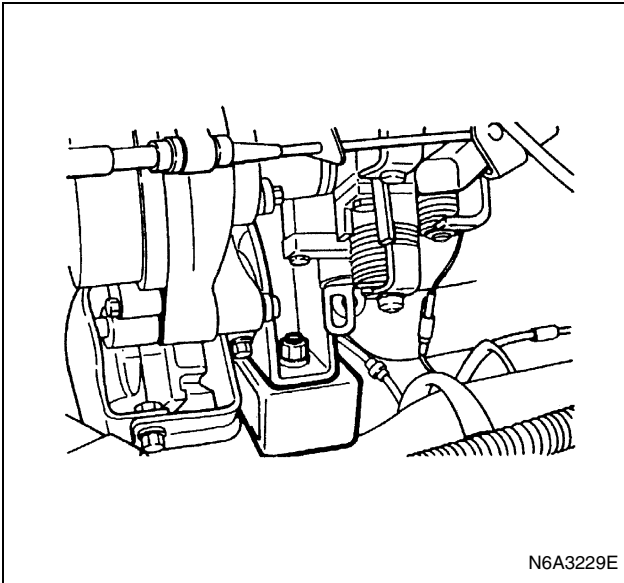
- Disconnect battery ground cable.
1. Air Intake Duct
 - Remove the intake duct.
 2. Fan Shroud
 - Remove reservoir tank hose and fan shroud.



- Remove the support rubber nut from engine foot side.
- Remove the support rubber while raising the engine.

3. Support Rubber

- Remove two fixing bolts at the crossmember side.



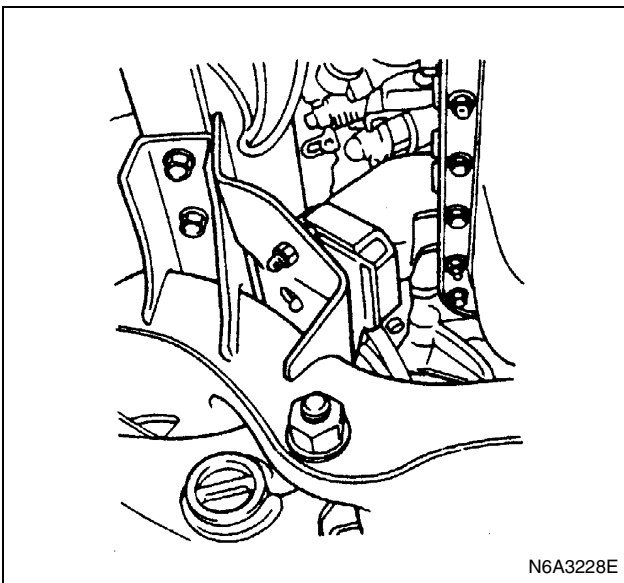
Installation

1. Support Rubber

- Install the support rubber while raising the engine.
- Tighten the fixing nuts to the specified torque.

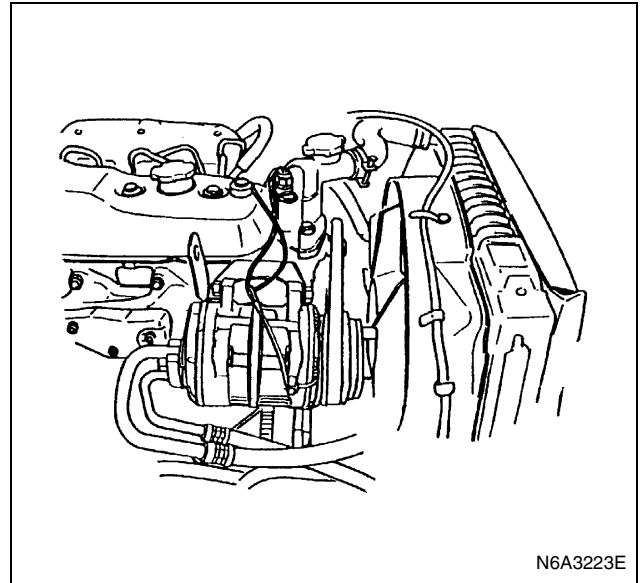
Tighten:

- Engine foot side to 82 N·m (8.4 kg·m / 61 lb·ft)
- Crossmember side to 40 N·m (4.1 kg·m / 30 lb·ft)



2. Fan shroud

- Install the fan shroud and clip the reservoir tank hose.

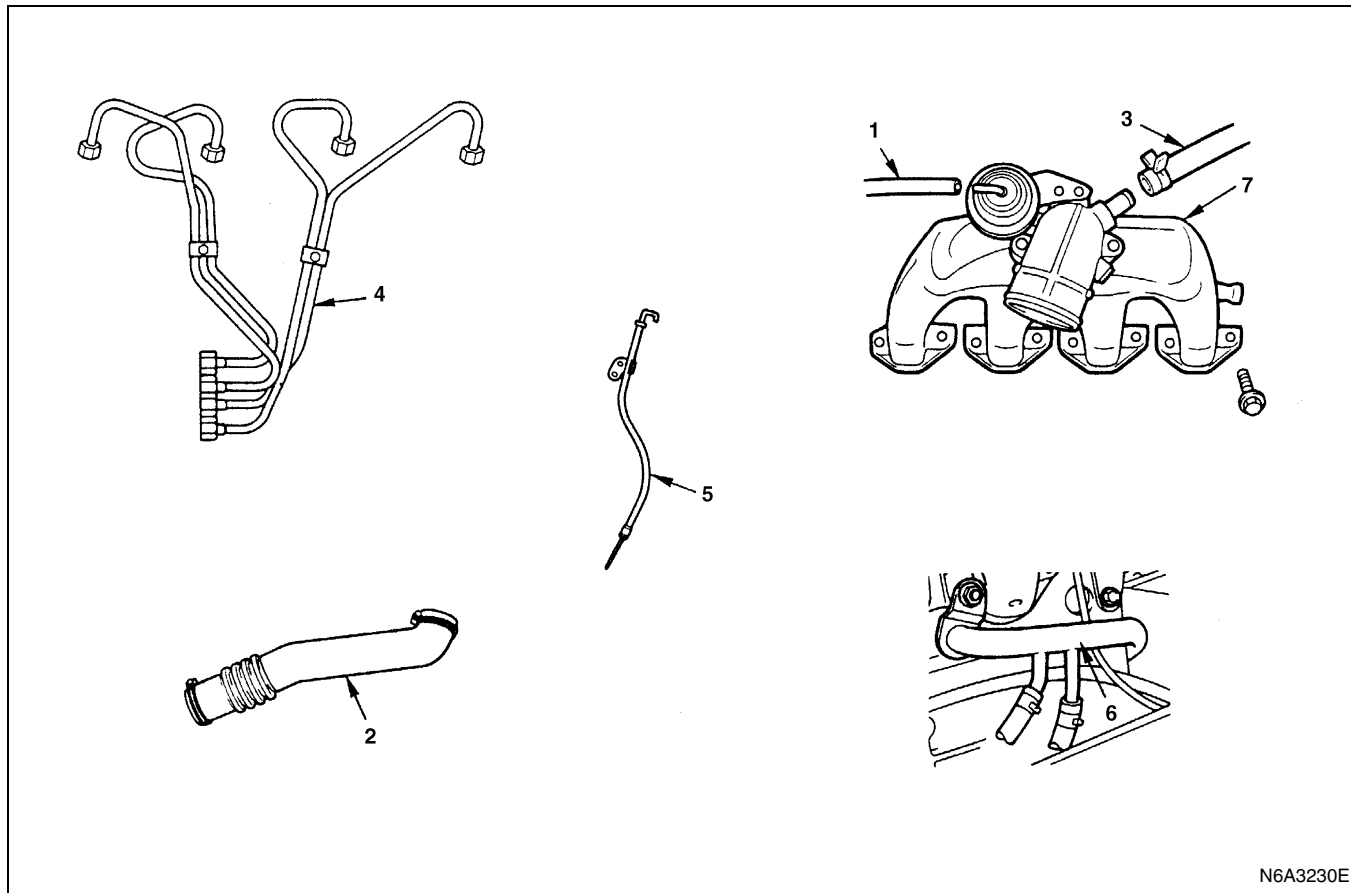


3. Air Intake Duct

- Install the air intake duct.
- Connect battery ground cable.

INLET MANIFOLD

Component



N6A3230E

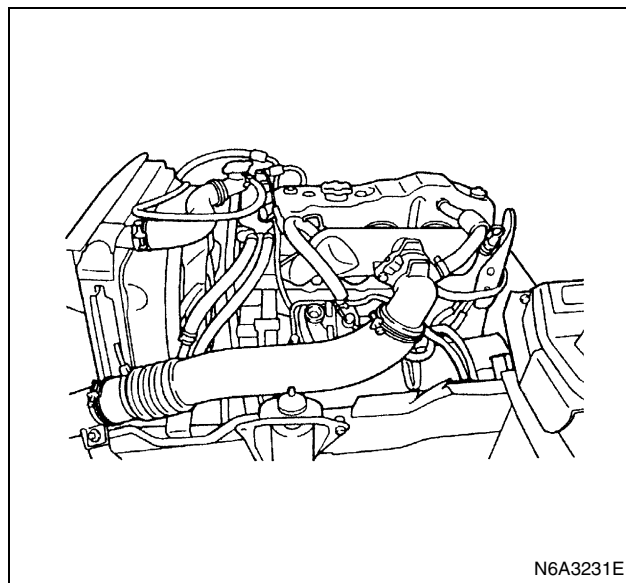
Legend

- | | |
|--------------------|---|
| 1. Vacuum hose | 5. Oil level gauge guide tube |
| 2. Air intake duct | 6. Oil cooler water pipe (Oil Cooler Model) |
| 3. PCV hose | 7. Inlet manifold |
| 4. Injection pipe | |

Removal

Preparation

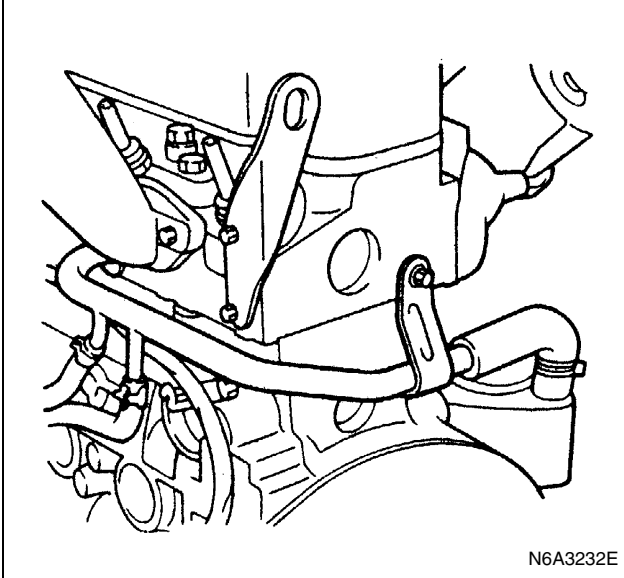
- Disconnect battery ground cable.
 - Drain coolant.
1. Vacuum Hose
 2. Air Intake Duct
 3. PCV Hose
 4. Injection Pipe
 - Release injection pipe clip.
 - Loosen the flare nut on the injection pump side.
 - Loosen the flare nut on the injection nozzle side, disconnect and put a side the pipe.



N6A3231E

5. Oil Level Gauge Guide Tube

- Remove the fixing bolt and remove level gauge guide tube.
6. Oil Cooler Water Pipe (Oil Cooler Model)
- Remove the water pipe bracket bolt.
 - Remove the inlet manifold fixing nut.



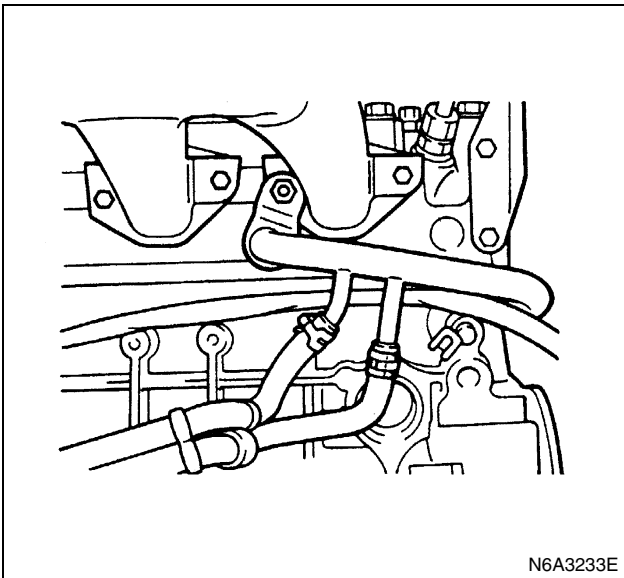
7. Inlet Manifold
- Remove the manifold fixing bolt and nut.

Installation

1. Inlet Manifold
- Tighten the fixing bolts and nuts to the specified torque.

Tighten:

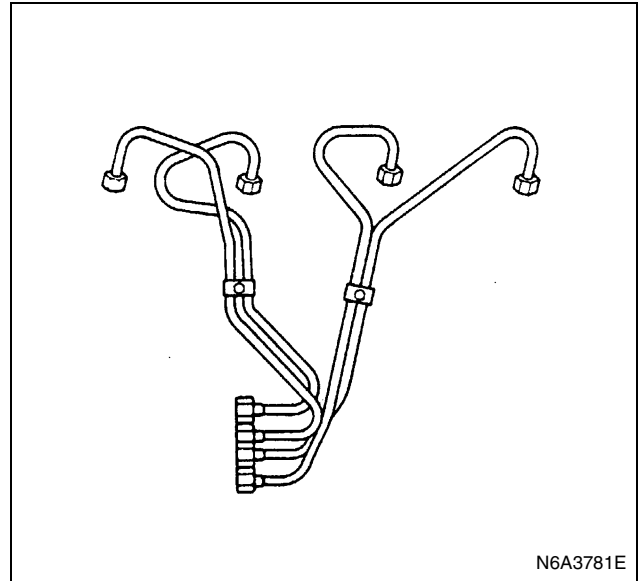
- Bolt & nut to 19 N·m (1.9 kg·m / 14 lb·ft)
2. Oil Cooler Water Pipe (Oil Cooler Model)
- Install the water pipe and tighten the manifold with water pipe.
 - Tighten the pipe bracket bolt of cylinder head rear side.



3. Oil Level Gauge Guide Tube
- Install the guide tube and tighten the manifold with guide tube.
4. Injection Pipe
- Connect the injection pipe and tighten flare nut to the specified torque.

Tighten:

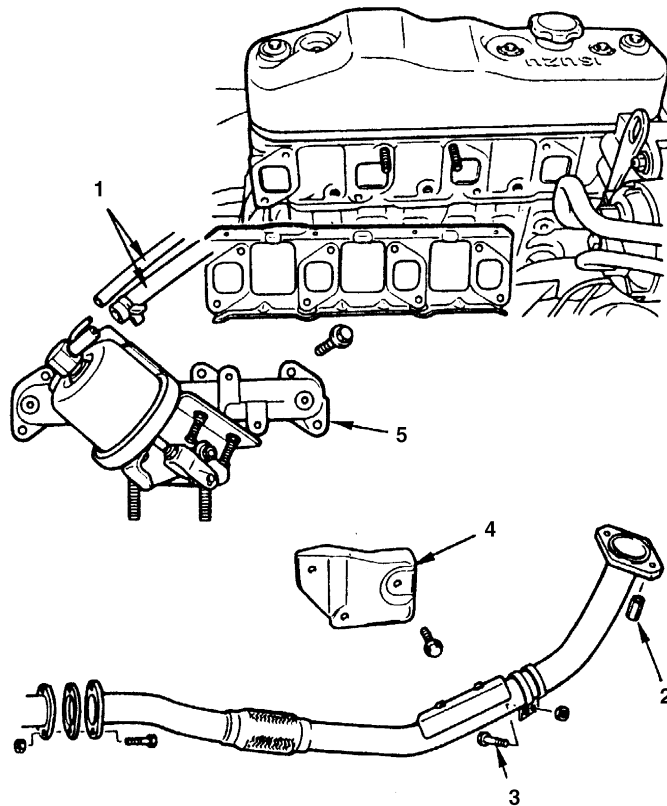
- Flare nut to 29 N·m (3.0 kg·m / 22 lb·ft)
- Install the pipe clip to the original position.



5. PCV Hose
6. Air Intake Duct
7. Vacuum Hose
- Connect the battery ground cable.
 - Pour coolant.
 - Start the engine and check coolant leakage.

EXHAUST MANIFOLD

Component



N6A3235E

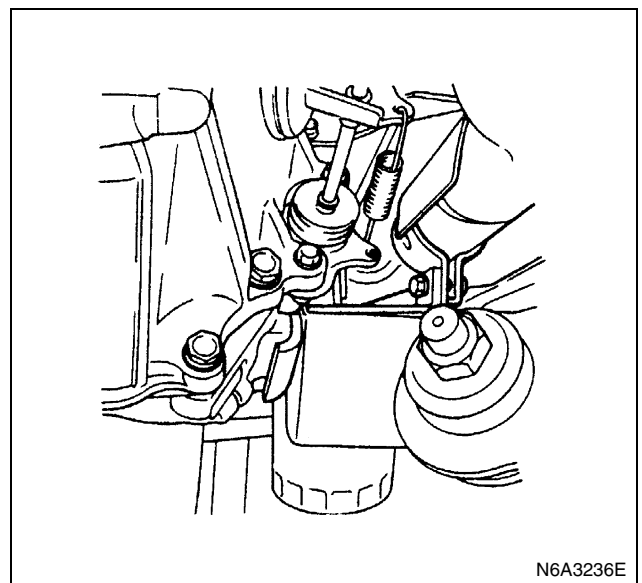
Legend

- | | |
|---------------------------------|---------------------|
| 1. Vacuum hose | 4. Heat protector |
| 2. Front exhaust pipe nut | 5. Exhaust manifold |
| 3. Front exhaust pipe stay bolt | |

Removal

Preparation

- Disconnect battery ground cable.
1. Vacuum Hose (Exhaust Brake Model)
 - Remove the vacuum actuator hose.
 2. Front Exhaust Pipe Nut
 - Remove the fixing nuts from exhaust manifold side.
 3. Front Exhaust Pipe Stay Bolt



N6A3236E

4. Heat Protector

5. Exhaust Manifold

- Remove the manifold bolt and nut, then remove the manifold and gasket.

Installation

1. Exhaust Manifold

- Tighten the fixing nuts and bolts to the specified torque.

Tighten:

- Manifold bolt to 26 N·m (2.7 kg·m / 20 lb·ft)
2. Heat Protector
- Remove the heat protector and tighten to the specified torque.

Tighten:

- Heat protector bolt to 19 N·m (1.9 kg·m / 14 lb·ft)
3. Front Exhaust Pipe Stay Bolt
- Tighten the fixing bolts to the specified torque.

Tighten:

- Stay bolt to 40 N·m (4.1 kg·m / 30 lb·ft)
4. Front Exhaust Pipe Nut
- Tighten the fixing nuts to the specified torque.

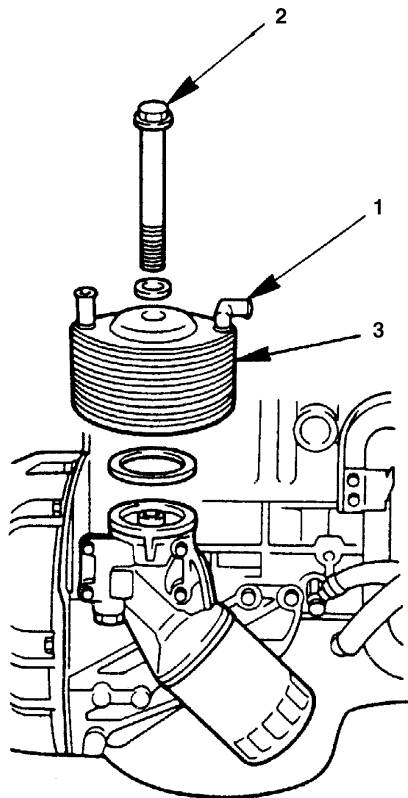
Tighten:

- Without exhaust brake to 69 N·m (7 kg·m / 51 lb·ft)
 - With exhaust brake to 69 N·m (7 kg·m / 51 lb·ft)
5. Vacuum Hose (Exhaust Brake Model)
- Install the two hose a vacuum actuator.
 - Connect battery ground cable.
 - Start the engine and check coolant leakage.

OIL COOLER (Oil Cooler Model)

Component

4JG2, 4JB1, 4JB1-TC, 4JH1-TC



N6A3237E

Legend

- | | |
|---------------------------|---------------|
| 1. Water hose | 3. Oil cooler |
| 2. Oil cooler fixing bolt | |

Removal

Preparation

- Disconnect battery ground cable
- Drain coolant
- Put rag to beneath side of oil cooler to prevent oil leaking.

1. Water Hose

- Disconnect water inlet and outlet hose.

2. Oil Cooler Fixing Bolt

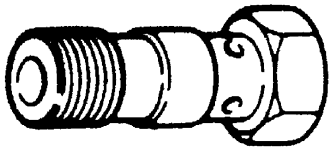
3. Oil Cooler

Relief Valve Opening Pressure		kPa (kg/cm ² /psi)
Type1	559 — 618	(5.7 — 6.3/81.0 — 89.6)
Type2	422 — 461	(4.3 — 4.7/61.1 — 66.8)

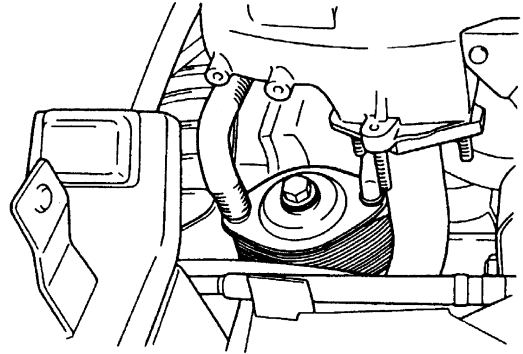
Inspection

Relief Valve

1. Attach an oil pressure gauge to the oil gallery near the oil filter.
2. Start the engine to check the relief valve opening pressure.



N6A3238E



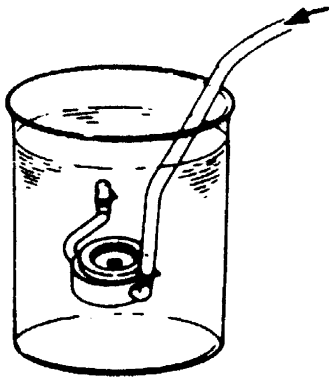
N6A3240E

Oil Cooler

Check for water leakage at the water passage.

1. Plug one side of the oil cooler water passage.
2. Submerge the oil cooler in water.
3. Apply compressed air (2 kg/cm² (28.5 psi / 196.0 kPa)) to the other side of the oil cooler water passage.

If air bubbles rise to the surface, there is water leakage.



N6A3239E

3. Water Hose

- Connect water hose.

Installation

1. Oil Cooler
 - Install the O-ring to oil filter body and set the oil cooler.
2. Oil Cooler Fixing Bolt

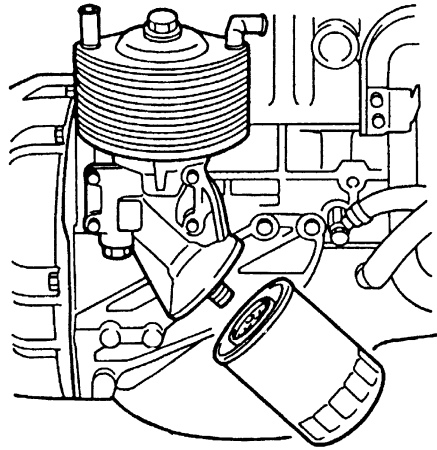
Tighten:

- Oil cooler bolt to 29 N·m (3.0 kg·m / 22 lb·ft)

OIL FILTER CARTRIDGE

Component

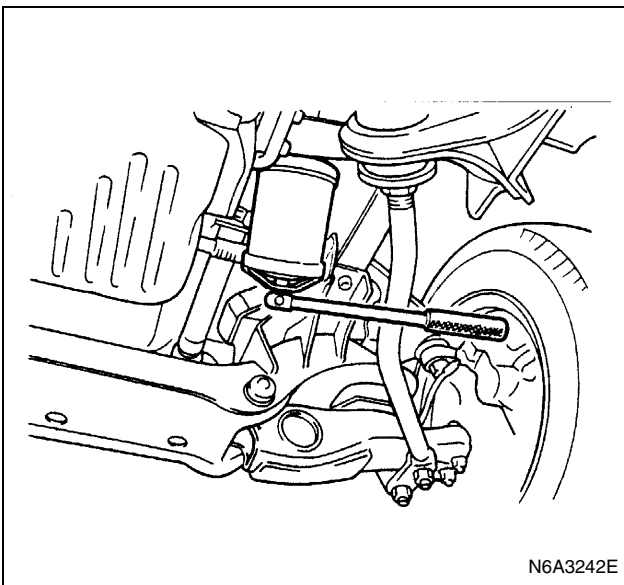
4JG2, 4JB1, 4JB1-TC, 4JH1-TC



N6A3241E

Removal

- Place a receptacle beneath the oil filter to contain the drained oil.
- Remove the oil filter cartridge using filter wrench.
Filter wrench: 5-8840-0200-0



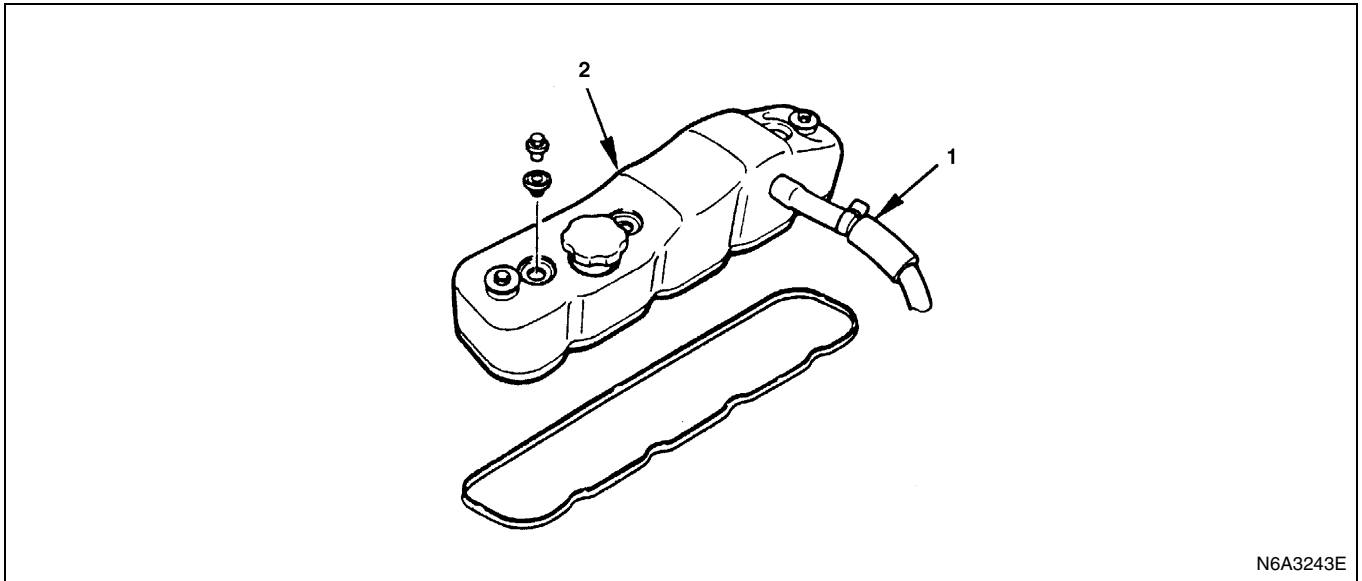
N6A3242E

Installation

- Lightly oil the O-ring of oil filter cartridge.
- Turn in the new oil filter cartridge by hand until the sealing face is fitted against the O-ring.
- Use the filter wrench to turn in the oil filter and additional one and 1.1/8 turns.
- Start the engine and check for oil leakage from oil filter.

CYLINDER HEAD COVER

Component



Legend

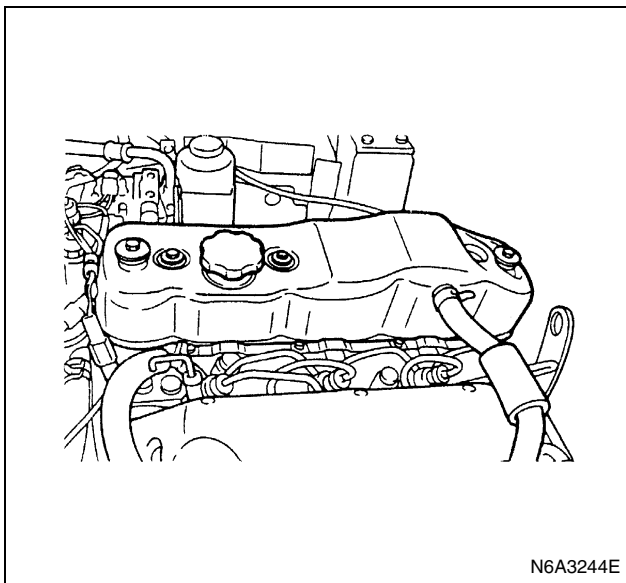
1. PCV hose

2. Cylinder head cover

Removal

Preparation

- Disconnect battery ground cable.
- 1. PCV Hose
 - Disconnect the PCV hose from intake pipe side.
- 2. Cylinder Head Cover



- Install the cylinder head cover gasket to the cylinder head cover.
- The gasket must be perfectly smooth with no loose areas.
- Tighten the cylinder head cover nuts to the specified torque.

Tighten:

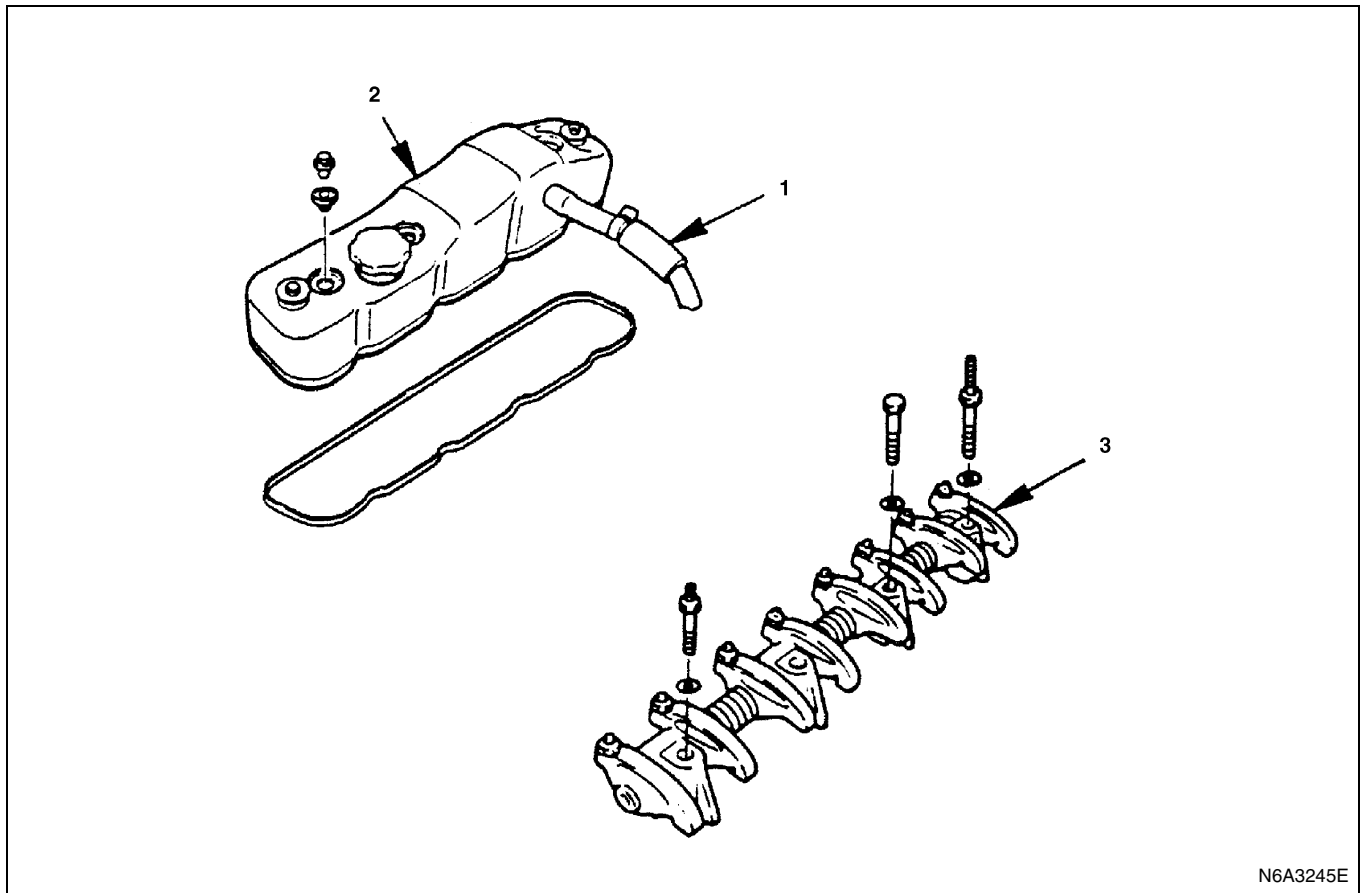
- 13 N·m (1.3 kg·m / 9 lb·ft)
- 2. PCV Hose
 - Connect the PCV hose to the intake pipe.
 - Connect battery ground cable.

Installation

- 1. Cylinder Head Cover
 - Apply engine oil to the rocker arms and the valve springs.

ROCKER ARM SHAFT ASSEMBLY

Component



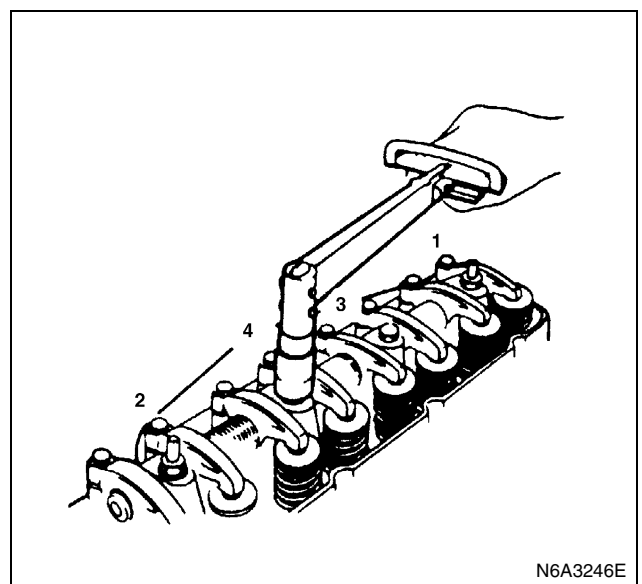
Legend

- | | |
|------------------------|------------------------------|
| 1. PCV hose | 3. Rocker arm shaft assembly |
| 2. Cylinder head cover | |

Removal

Preparation

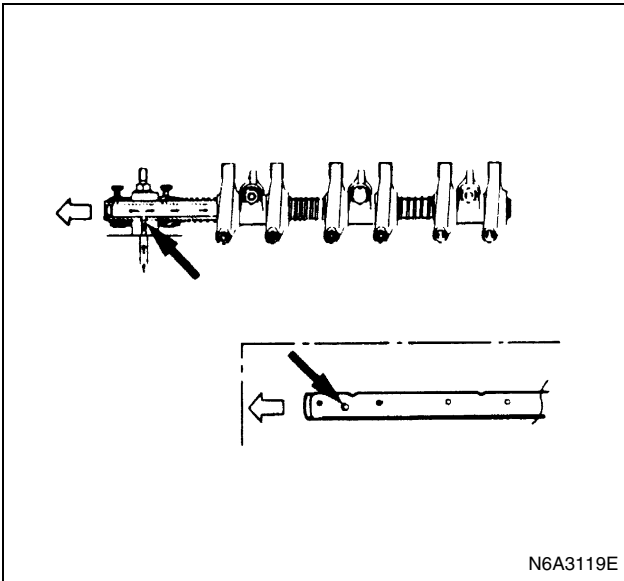
- Disconnect battery ground cable.
1. PCV Hose
 2. Cylinder Head Cover
 3. Rocker Arm Shaft Assembly
- Loosen bolts and nuts of rocker shaft bracket by turns and remove rocker shaft assembly.



Installation

1. Rocker Arm Shaft Assembly

- Install rocker arm shaft with larger oil hole $\phi 4$ to the front of engine.



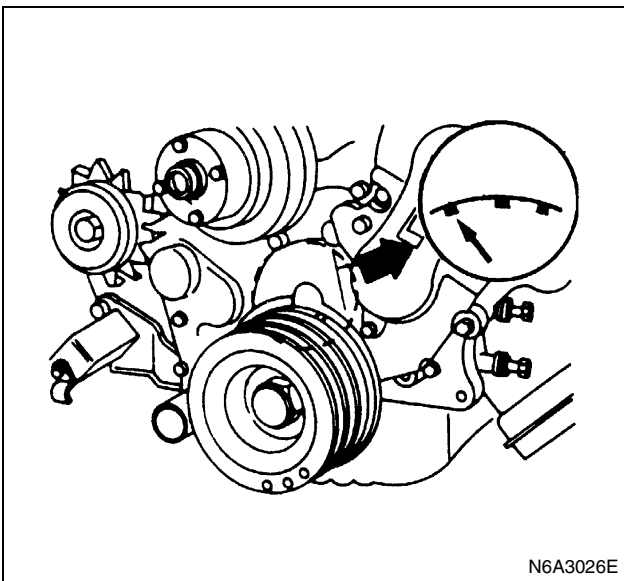
- Align fixing bolt with nut of rocker arm shaft and tighten fixing bolts to the specified torque.

Tighten:

- 54 N·m (5.5 kg·m / 40 lb·ft)

2. Valve clearance adjustment

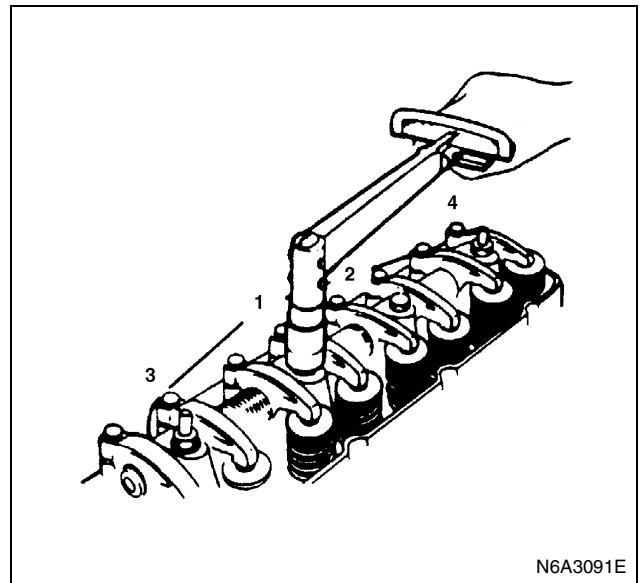
- 1) Bring the piston in either the No.1 cylinder or the No.4 cylinder to TDC on the compression stroke by turning the crankshaft until the crankshaft damper pulley TDC line is aligned with the timing pointer.



- 2) Check the rocker arm shaft bracket nuts for looseness. Tighten any loose rocker arm shaft bracket nuts before adjusting the valve clearance.

Tighten:

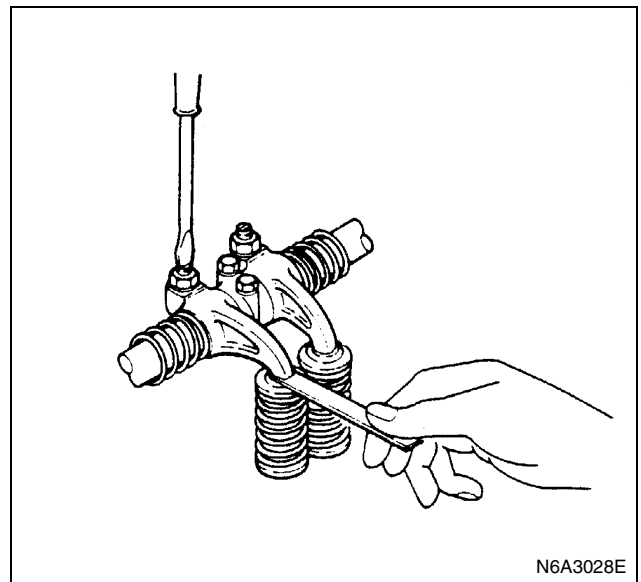
- Rocker arm shaft bracket nut to 54 N·m (5.5 kg·m / 40 lb·ft)



- 3) Check for play in the No.1 intake and exhaust valve push rods.

If the No.1 cylinder intake and exhaust valve push rods have play, the No.1 piston is at TDC on the compression stroke.

If the No.1 cylinder intake and exhaust valve push rods are depressed, the No.4 piston is at TDC on the compression stroke.

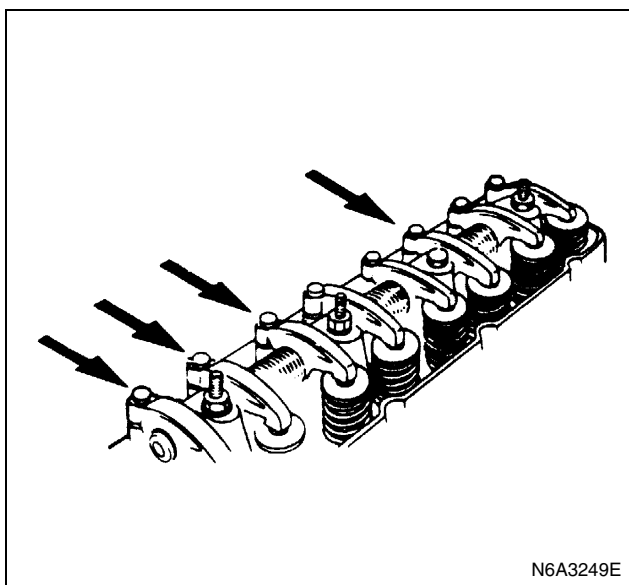


Adjust the No.1 or the No.4 cylinder valve clearances while their respective cylinders are at TDC on the compression stroke.

Valve Clearance (At Cold)	mm (in)
0.4 (0.016)	

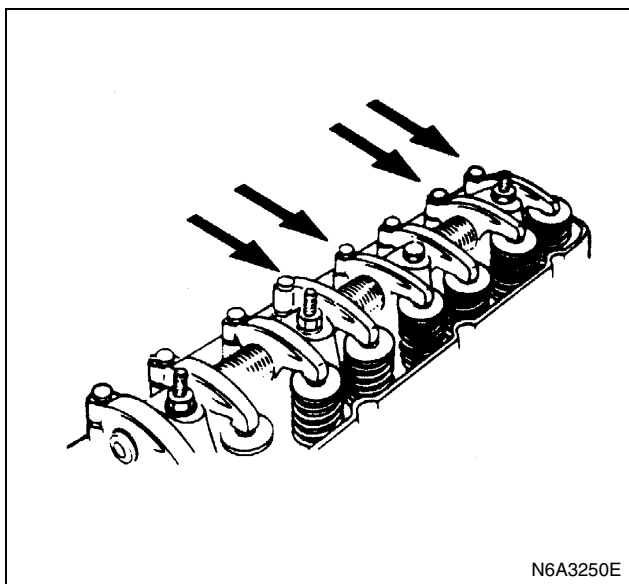
- 4) Loosen each valve clearance adjusting screw as shown in the illustration.

No. 1 Cylinder T.D.C (Compression stroke)



- 5) Insert a feeler gauge of the appropriate thickness between the rocker arm and the valve stem end.
- 6) Turn the valve clearance adjusting screw until a slight drag can be felt on the feeler gauge.
- 7) Tighten the lock nut securely.
- 8) Rotate the crankshaft 360°.
- 9) Realign the crankshaft damper pulley TDC notched line with the timing pointer.
- 10) Adjust the clearances for the remaining valves as shown in the illustration.

No. 4 Cylinder T.D.C (Compression stroke)



3. Cylinder Head Cover

- Install cylinder head cover and tighten bolts to the specified torque.

Tighten:

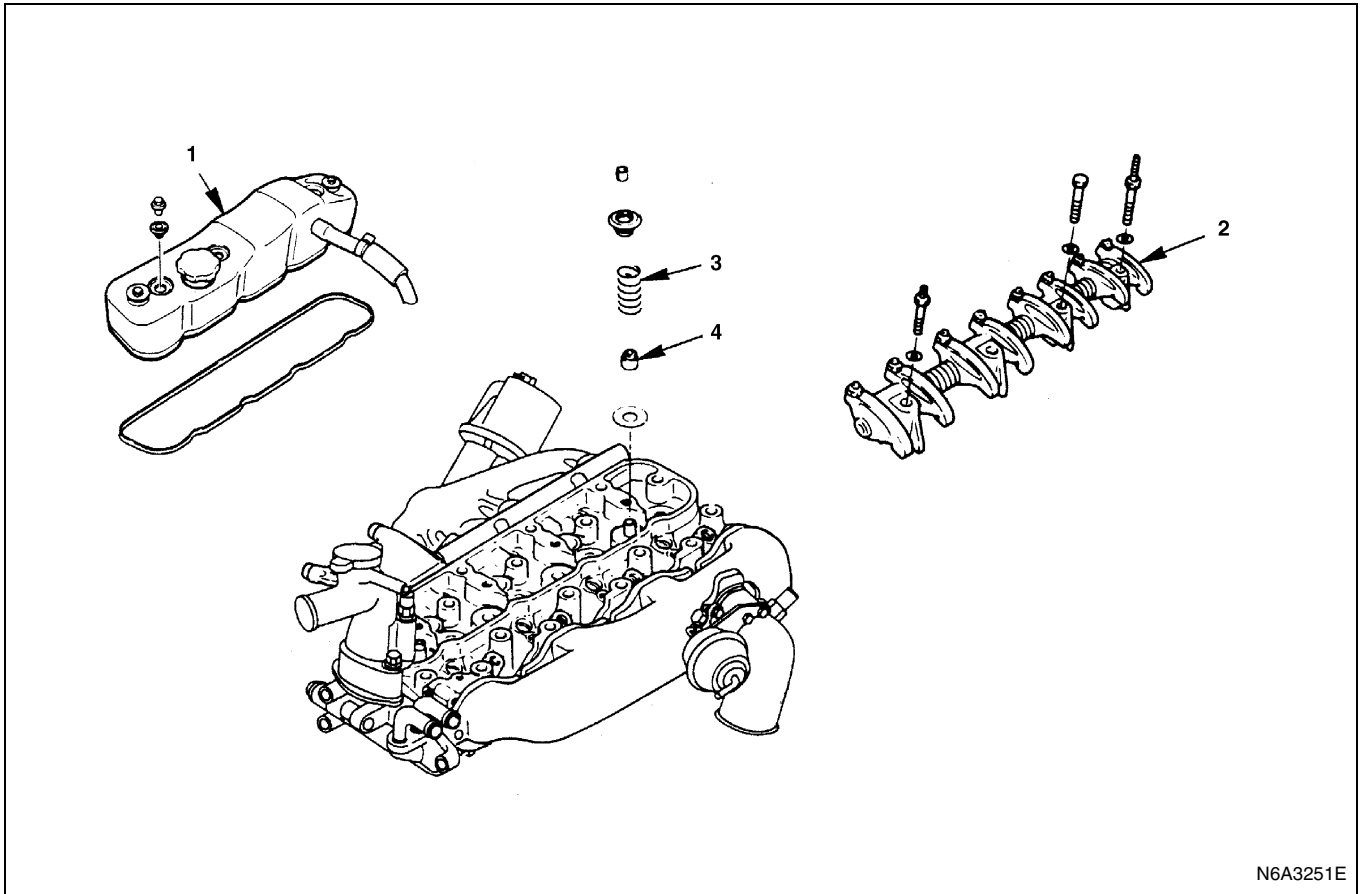
- 13 N·m (1.3 kg·m / 113 lb·in)

4. PCV Hose

- Connect battery ground cable.

VALVESTEM OIL CONTROLLER & VALVE SPRING

Component



N6A3251E

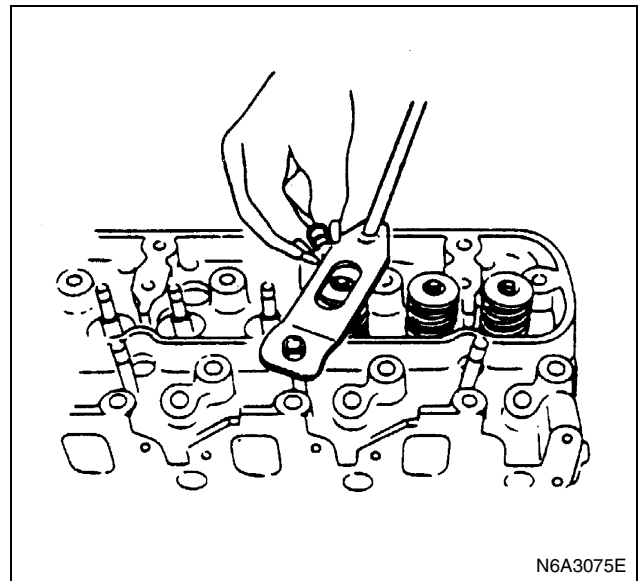
Legend

- | | |
|------------------------------|-------------------------|
| 1. Cylinder head cover | 3. Valve spring |
| 2. Rocker arm shaft assembly | 4. Valve guide oil seal |

Removal

Preparation

- Disconnect battery cable.
1. Cylinder Head Cover
 2. Rocker Arm Shaft Assembly
 - Loosen bolts and nuts of rocker shaft bracket by turns and removal rocker shaft assembly.
 3. Valve Spring
 - Apply compressed air to cylinder from the glow plug hole hold the valve in place.
 - Using special tool, compress valve spring and removal split cover.
- Valve spring compressor: 9-8523-1423-0 (J-29760)



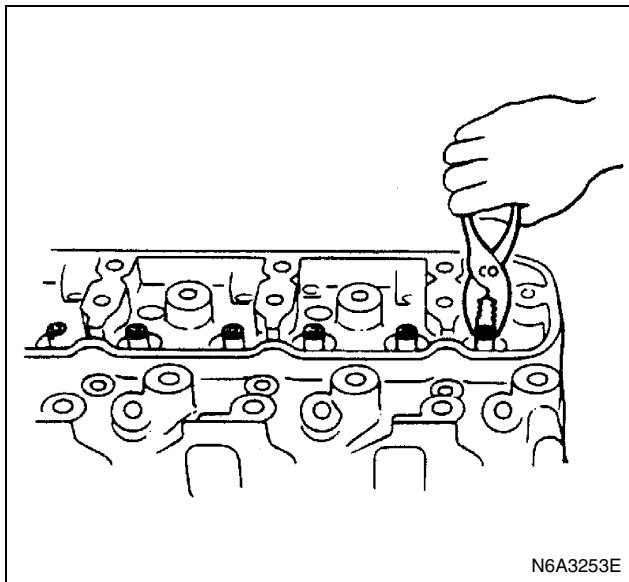
N6A3075E

Caution:

Put removed valve spring in the order of cylinder number.

4. Valve Guide Oil Seal

- Remove valve guide oil seal by pliers



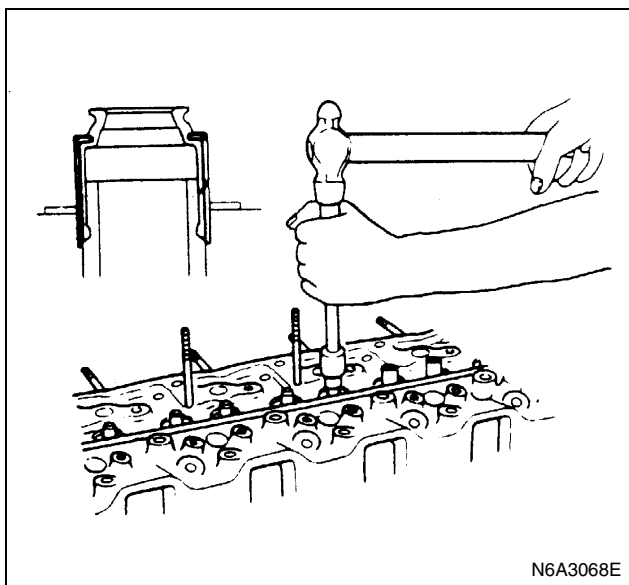
Caution:

Removed oil controller should not be reused.

Installation

1. Valve Guide Oil Seal

- Install new valve guide oil seal in valve.
 - Guide using special tool.
- Special tool: 5-8840-2033-0

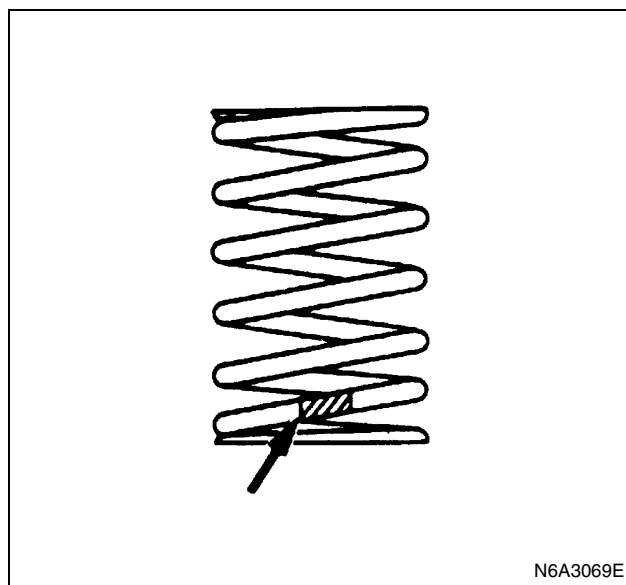


2. Valve Spring

- Attach the new valve spring to the upper spring seat.

Caution:

- The painted area of the valve spring should be facing toward.



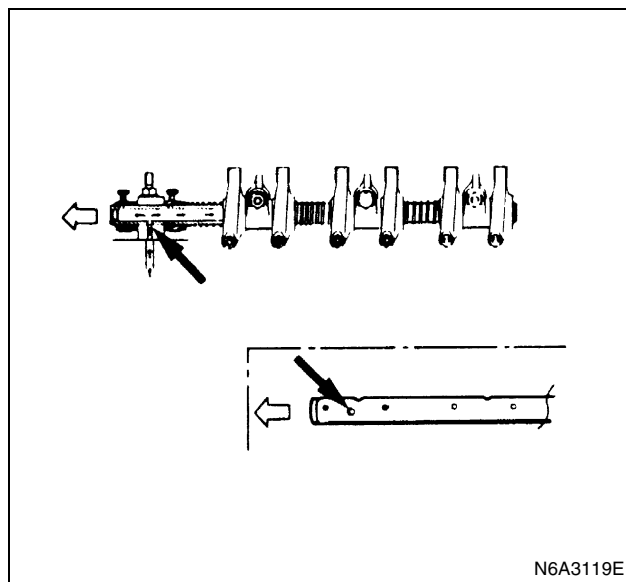
- Apply compressed air to cylinder from the glow plug hole to hold the valve in place.

- Install split collar by special tool

Valve spring compressor: 9-8523-1423-0 (J-29760)

3. Rocker Arm Shaft Assembly

- Install rocker arm shaft with larger oil hole $\phi 4$) to the front of engine.



- Align fixing bolt with nut of rocker arm shaft and tighten fixing bolts to the specified torque.

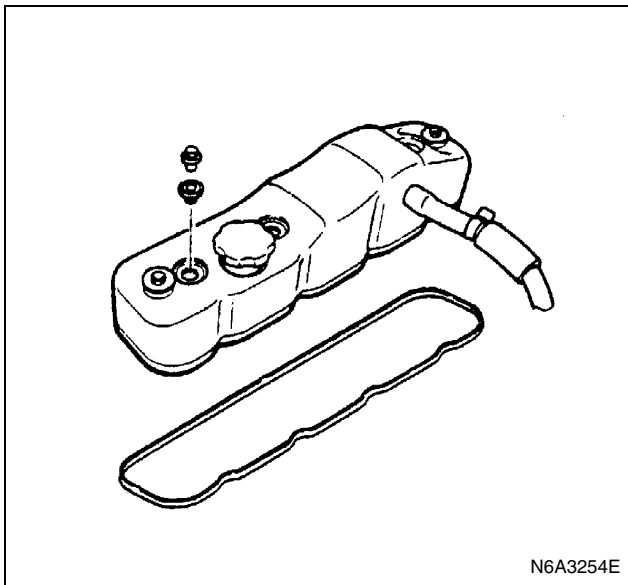
Tighten:

- 54 N·m (5.5 kg·m / 40 lb·ft)
- Valve clearance adjustment

4. Valve clearance adjustment
Above works refer to "ROCKER ARM SHAFT ASSEMBLY" Section in this manual.
5. Cylinder Head Cover
 - Apply engine oil to the rocker arms and the valve spring.
 - Install the cylinder head cover gasket to the cylinder head cover.
The gasket must be perfectly smooth with no loose areas.
 - Install cylinder head cover and tighten bolt to the specified torque.

Tighten:

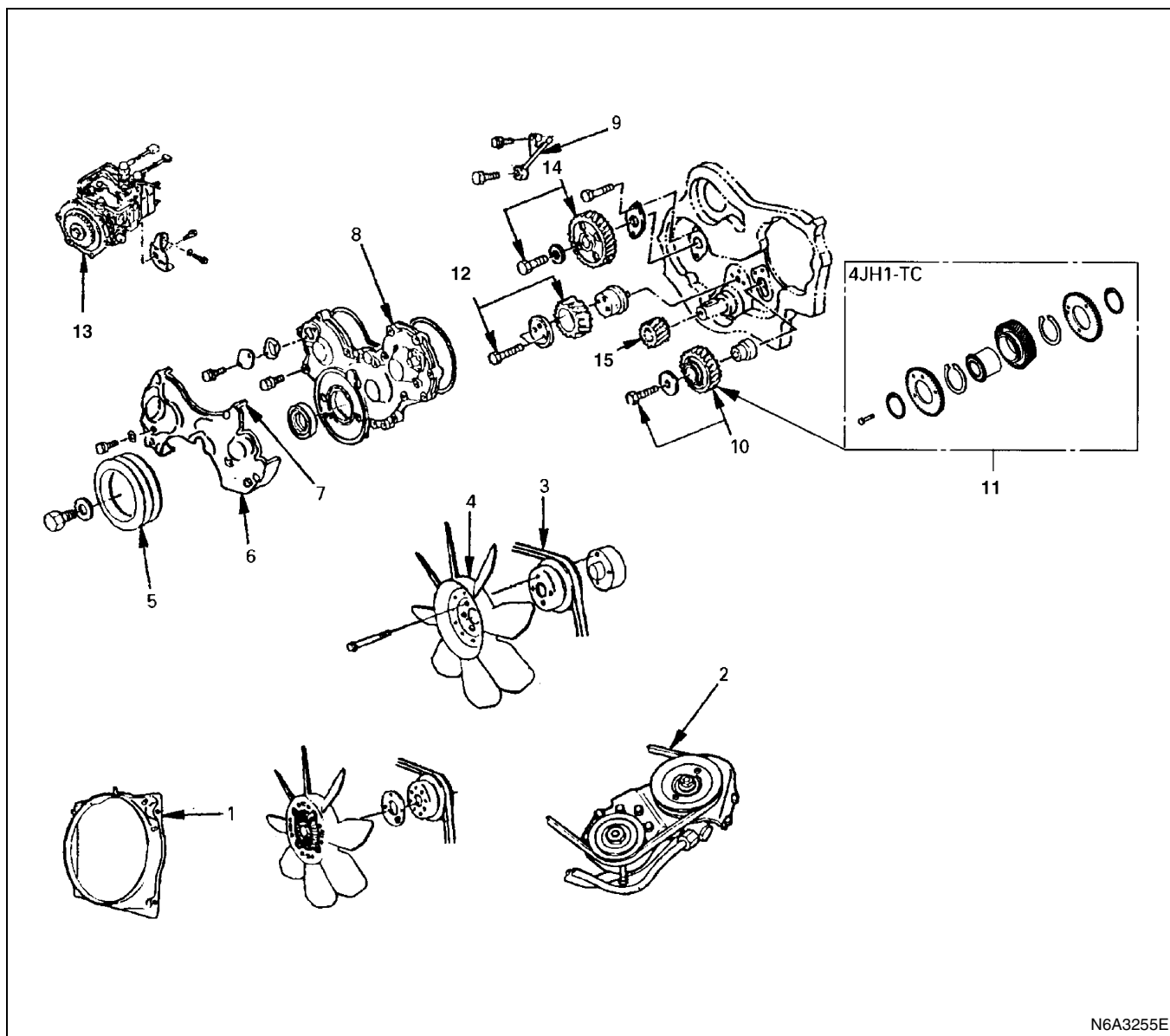
- Head cover bolt to 13 N·m (1.3 kg·m / 113 lb·in)



- Connected PCV hose.
- Connect battery ground cable.

TIMING GEAR (4JB1, 4JB1-TC, 4JH1-TC Gear Type)

Component



N6A3255E

Legend

- | | |
|-----------------------------------|--------------------------|
| 1. Fan shroud | 9. Oil pipe |
| 2. Power steering pump drive belt | 10. Idle gear |
| 3. AC generator drive belt | 11. Idle gear "B" |
| 4. Cooling fan assembly | 12. Idle gear |
| 5. Crankshaft damper pulley | 13. Injection pump |
| 6. Noise shield cover | 14. Camshaft timing gear |
| 7. Noise cover spacer | 15. Crankshaft gear |
| 8. Timing gear case cover | |

Removal

Preparation

- Disconnect battery ground cable.
- Drain coolant.

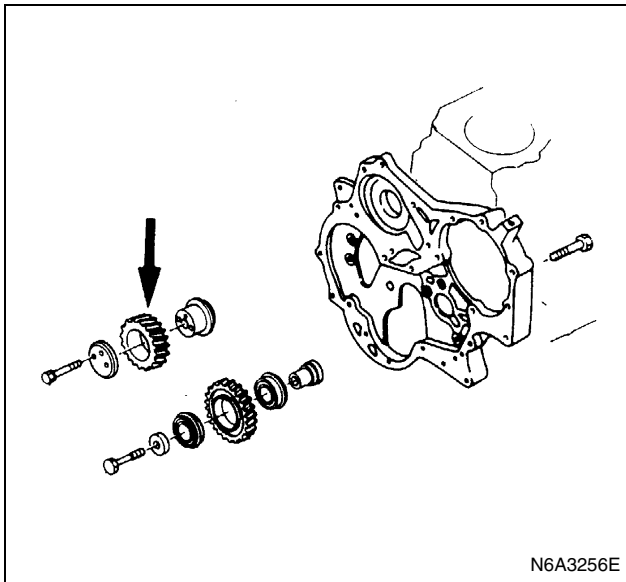
1. Fan Shroud

2. Power Steering Pump Drive Belt (P/S Model)

- Loosen power steering pump mounting bolt and adjust bolt, and remove the drive belt.

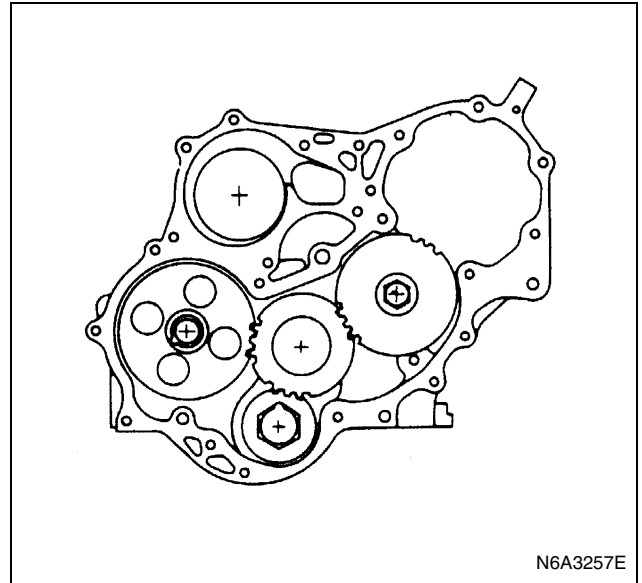
3. AC Generator Drive Belt

- Loosen AC Generator mounting bolt (under size) and adjust plate lock bolt, and remove the drive belt.
- 4. Cooling Fan Assembly
 - Remove clamp nut, and remove cooling fan assembly, distant pipe, and fan pulley.
- 5. Crankshaft Damper Pulley
- 6. Noise Shield Cover
- 7. Noise Cover Spacer
- 8. Timing Gear Case Cover
- 9. Oil Pipe
- 10. Idler Gear
 - 1) Measure the camshaft timing gear backlash and the crankshaft timing gear backlash before removing the idler gear.
 - 2) Measure the idler gear end play before removing the idler gear.

**Notice:**

Refer to the following items for details on the backlash and end play measurement procedures.

11. Timing Gear Backlash Measurement
 - 1) Set a dial indicator to the timing gear to be measured.
 - Hold both the gear to be checked and the adjoining gear stationary.



- 2) Move the gear to be checked as far as possible to both the right and the left.
- Take the dial indicator reading.
- If the measured value exceeds the specified limit, the timing gear must be replaced.

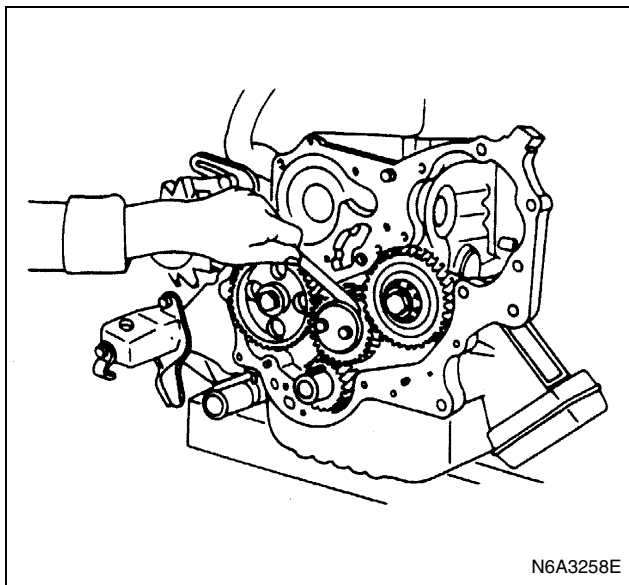
Timing Gear Backlash		mm (in)
Standard	Limit	
0.010 — 0.17 (0.0039 — 0.0067)	0.30 (0.012)	

12. Idler Gear "A" End Play Measurement

Insert a feeler gauge between the idler gear and the thrust collar to measure the gap and determine the idler gear end play.

If the measured value exceeds the specified limit, the thrust collar must be replaced.

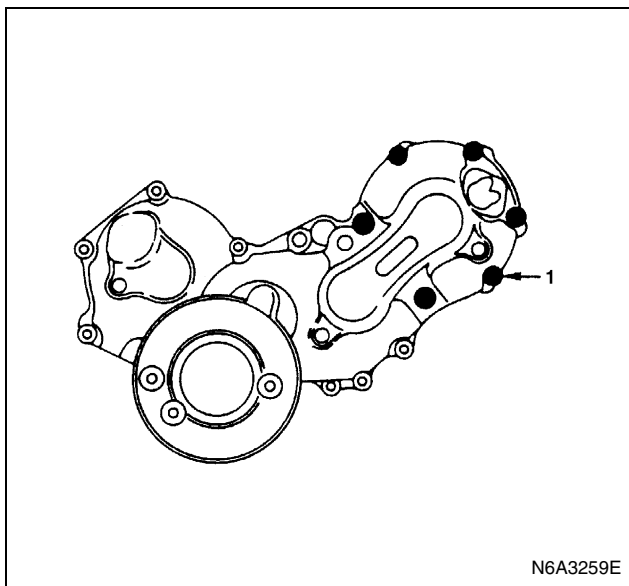
Idle Gear End Play		mm (in)
Standard	Limit	
0.07 (0.0028)	0.2 (0.0079)	



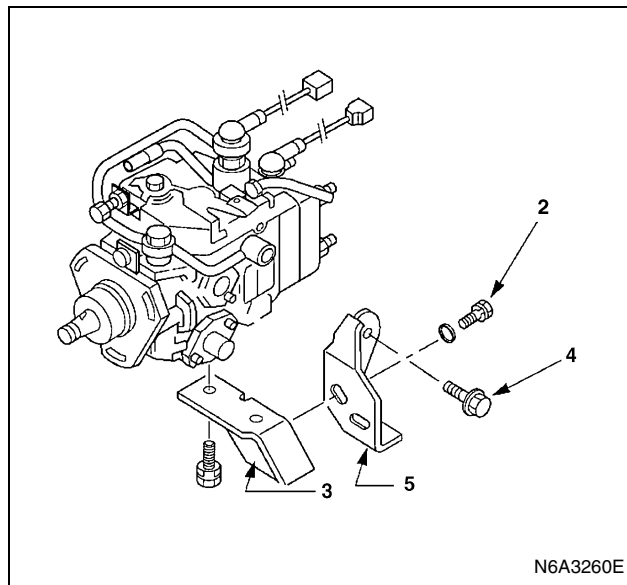
13. Idle Gear

14. Injection Pump

- 1) Remove the six injection pump bracket bolts (1) from the timing gear case.



- 2) Remove the injection pump rear bracket bolts (2) from the injection pump bracket (3).
- 3) Remove the injection pump rear bracket bolts (4) and the bracket (5) from the cylinder body.



- 4) Pull the injection pump along with the injection pump timing gear free toward the rear of the engine.

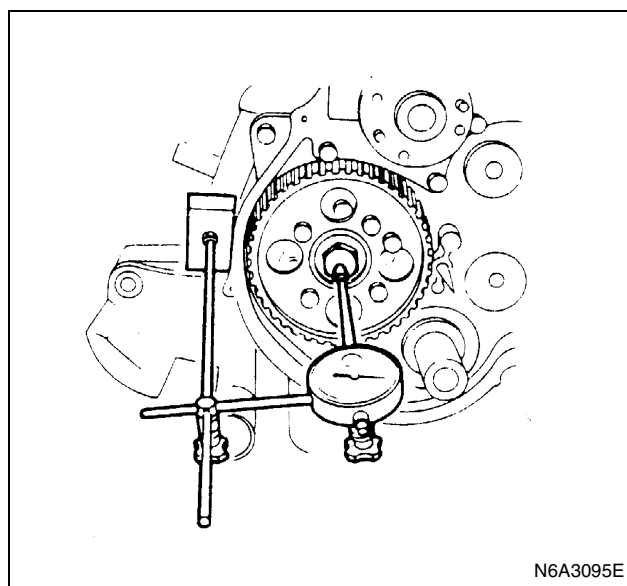
Notice:

Plug the injection pump delivery holder ports with the shipping caps (or the equivalent) to prevent the entry of foreign material.

15. Camshaft Timing Gear

- 1) Use a dial indicator to measure the camshaft end play. This must be done before removing the camshaft gear. If the camshaft end play exceeds the specified limit, the thrust plate must be replaced.

Camshaft End Play		mm (in)
Standard	Limit	
0.050 — 0.114 (0.002 — 0.0044)	0.2 (0.008)	

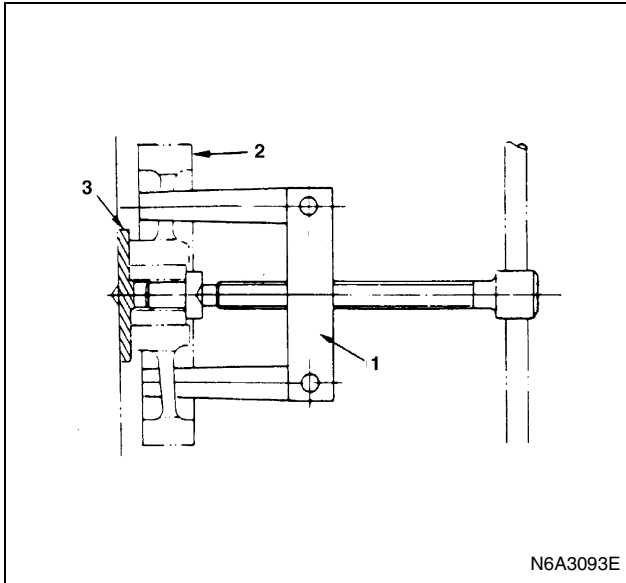


- 2) Remove the camshaft timing gear bolt from the camshaft.

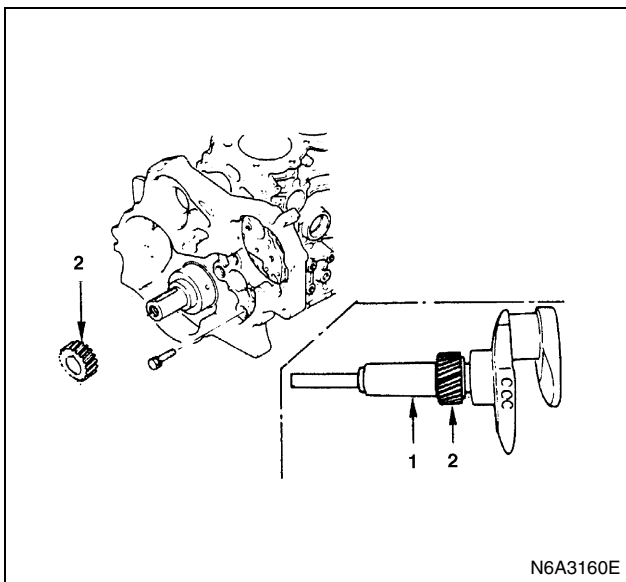
Notice:

Hold the camshaft stationary to prevent the camshaft from turning.

- 3) Use the universal puller (1) to pull out the camshaft timing gear (2).
Universal Puller: 5-8521-0002-0
- 4) Remove the thrust plate (3).

**16. Crankshaft Gear****Installation****1. Crankshaft Gear**

- 1) Install the crankshaft gear.
- 2) Use the crankshaft gear installer (1) to install the crankshaft gear (2).
The crankshaft gear timing mark ("X — X") or ("· — ·") must be facing outward.
Crankshaft Gear Installer: 9-8522-0020-0

**2. Camshaft Timing Gear**

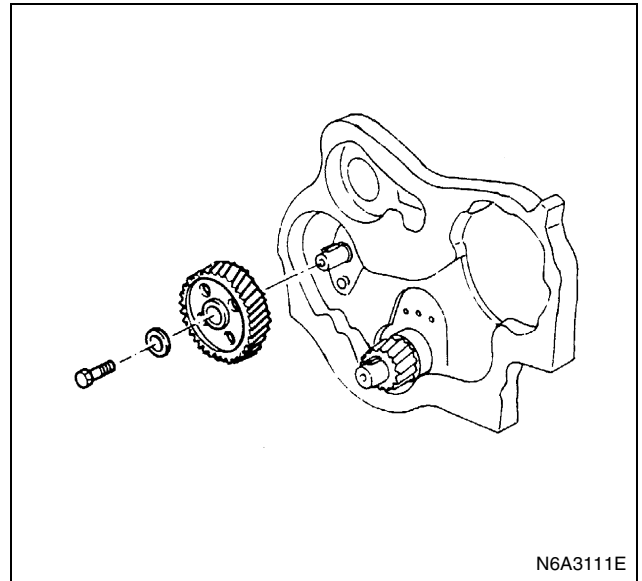
- 1) Install the thrust plate to the cylinder body.
- 2) Tighten the thrust plate bolts to the specified torque.

Tighten:

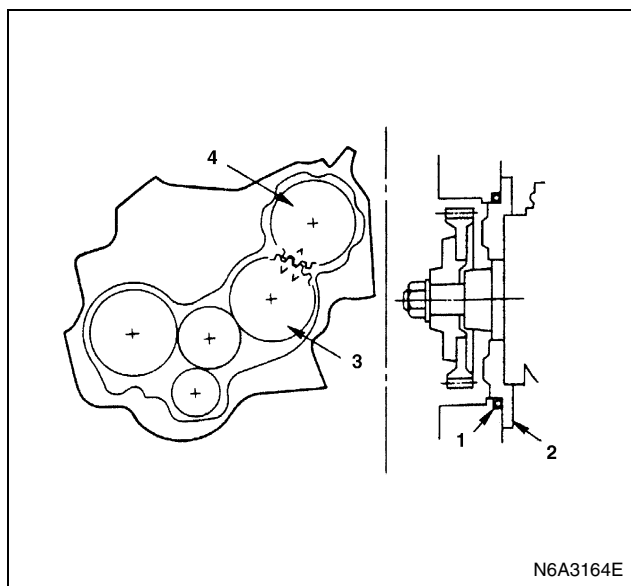
- 18 N·m (1.8 kg·m / 13 lb·ft)
- 3) Install the camshaft timing gear to the camshaft.
The timing gear mark ("Y — Y") or ("· — ·") must be facing outward.
 - 4) Tighten the timing gear to the specified torque.

Tighten:

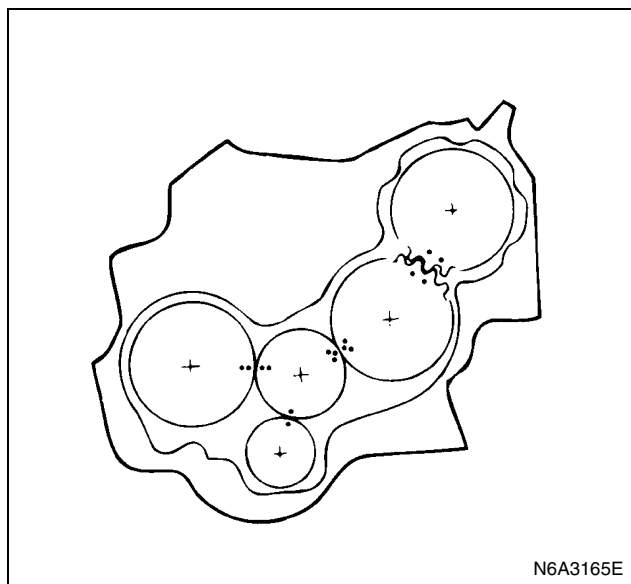
- 64 N·m (6.5 kg·m / 47 lb·ft)

**3. Injection Pump**

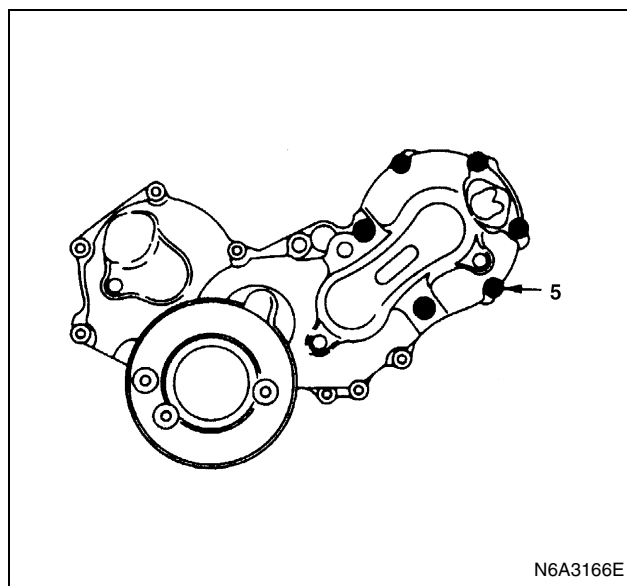
- 1) Install the O-ring (1) to the injection pump flange (2).
- 2) Install the injection pump to the timing gear case.
Align the idler gear "B" (3) "V — V" or ("· — ·") mark with the injection pump timing gear (4) "V" or ("·") mark.



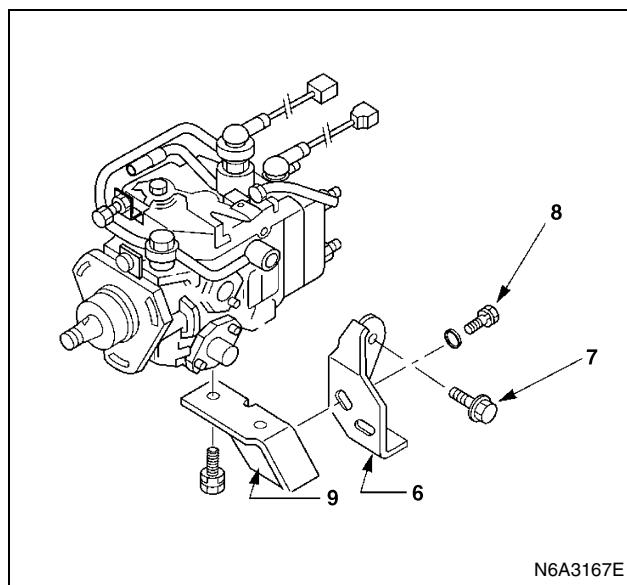
Gear	4JB1-TC, 4JG2	4JH1TC
Crank gear — Idle gear "A"	X — X	. — .
Idle gear "A" — Cam gear	Y — Y	.. — ..
Idle gear "A" — Idle gear "B"	Z — Z	: — :
Idle gear "B" — Injection pump	V — V	: — :



- 3) Temporarily tighten the six injection pump bolts (5).
The injection pump bolts will be finally tightened after the injection pump rear bracket bolts.



- 4) Install the injection pump rear bracket (6) and the rear bracket bolts (7) to the cylinder body.
5) Install the rear bracket bolts (8) to the injection pump bracket (9).
Do not tighten the bolts.
The rear bracket bolts (7) and (8) will be finally tightened to the specified torque after tightening the injection pump nuts.



- 6) Tighten the injection pump nuts to the specified torque.

Tighten:

- 19 N·m (1.9 kg·m / 14 lb·ft)

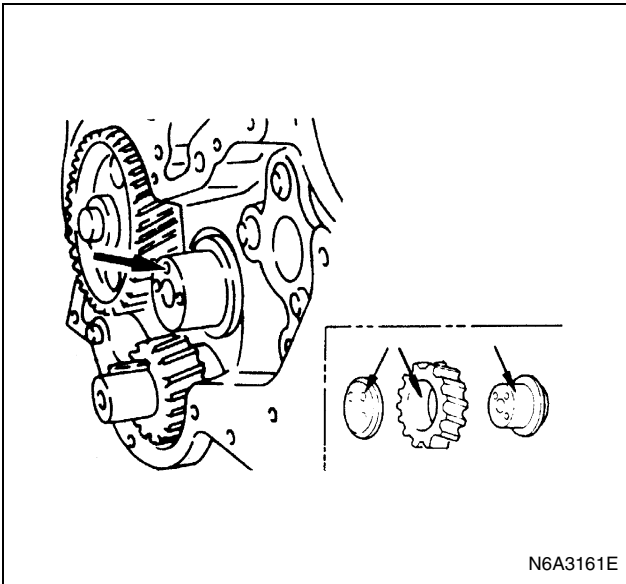
- 7) Tighten the injection pump bracket bolts to the specified torque.

Tighten:

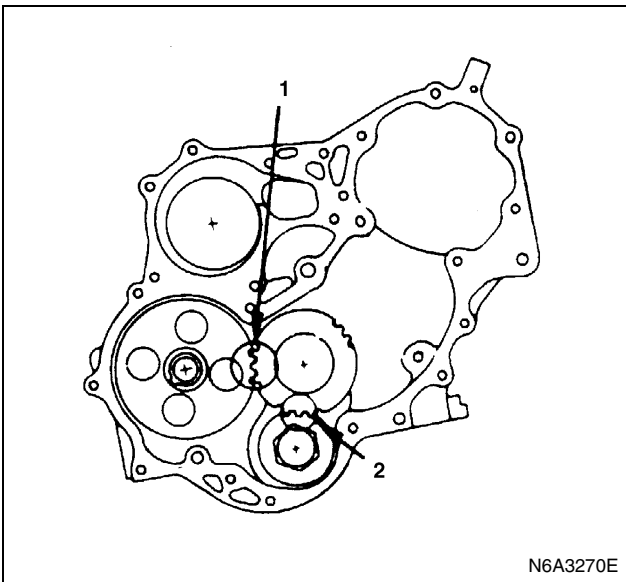
- 19 N·m (1.9 kg·m / 14 lb·ft)

4. Idler Gear

- 1) Apply engine oil to the idler gear and the idler gear shaft.
The idler gear shaft oil hole must be facing up.



- 2) Position the idler gear setting marks "X" or "." and "Y" or ".." so that they are facing the front of the engine.
- 3) Align the idler gear "X" or "." setting mark with the crankshaft timing gear (1) "X — X" or ". — ." setting mark.
- 4) Align the idler gear "Y" or ".." setting mark with the camshaft timing gear (2) "Y — Y" or ".. — .." setting mark.



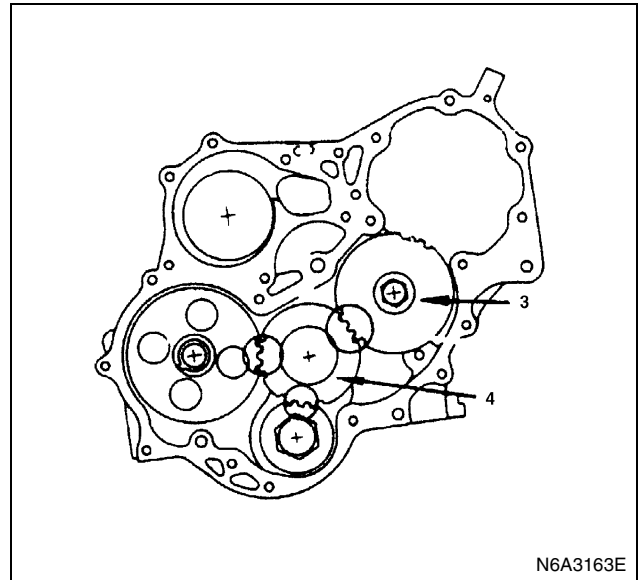
- 5) Install the thrust collar and bolts to the cylinder body through the shaft.
The thrust collar oil hole must be facing up, and the thrust collar chamfered must be outward.
- 6) Tighten the idler gear bolt to the specified torque.

Tighten:

- 19 N·m (1.9 kg·m / 14 lb·ft)

5. Idler Gear

- 1) Apply engine oil to the idler gear and the idler gear shaft.
- 2) Align the idler gear "B" (3) "Z" or "·" setting mark with the idler gear "A" (4) "Z — Z" or "· — ·" setting mark.



- 3) Tighten the idler gear bolt to the specified torque.

Tighten:

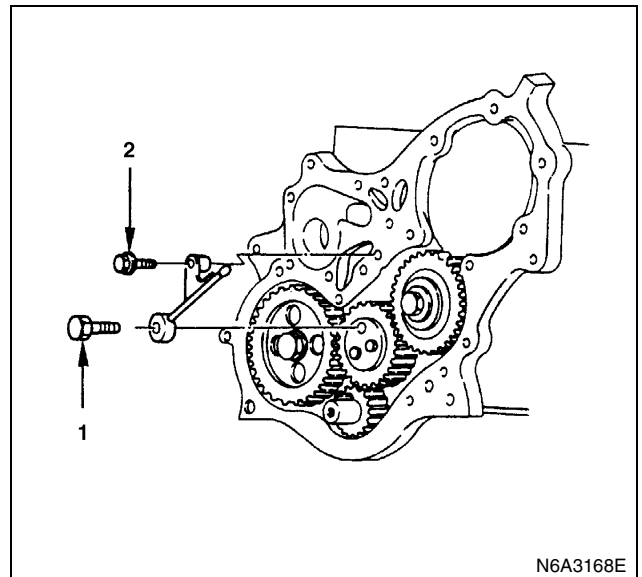
- 76 N·m (7.7 kg·m / 56 lb·ft)

6. Oil Pipe

- 1) Install the oil pipe to the timing gear case and idler gear "A".
- 2) Tighten the oil pipe eye bolt (1) and bolt (2) to the specified torque.

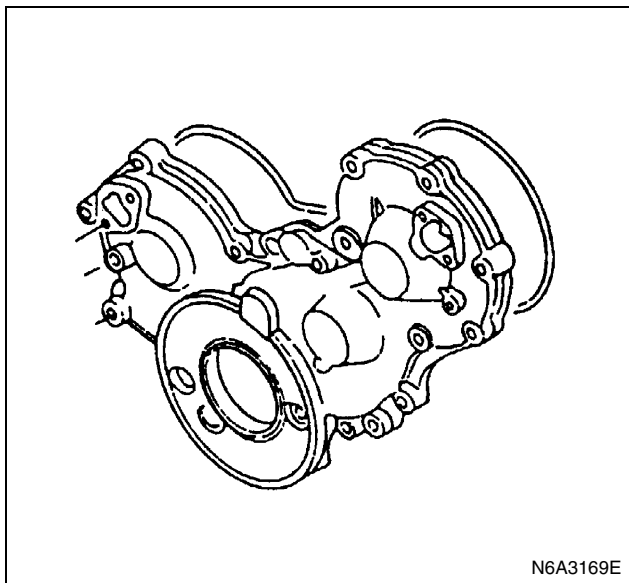
Tighten:

- Oil pipe eye bolt to 13 N·m (1.3 kg·m / 9 lb·ft)



7. Timing Gear Case Cover

- 1) Align the gear case with the timing gear case knock pin and then install the timing gear case cover.
- 2) Tighten the gear case cover bolts to the specified torque.



8. Noise Cover Spacer

9. Noise Shield Cover

10. Crankshaft Damper Pulley

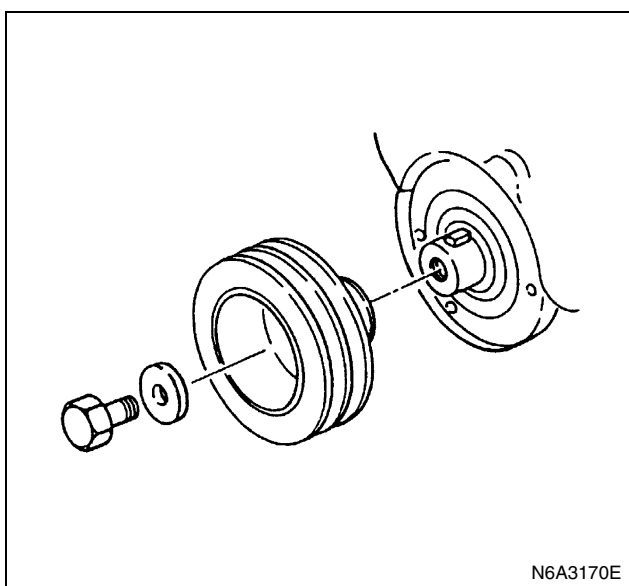
Tighten the crankshaft damper pulley bolt to the specified torque.

Notice:

Hold the flywheel ring gear stationary to prevent the crankshaft from turning when tightening the damper pulley.

Tighten:

- Pulley boss bolt to 206 N·m (21 kg·m / 152 lb·ft)



11. Cooling Fan Assembly

- Mount fan pulley, distance piece, and cooling fan assembly (in this order) on the water pump, and tighten to the specified torque.

Tighten:

- 8 N·m (0.8 kg·m / 69 lb·in)

12. AC Generator Drive Belt

- Install AC Generator drive belt and adjust belt tension.
- Depress the drive belt mid-portion with a 98 N (10 kg / 22 lb) force.

Drive Belt Deflection	mm (in)
8 (0.31) — 12 (0.47)	

- Tighten the idler lock nut to the specified torque.

Tighten:

- Idler lock nut to 27 N·m (2.8 kg·m / 20 lb·ft)

13. Power Steering Pump Drive Belt (P/S Model)

- Install Power Steering pump drive belt and adjust belt tension.
- Depress the drive belt mid-portion with a 98 N (10 kg / 22 lb) force.

Drive Belt Deflection	mm (in)
8 (0.31) — 12 (0.47)	

- Tighten the idler lock nut to the specified torque.

Tighten:

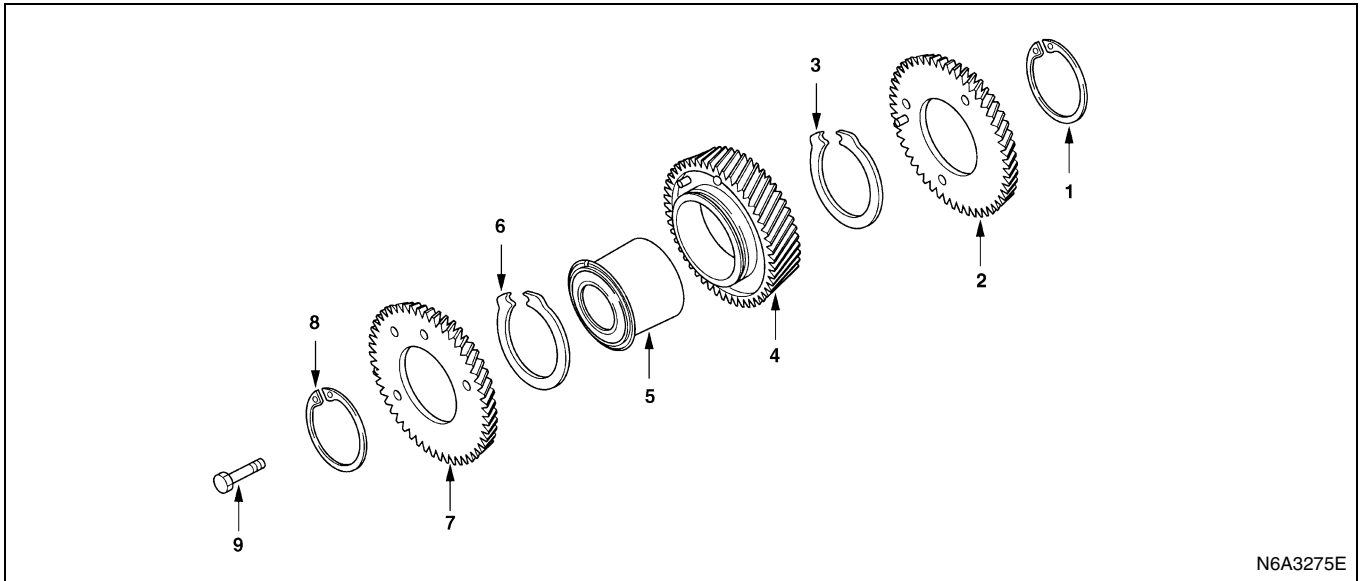
- 27 N·m (2.8 kg·m / 20 lb·ft)

14. Fan shroud

- Install the fan shroud and reservoir tank hose.
- Pour coolant
- Start the engine and check coolant leakage.

IDLE GEAR "B" (4JH1-TC SCISSOR GEAR)

Component



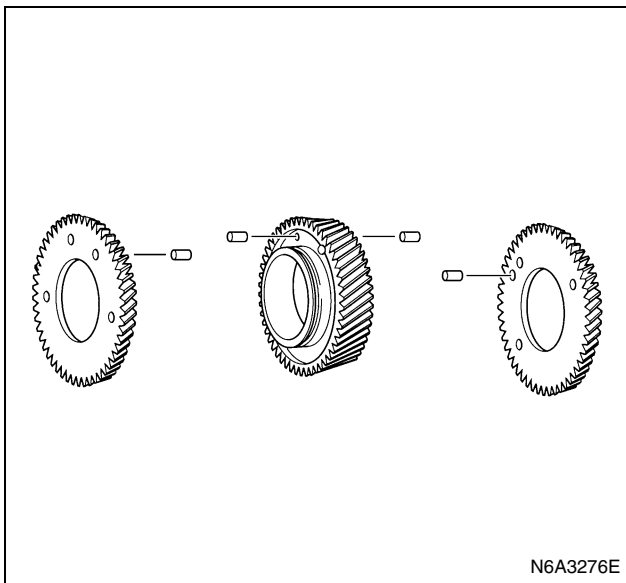
N6A3275E

Legend

- | | |
|--------------|---------------|
| 1. Snap ring | 6. Spring |
| 2. Rear gear | 7. Front gear |
| 3. Spring | 8. Snap ring |
| 4. Main gear | 9. Lock bolt |
| 5. Bearing | |

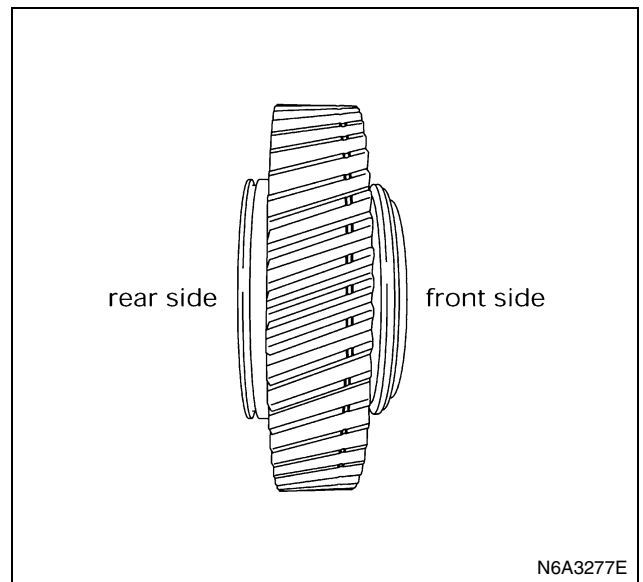
Reassembly

1. Drive pins into the main gear, the front gear, and the rear gear.



N6A3276E

2. Apply pressure to the main gear bearing from the front side of the main gear (the side with the groove).

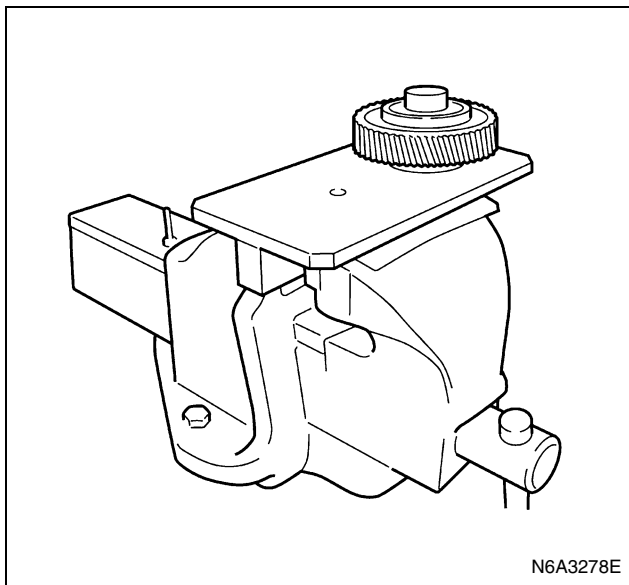


N6A3277E

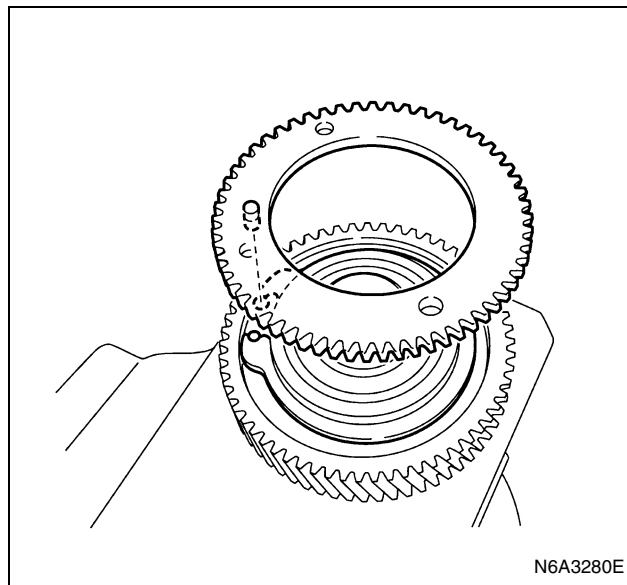
3. Place the special tool in a vise so that the main gear is pushed up toward the rear side.

Scissor gear setting tool

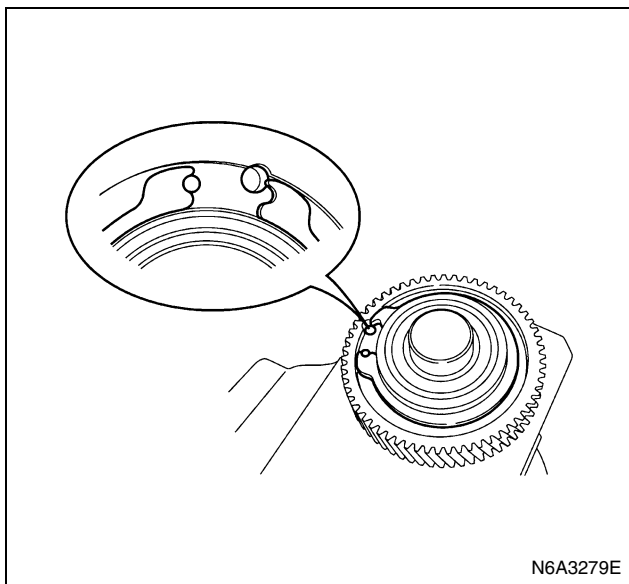
Base: 5-86739-149-0



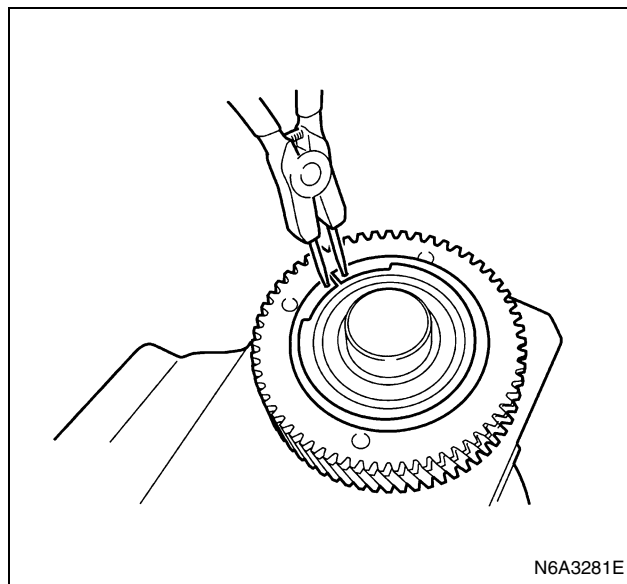
4. Set the spring as shown in the illustration.



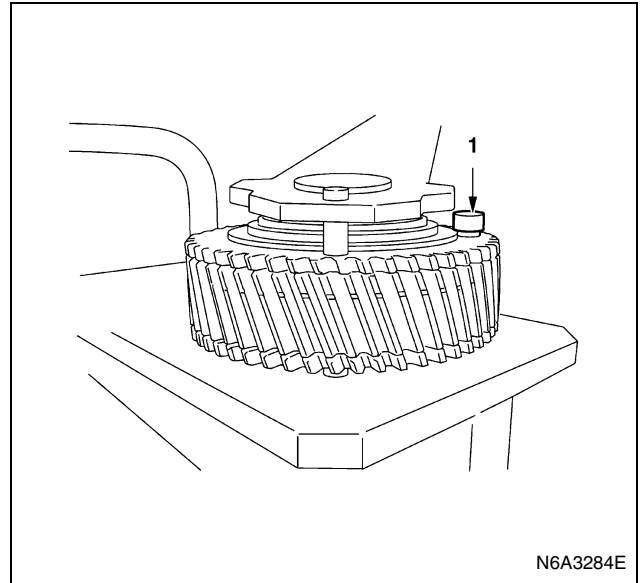
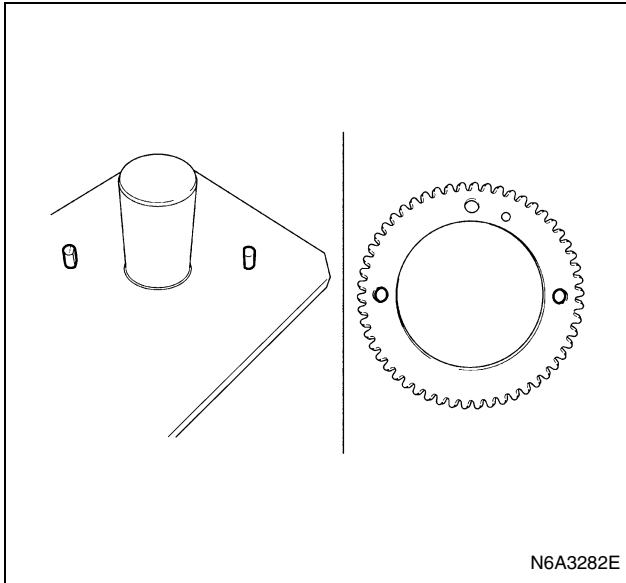
6. Install the snap ring to the main gear groove.



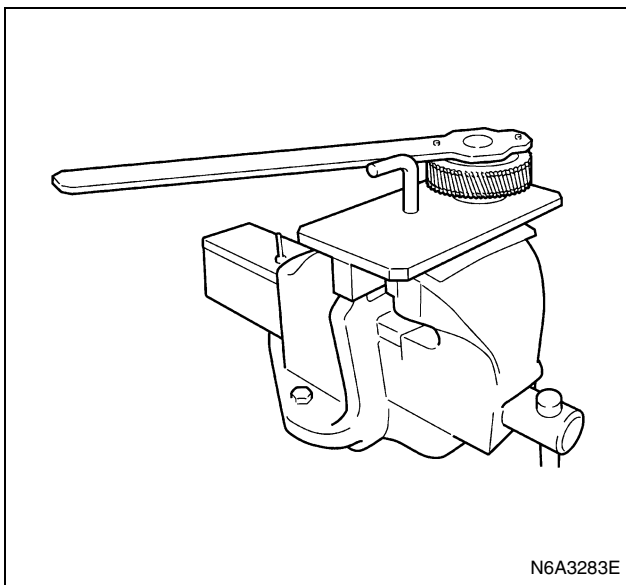
5. Position the rear gear so that its pin is aligned with the receiving end of the spring.



7. Set the rear gear setting hole to the pin of the special tool.



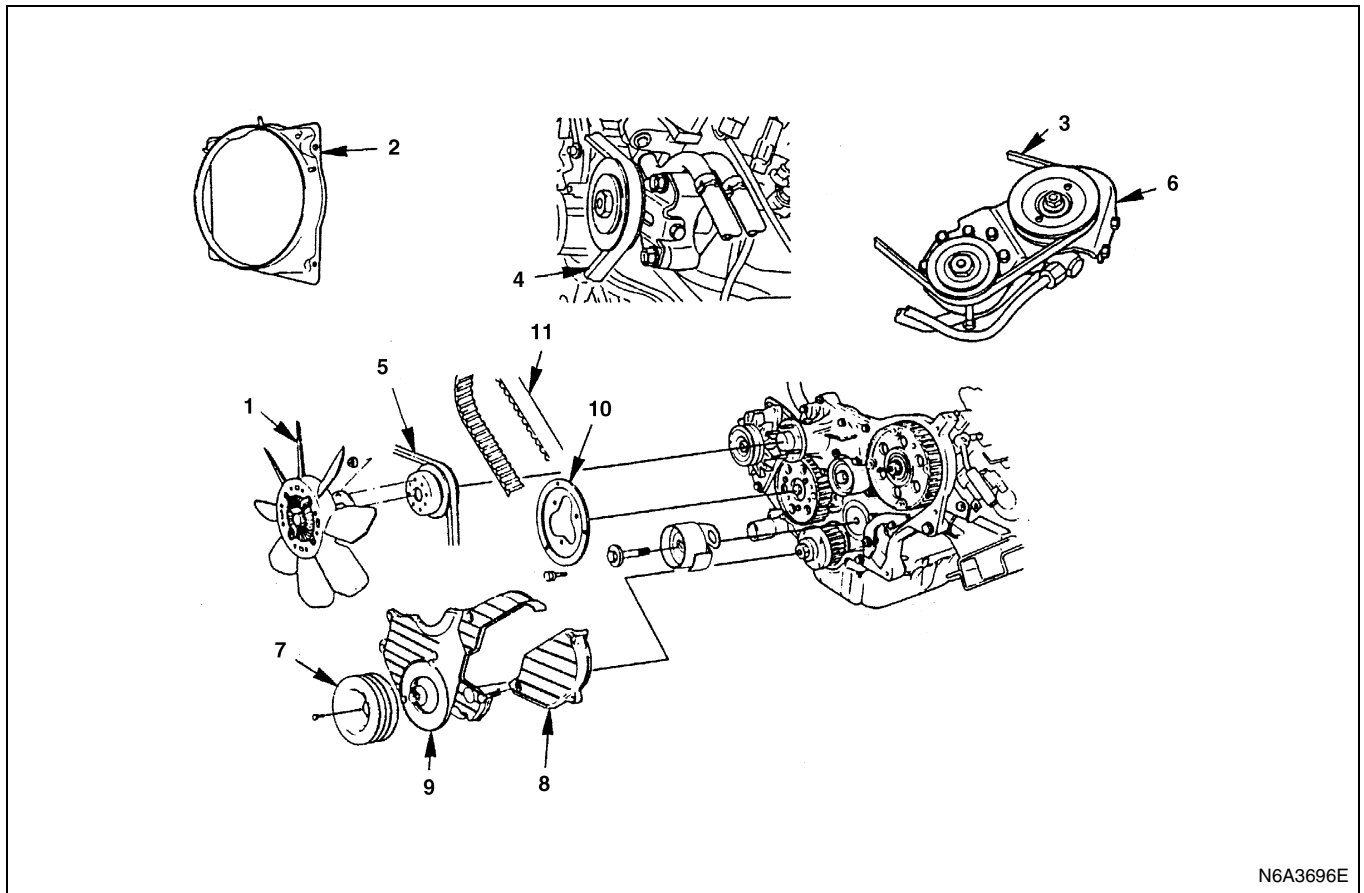
8. Place the special tool in a vise so that the main gear is pushed up toward the front side.
9. Repeat Steps 3, 4, and 5.
10. Use the special tool to mesh the teeth of the front gear, the main gear, and the rear gear.



11. Insert a lock bolt (M6 × 1.00 L = 30) (1) into the scissor gear fixing hole to prevent the scissor gear from turning.
 Scissor gear setting tool
 Lever: 5-86739-150-0

TIMING BELT (4JG2 Belt Type)

Component



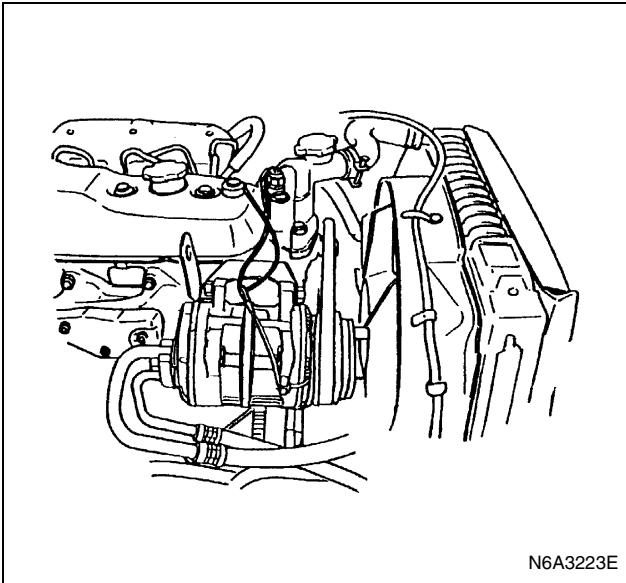
Legend

- | | |
|---|------------------------------|
| 1. Cooling fan assembly | 7. Crankshaft damper pulley |
| 2. Fan shroud | 8. Timing pulley upper cover |
| 3. Power steering pump drive belt | 9. Timing pulley lower cover |
| 4. A/C compressor drive belt | 10. Flange; Camshaft pulley |
| 5. AC Generator drive belt | 11. Timing belt |
| 6. Power steering pump bracket assembly | |

Removal

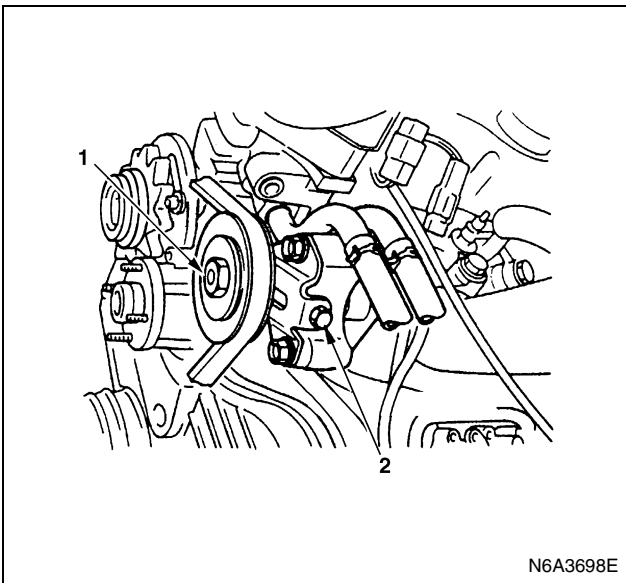
Preparation

- Disconnect battery ground cable.
 - Drain coolant.
1. Cooling Fan Assembly
 - Remove clamp nut, and remove cooling fan asm, distant pipe, and fan pulley.
 2. Fan Shroud
 - Removal reservoir tank hose and fan shroud.



3. Power Steering Pump Drive Belt (P/S Model)

- Loosen power steering pump idle pulley lock nut and adjust bolt, and remove the drive belt.

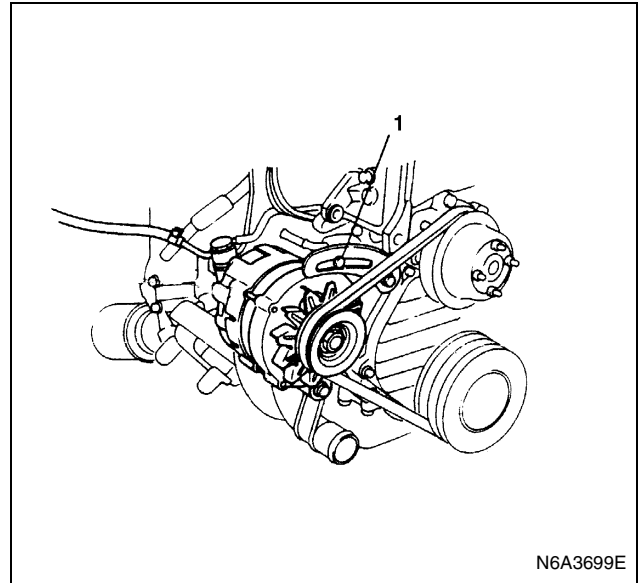


4. A/C Compressor Drive Belt (A/C Model)

- Loosen A/C compressor idle pulley lock nut (1) and adjust bolt (2), and remove the drive belt.

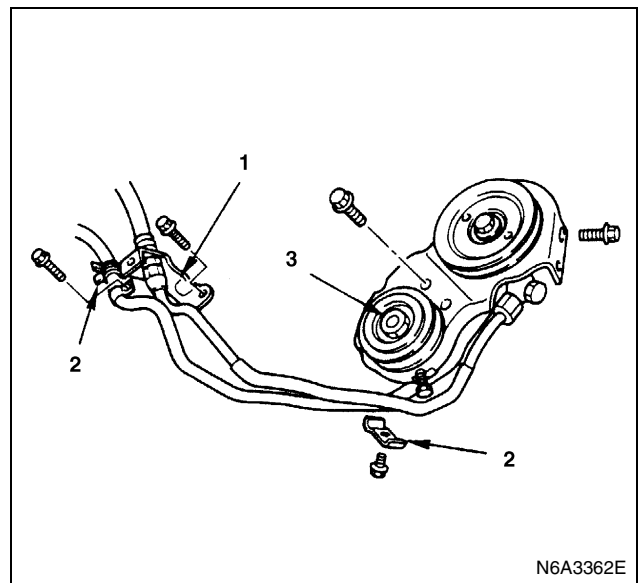
5. AC Generator Drive Belt

- Loosen AC Generator mounting bolt (under side) and adjust plate lock bolt (1), and remove the drive belt.



6. Power Steering Pump Bracket Assembly (P/S Model)

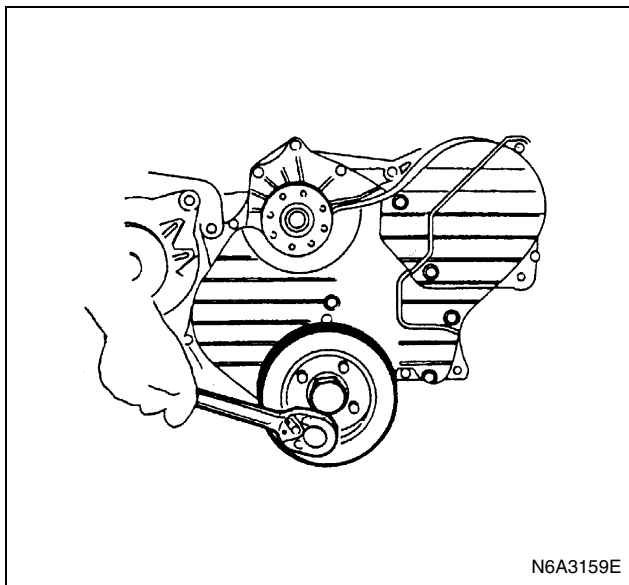
- Loosen power steering oil pipe bracket (1) and clip (2).
- Remove power steering pump bracket assembly and hang the power steering pump bracket assembly.



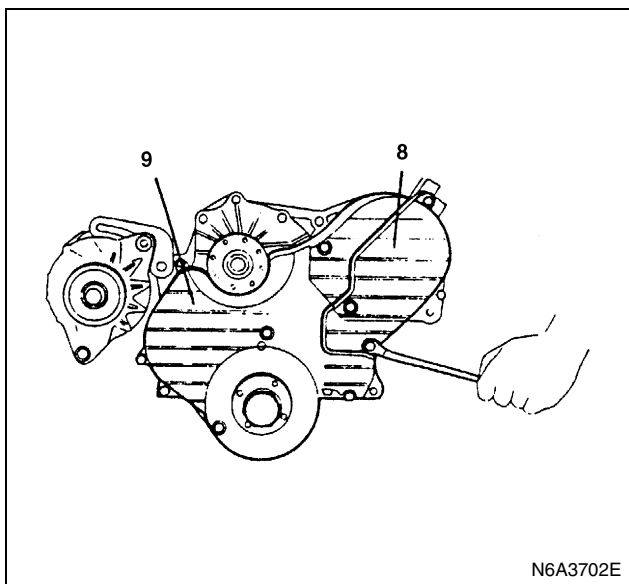
Legend

- Pipe bracket
- Clip
- Lock nut

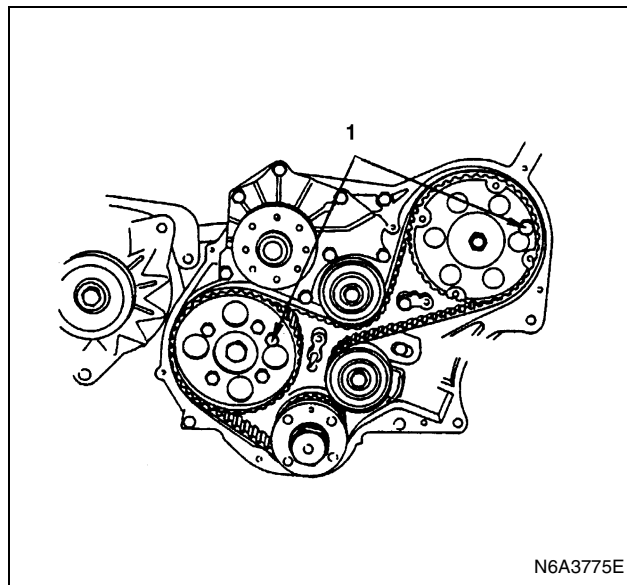
7. Crankshaft Damper Pulley



- 8. Timing Pulley Upper Cover
- 9. Timing Pulley Lower Cover

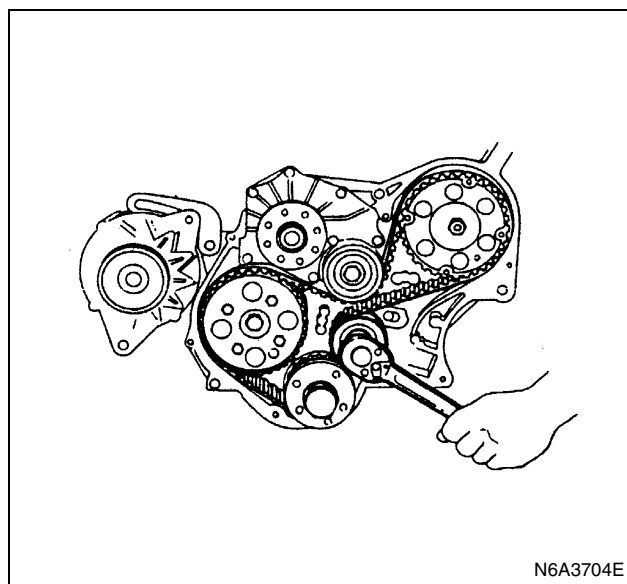


- 10. Flange; Camshaft Pulley
- 11. Timing Belt
- Prepare a fixing bolt (M8 × 40, P = 1.25)
- Turn crankshaft timing pulley in the normal direction pulley side mark to timing pulley housing side mark.
- Make sure that the camshaft pulley and injection timing pulley fixing bolt holes are set to each other. Then fit in a fixing bolt (1) and lightly tighten.



- No.1 cylinder should be at top dead center. If the fixing bolt holes are not set (No.4 cylinder is at top dead center) give another turn.
- Remove tensioner and timing belt.

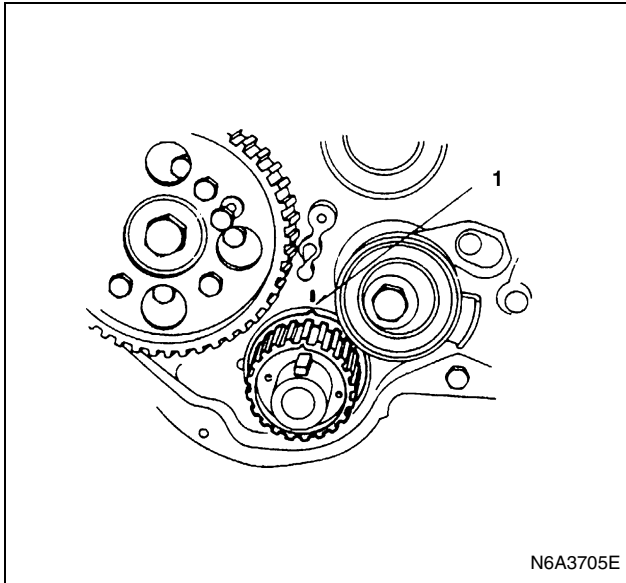
WARNING:
IF CRANKSHAFT AND CAMSHAFT AND TURNED WITH TIMING BELT BEING NOT MOUNTED, PISTON AND VALVE WILL INTERFERE WITH EACH OTHER. THEREFORE, THE SHAFTS MUST NOT BE TURNED.



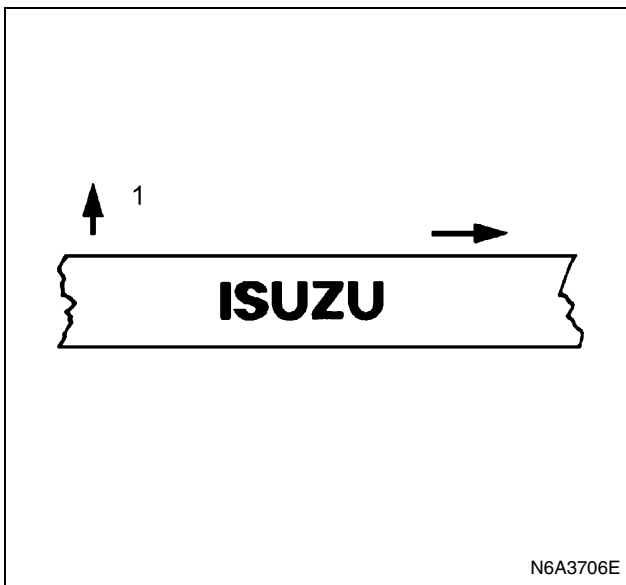
Installation

- 1. Timing Belt
 - When removing the belt, make sure the marks on the bolt fixed camshaft, injection pulley and crankshaft timing pulley are set to each other (1).

Caution:
Do not turn crankshaft because otherwise piston and valve will interfere with each other.

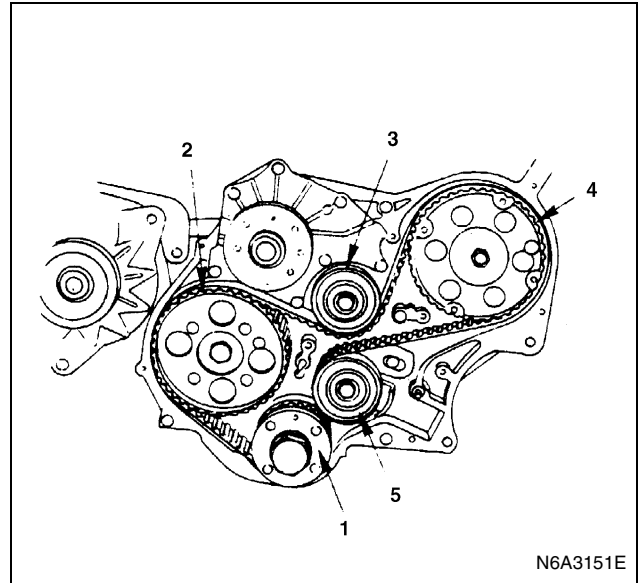
**Caution:**

For accurate mounting, be sure to mount the belt in the direction that letters on the belt are readable.

**Legend**

1. Cylinder head side

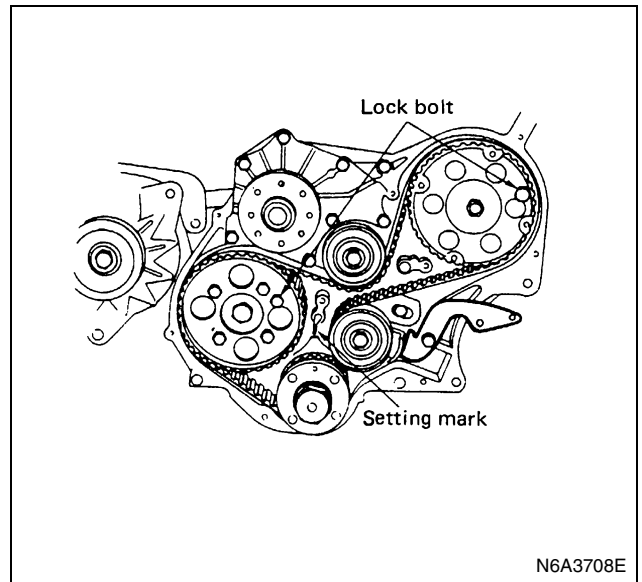
- Mount new timing belt on pulleys in the following steps.
Crankshaft timing pulley (1) → Camshaft
Timing pulley (2) → Idle pulley (3) → Injection
Pump pulley (4) → tensioner (5)



- Set the belt on crankshaft timing pulley and hold with one hand.
- Stretch and pass the belt round each pulley with the other hand.
- After passing it round injection pump pulley, install tensioner while taking care not to slacken the belt.

Caution:

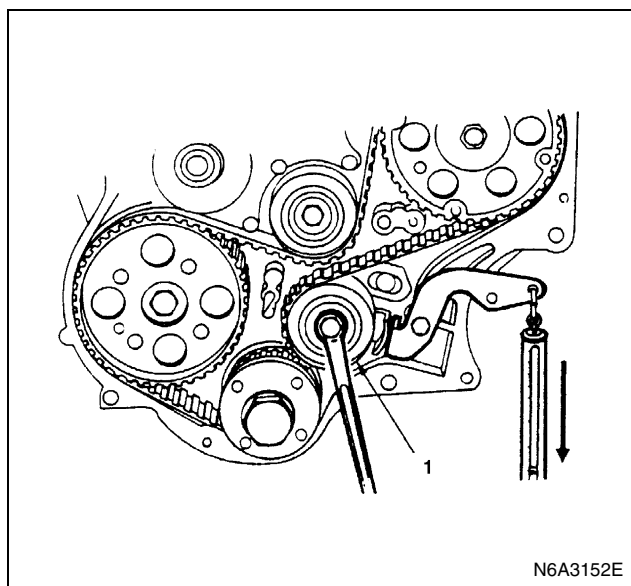
- On completion of belt passing, make sure that the setting mark on crankshaft timing pulley is set.
- If not set, reset the mark and repeat the belt passing.

**Legend**

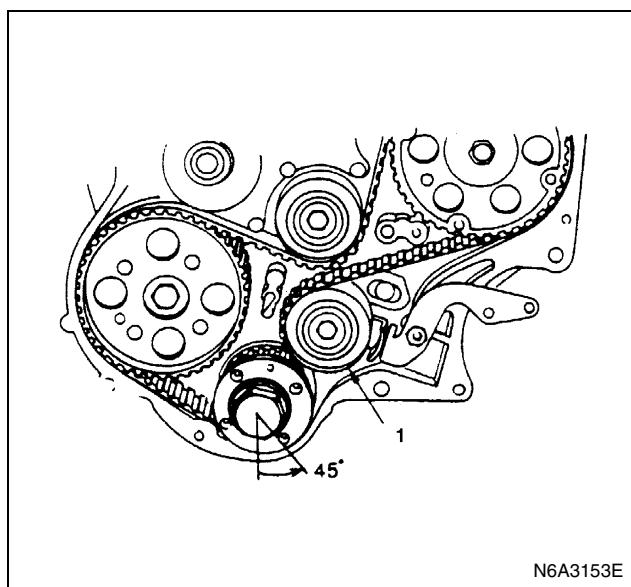
- 1. Lock bolt
- 2. Setting mark

- Remove tension adjust, lever mounting bolt, and loosen the fulcrum bolt to such extent that the lever is movable.

- Hung a spring balance from the end hole of tension adjust lever, and with the balance pulled down with 9 kg., loosen once the tensioner (1) mounting bolt and there retighten it.



- Turn the crankshaft by 45° counterclockwise to shift belt slackness on to the tensioner (1).



- Again hang the spring balance from the end hole of tension adjust lever and pull it down with the specified force. Under this condition, loosen tensioner mounting bolt to absorb belt slackness and retighten to specified torque.

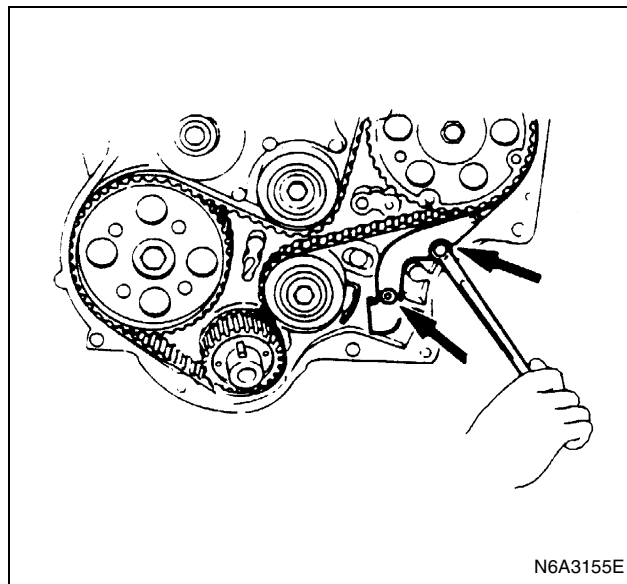
Belt	N·(kg/lb)
Tension	98 — 118 (10 — 12/22 — 26)

Tighten:

- Bolt to 76 N·m (7.8 kg·m / 56 lb·ft)
- Fix the tension adjust lever.

Caution:

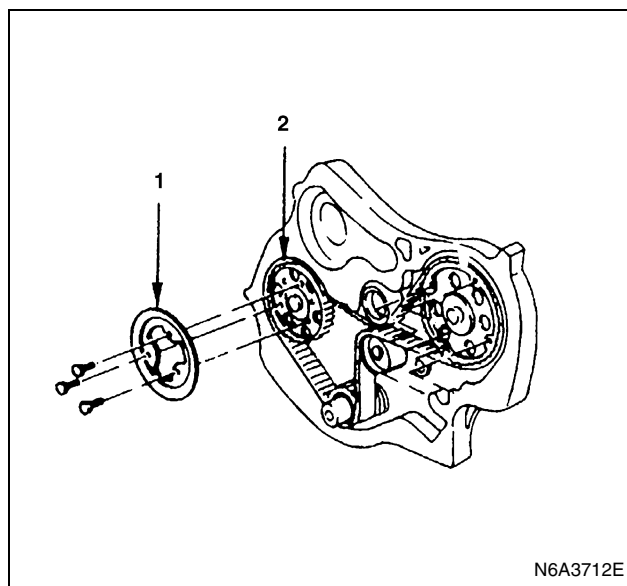
- In case where the timing belt has been replaced with the actuation of warning light, put off the light with change over switch on the reverse side of meter.
- Refer to Chassis Electrical in Section 8.
- Tighten the tension adjusting lever nut and bolt.

**2. Flange; Camshaft Pulley**

- Install the timing pulley flange (1) to the camshaft timing pulley (2).

Tighten:

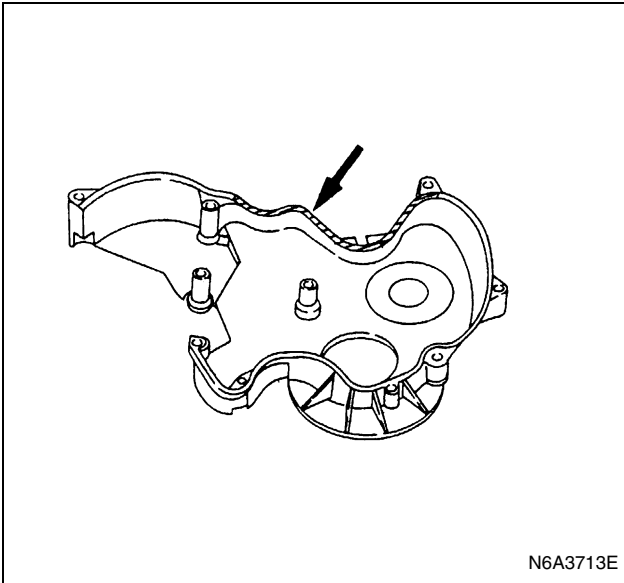
- Flange bolts to 19 N·m (1.9 kg·m / 14 lb·ft)

**3. Timing Pulley Lower Cover**

- Install timing pulley lower cover and tighten bolt to the specified torque.

Tighten:

- Cover bolts to 8 N·m (0.8 kg·m / 69 lb·in)

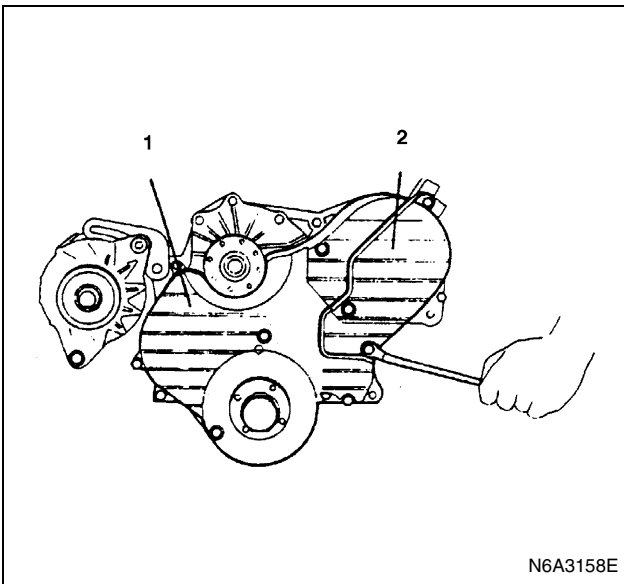


4. Timing Pulley Upper Cover

- Install timing pulley upper cover and tighten bolt to the specified torque.

Tighten:

- Cover bolts to 8 N·m (0.8 kg·m / 69 lb·in)



Legend

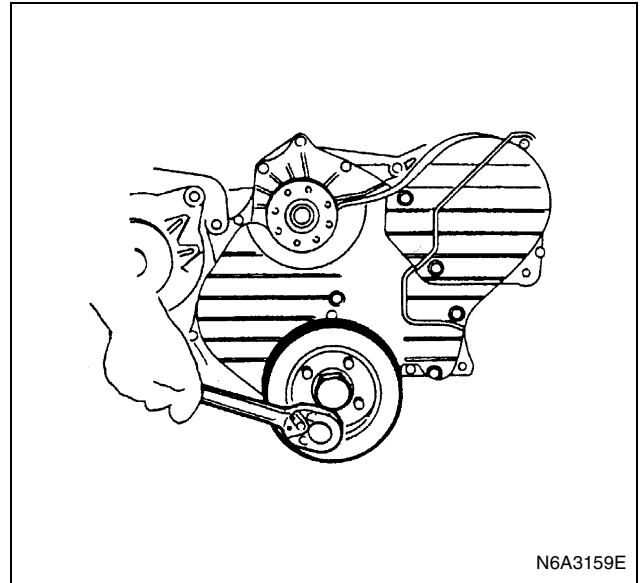
1. Lower cover
2. Upper cover

5. Crankshaft Damper Pulley

- Install crankshaft damper pulley and tighten bolt to the specified torque.

Tighten:

- 19 N·m (1.9 kg·m / 14 lb·ft)



6. Power Steering Pump Bracket Assembly (P/S Model)

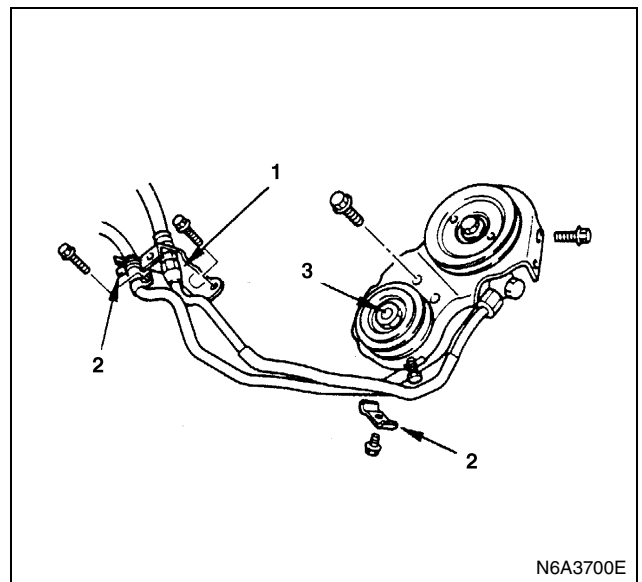
- Install the pipe bracket & clip and tighten bolts to the specified torque.

Tighten:

- Pipe bracket bolts to 19 N·m (1.9 kg·m / 14 lb·ft)
- Pipe clip bolts to 10 N·m (1.0 kg·m / 87 lb·in)
- Install the P/S pump & bracket assembly.

Tighten:

- M10 bolts to 40 N·m (4.1 kg·m / 30 lb·ft)
- M8 bolts to 19 N·m (1.9 kg·m / 14 lb·ft)
- Lock nut to 27 N·m (2.8 kg·m / 20 lb·ft)



Legend

1. Pipe bracket
2. Clip
3. Lock nut

7. AC Generator Drive Belt

- Install AC Generator drive belt and adjust belt tension.
- Depress the drive belt mid-portion with a 98 N (10 kg / 22 lb) force.

Drive Belt Deflection	mm (in)
8 (0.31) — 12(0.47)	

- Install fixing bolt and tighten bolts to the specified torque.

Tighten:

- Generator fixing bolts to 40 N·m (4.1 kg·m / 30 lb·ft)
- Adjust plate fixing bolts to 19 N·m (1.9 kg·m / 14 lb·ft)

8. A/C Compressor Drive Belt (A/C type)

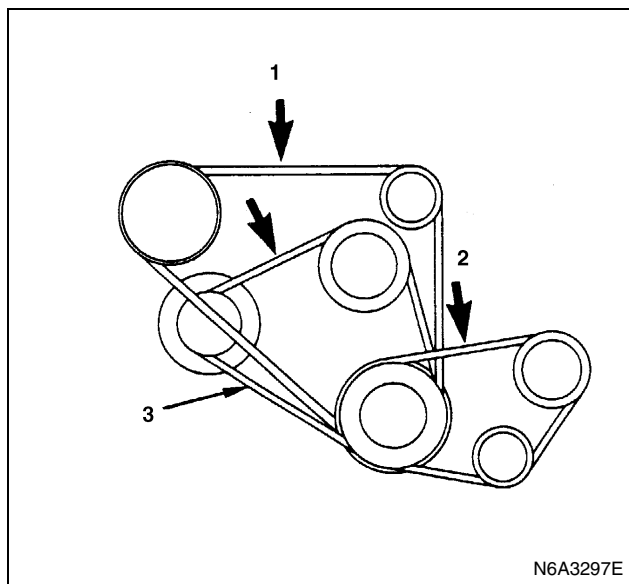
- Install A/C compressor drive belt and adjust belt tension.
- Depress the drive belt mid-portion with a 98 N (10 kg / 22 lb) force.

Drive Belt Deflection	mm (in)
8 (0.31) — 12(0.47)	

- Tighten the idler lock nut to the specified torque.

Tighten:

- Idler lock nut to 27 N·m (2.8 kg·m / 20 lb·ft)



N6A3297E

Legend

1. A/C compressor drive belt
2. P/S pump drive belt
3. AC generator fan pulley

9. Power Steering Pump Drive Belt (P/S pump model)

- Install PS pump drive belt and adjust belt tension.
- Depress the drive belt mid-portion with a 98 N (10 kg / 22 lb) force.

Drive Belt Deflection	mm (in)
8 (0.31) — 12(0.47)	

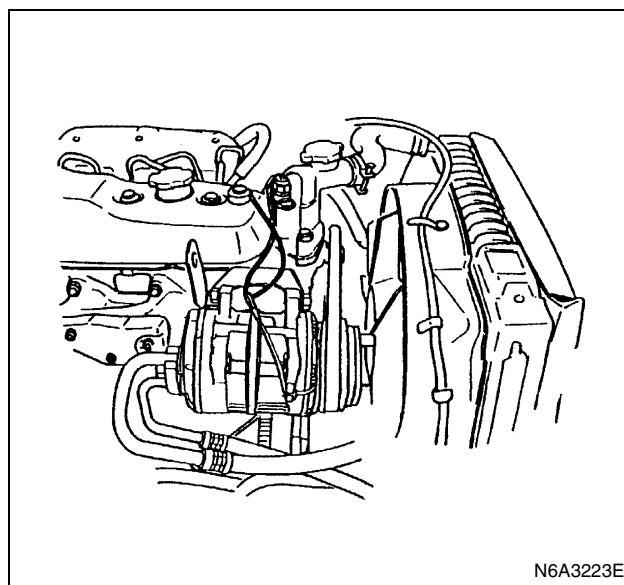
- Tighten the idler lock nut to the specified torque.

Tighten:

- Idler lock nut to 27 N·m (2.8 kg·m / 20 lb·ft)

10. Fan Shroud

- Install the fan shroud and reservoir tank hose.



N6A3223E

11. Cooling Fan Assembly

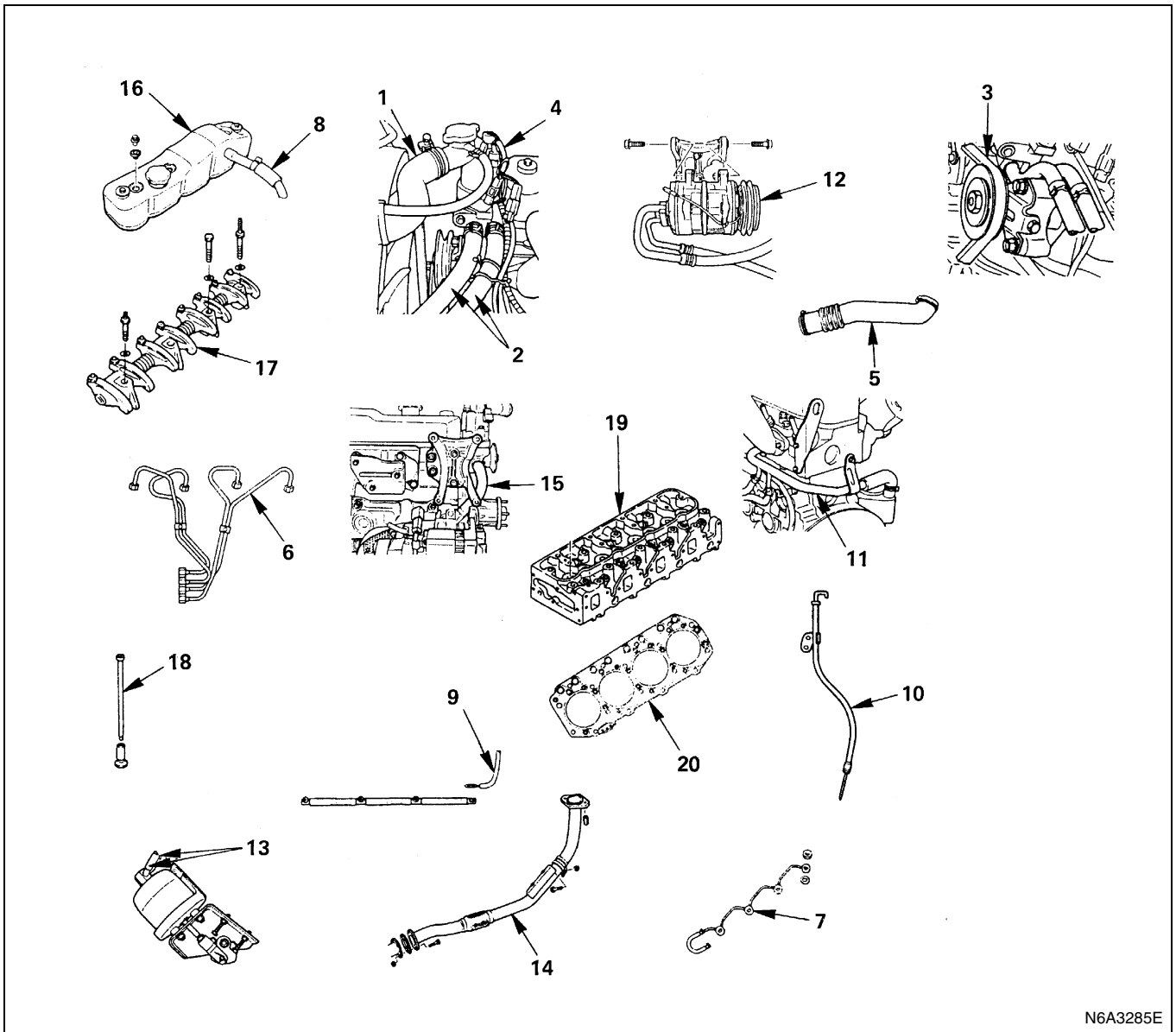
- Mount fan pulley, distance piece, and cooling fan asm (in this order) on the water pump, and tighten to the specified torque.

Tighten:

- Nut to 8 N·m (0.8 kg·m / 69 lb·in)
- Connect battery ground cable.
- Pour coolant.
- Start the engine and check coolant leakage.

CYLINDER HEAD ASSEMBLY AND GASKET

Component



N6A3285E

Legend

- | | |
|--------------------------------|-----------------------------|
| 1. Radiator hose upper | 11. Oil cooler water pipe |
| 2. Heater hose | 12. A/C Compressor assembly |
| 3. A/C Compressor drive belt | 13. Vacuum actuator hose |
| 4. Engine harness | 14. Front exhaust pipe |
| 5. Air intake duct | 15. By-pass hose |
| 6. Injection pipe | 16. Cylinder head cover |
| 7. Leak off pipe | 17. Rocker arm shaft |
| 8. PCV hose | 18. Push rod |
| 9. Glow plug harness | 19. Cylinder head assembly |
| 10. Oil level gauge guide tube | 20. Cylinder head gasket |

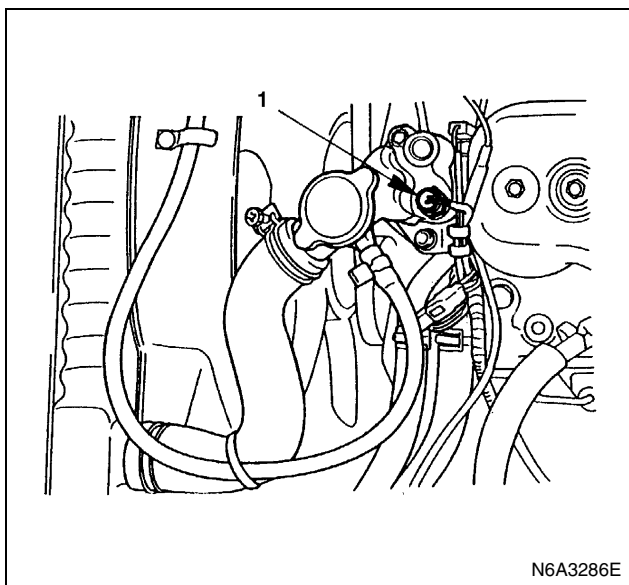
Removal

Preparation

- Disconnect battery ground cable.

- Drain coolant from the radiator and engine.
- 1. Radiator Hose Upper
- Disconnect upper radiator hose from engine side.

2. Heater Hose
 - Disconnect heater hose from heater pipe.
3. A/C Compressor Drive Belt
 - Loosen idler lock nut.
 - Loosen adjust bolt and remove drive belt.
4. Engine Harness
 - Disconnect harness connectors from units on thermostat housing.



Legend

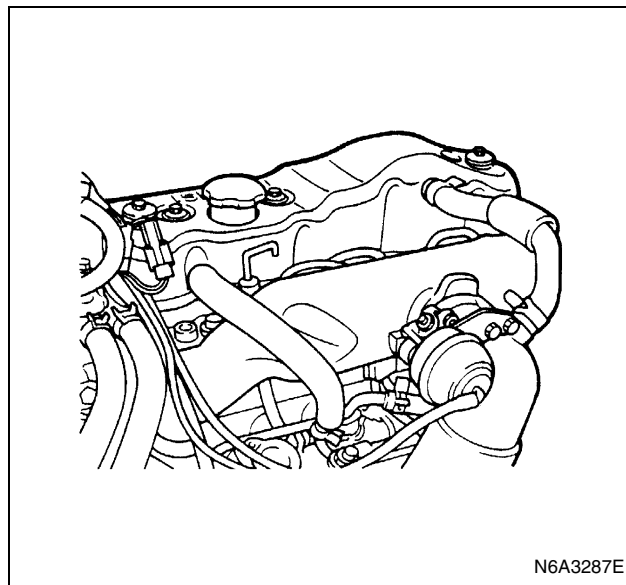
1. Thermo-sensor

5. Air Intake Duct
 - Remove the clip and air intake duct.
6. Injection Pipe
 - Release injection pipe clip.
 - Remove flare nut injection pump side.
 - Remove flare nut injection nozzle side and remove injection pipe.

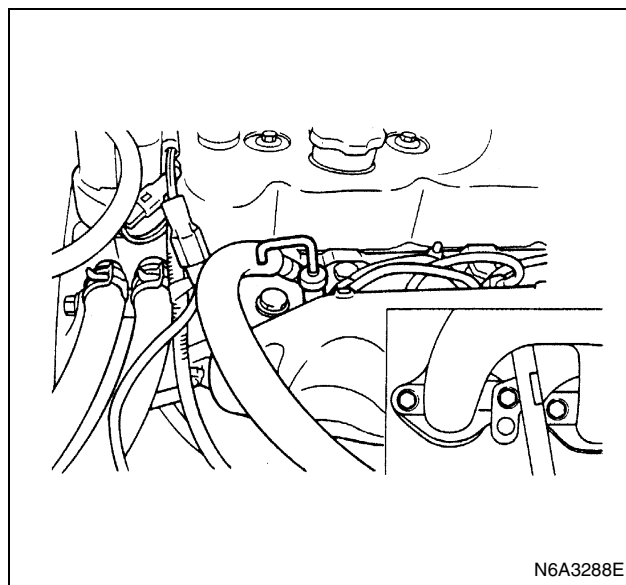
Notice:

Plug the injection nozzle holder and the delivery holder to prevent the entry of foreign matters into them.

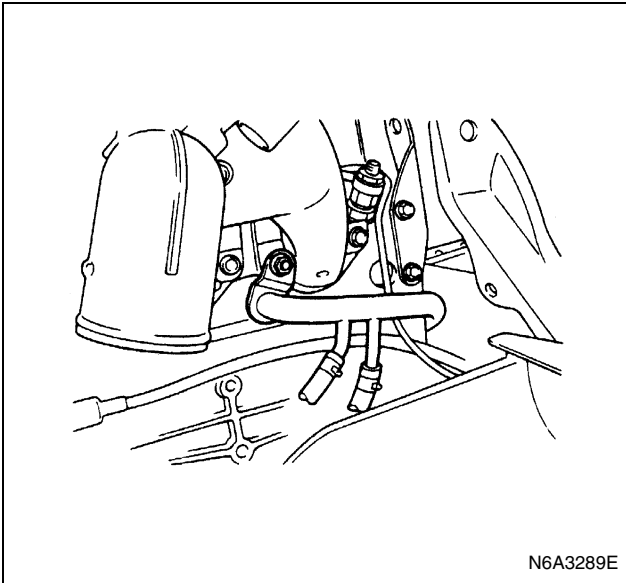
7. Leak Off Pipe
 - Remove the leak off pipe side of leak off hose.
8. PCV Hose
 - Remove the PCV hose from air intake pipe.



9. Glow Plug Harness
10. Oil Level Gauge Guide Tube
 - Remove the guide tube from cylinder head.

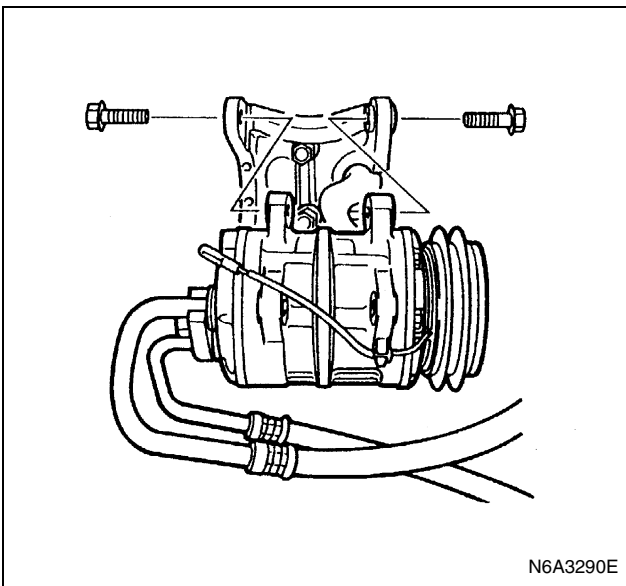


11. Oil Cooler Water Pipe (Oil Cooler Model)
 - Remove the pipe fixing bolt of cylinder head rear side.
 - Remove the oil cooler water pipe fixing nut from inlet manifold.



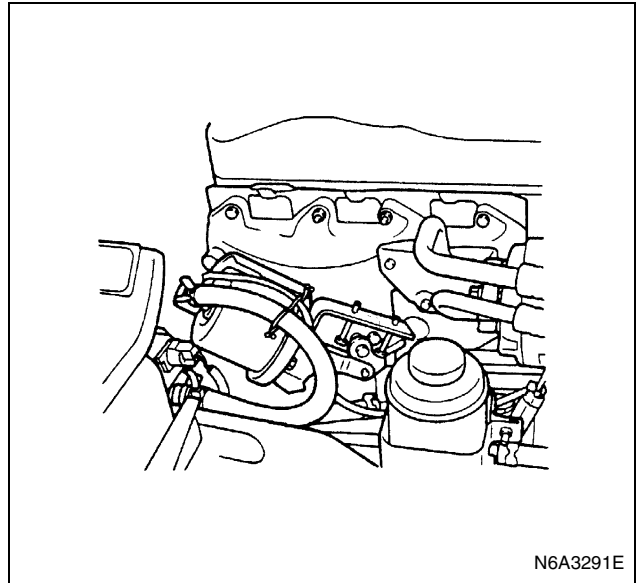
12. A/C Compressor Assembly (A/C Model)

- Remove the clutch harness connector.
- Remove the A/C compressor fixing bolts and temporarily tighten the A/C compressor to chassis frame side use the wire.



13. Vacuum Actuator Hose (Exhaust Brake Model)

- Remove the vacuum hoses from vacuum actuator.

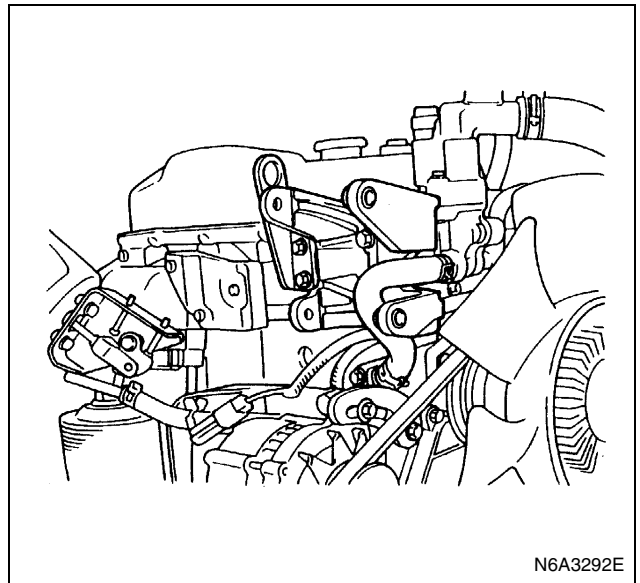


14. Front Exhaust Pipe

- Remove the exhaust pipe fixing bolts from exhaust manifold.
- Remove the exhaust pipe stay bolt.

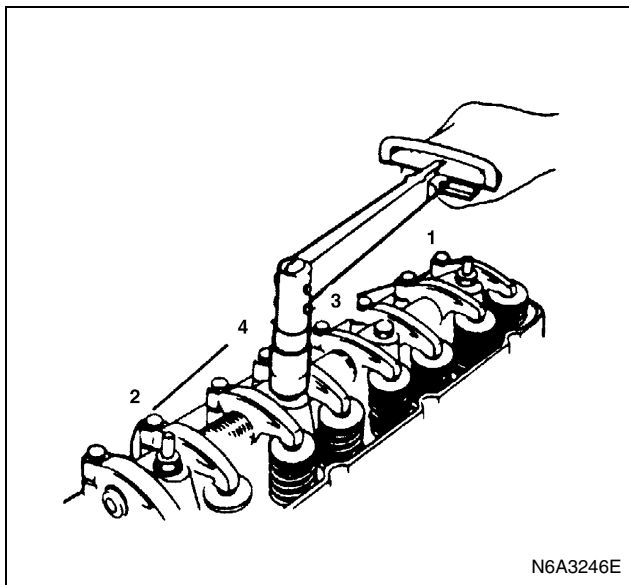
15. By-pass Hose

16. Cylinder Head Cover



17. Rocker Arm Shaft

- Loosen the rocker arm shaft bracket bolts a little at a time in the numerical order shown in the illustration.

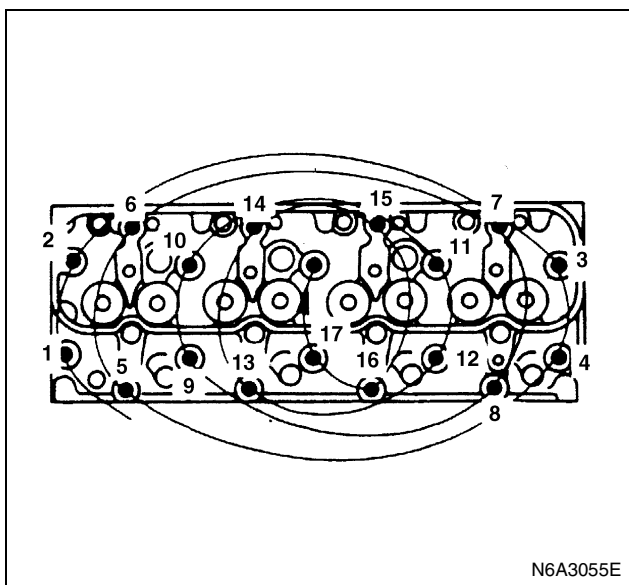
**Notice:**

Failure to loosen the rocker arm shaft bracket bolts a little at a time in numerical order will adversely effect the rocker arm shaft.

18. Push Rod

19. Cylinder Head Assembly

- Loosen the cylinder head bolts a little at a time in the numerical order shown in the illustration.

**Notice:**

Failure to loosen the cylinder head bolts a little at a time in numerical order will adversely effect the cylinder head lower surface.

20. Cylinder Head gasket

- Remove the cylinder head gasket and dowel.

Installation**1. Cylinder Head Gasket**

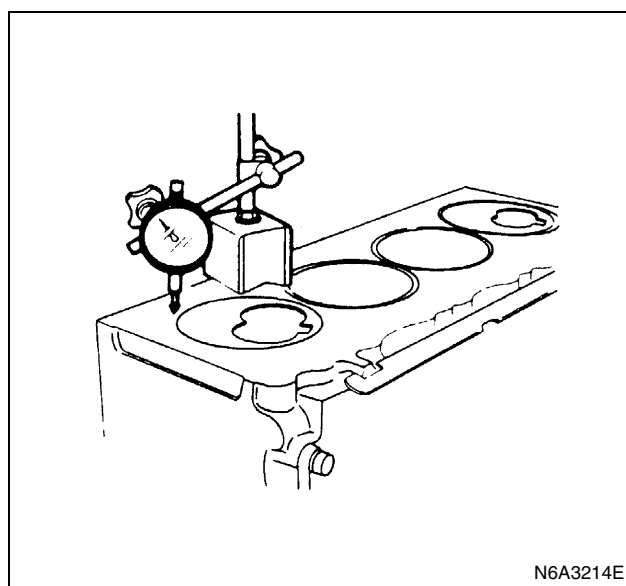
Cylinder head gasket is determined by the piston head projection from the cylinder body upper surface, in order to improve engine performance.

Three types of gasket are provided by the difference of thickness. Select the adequate one out of three grades of gasket, according to the following procedure.

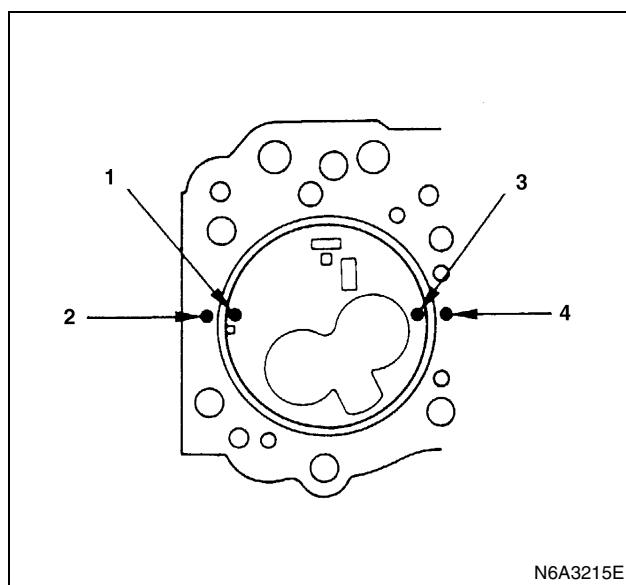
Before measurement, clear off carbon from the piston head and cylinder body surface and also clean the place where a gasket was installed.

Piston Head Projection Measurement Point

- 1) Use a dial indicator to measure the piston projection amount.



- 2) Refer to the illustration for the piston head projection measuring positions. All measuring positions should be as close as possible to the cylinder liner.



- 3) Measure the points (1), (2), (3) and (4) and obtain two differences (1) — (2) and (3) — (4) on each cylinder.
Calculate the average value of the piston head projection on each cylinder.
- 4) Obtain the maximum value in the four cylinders.
- 5) Determine the gasket grade required to the maximum value described above in accordance with the following table.

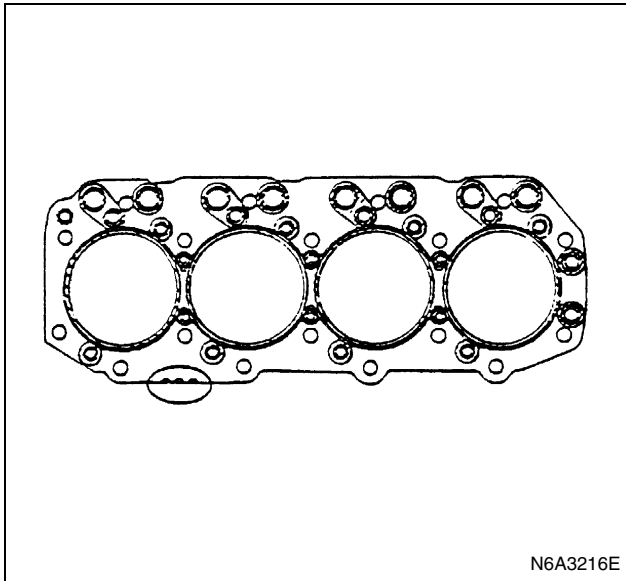
4JB1

mm (in)			
	1	2	3
A		0.758 - 0.813 (0.030 - 0.032)	1.60 (0.0630)
B		0.813 - 0.859 (0.032 - 0.034)	1.65 (0.0650)
C		0.859 - 0.914 (0.034 - 0.036)	1.70 (0.0670)

N6A3690E

Notice:

The difference between the highest measured piston head projection and the lowest measured piston head projection must not exceed 1.0 mm (0.039 in).

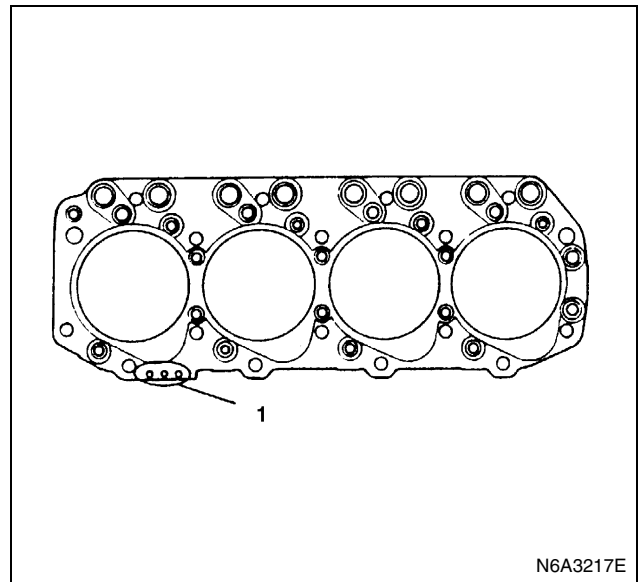


N6A3216E

4JG2

mm (in)			
	1	2	3
A		0.658-0.713 (0.0259-0.0281)	1.60 (0.0630)
B		0.713-0.759 (0.0281-0.0299)	1.65 (0.0650)
C		0.759-0.814 (0.0299-0.0320)	1.70 (0.0670)

N6A3693E



N6A3217E

Legend

1. Grade mark

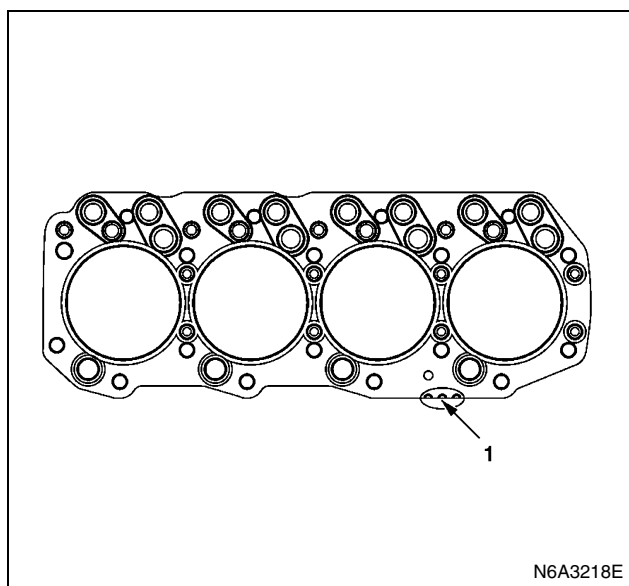
4JH1

mm (in)		
1	2	3
A	0.215 - 0.265 (0.0085 - 0.0104)	1.3 (0.5118)
B	0.265 - 0.315 (0.0104 - 0.0124)	1.35 (0.5315)
C	0.315 - 0.365 (0.0124 - 0.0144)	1.4 (0.5512)

N6A3691E

Notice:

The difference between the highest measured piston head projection and the lowest measured piston head projection must not exceed 1.0 mm (0.039 in).

**Legend**

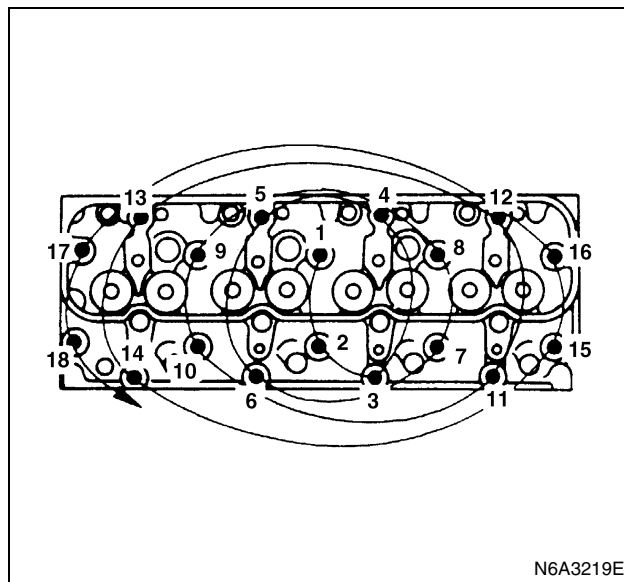
1. Grade mark
-
2. Cylinder Head Assembly
 - 1) Install the dowel in cylinder block.
 - 2) Install the cylinder head gasket with top mark up.
 - 3) Clean up cylinder head lower surface and cylinder body upper surface.
 - 4) Install the cylinder head as softly.
 - 5) Apply engine oil to screw and seat of cylinder head bolts.

- 6) Tighten the cylinder head bolts to the specified torque in three steps following the numerical order shown in the illustration.

Tighten:

Cylinder head bolts to

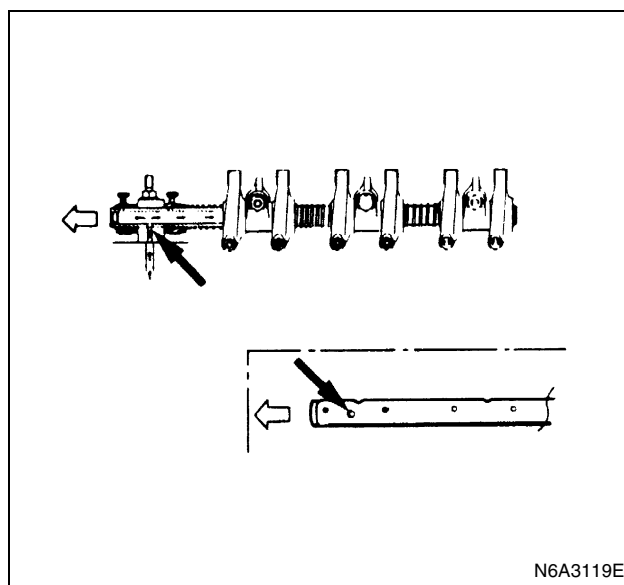
- 1st step: 49 N·m (5kg·m / 36 lb-ft)
- 2nd step: 60° — 75°
- 3rd step: 60° — 75°

**3. Push Rod**

- Apply engine oil to push rod and in to the cylinder head.

4. Rocker Arm shaft

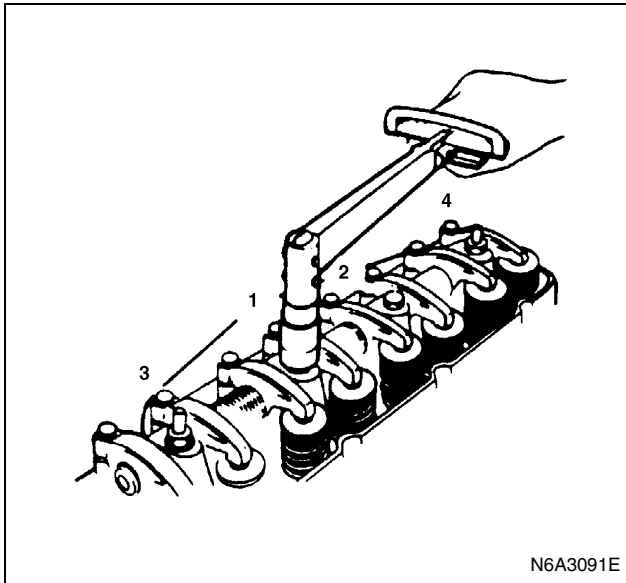
- 1) Loosen all adjusting screws.
- 2) Position the rocker arm shaft with the large oil hole (4φ) facing the front of the engine.



- 3) Tighten the rocker arm shaft bracket bolts to the specified torque in the numerical order shown in the illustration.

Tighten:

- Rocker arm shaft bracket bolt to 54 N·m (5.5kg·m / 40 lb·ft)



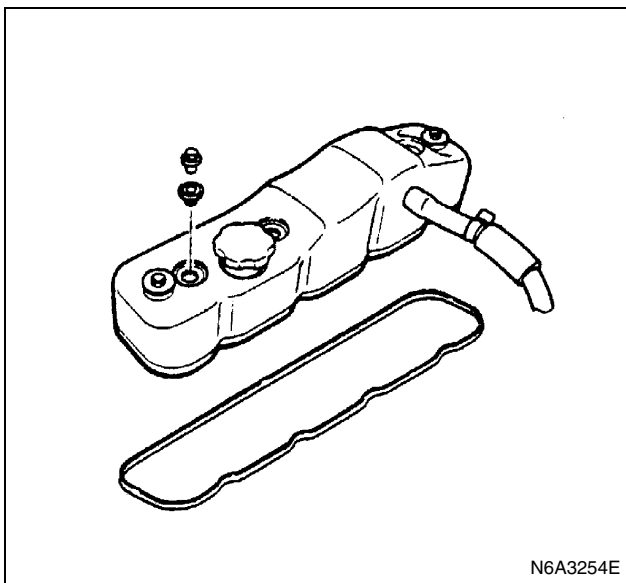
- Valve clearance adjustment.
Above works refer to "ROCKER ARM SHAFT ASSEMBLY" Section in this manual.

5. Cylinder Head Cover

- Apply engine oil to the rocker arms and the valve spring.
- Install the cylinder head cover gasket to the cylinder head cover.
- The gasket must be perfectly smooth with no loose areas.
- Tighten the cylinder head cover nuts to the specified torque in the numerical order shown in the illustration.

Tighten:

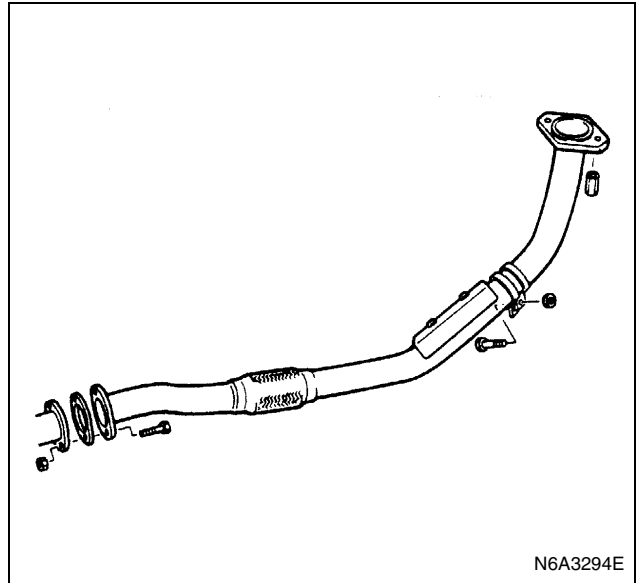
- Cylinder head cover to 13 N·m (1.3kg·m / 113 lb·in)

**6. By-Pass Hose****7. Front Exhaust Pipe**

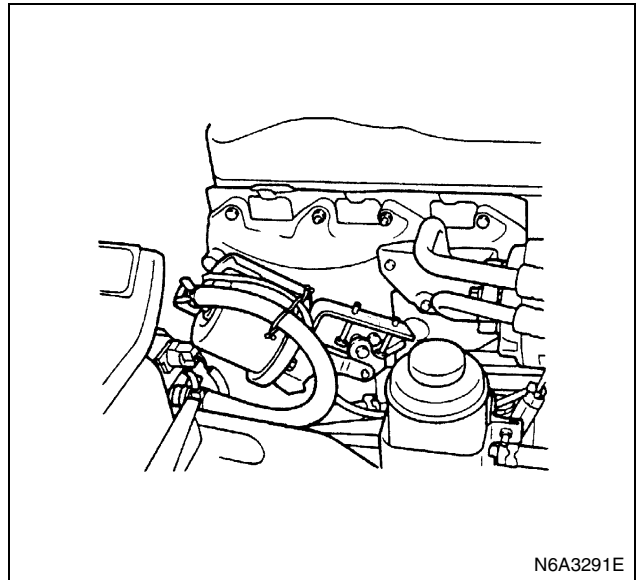
- Install the pipe to manifold and tighten bolts and nuts to the specified torque.

Tighten:

- W/Exhaust brake manifold nut to 37 N·m (3.8 kg·m / 27 lb·ft)
- WO/Exhaust brake manifold nut to 40 N·m (4.1 kg·m / 30 lb·ft)
- Pipe stay bolts to 40 N·m (4.1kg·m / 30 lb·ft)

**8. Vacuum Actuator Hose (Exhaust Brake Model)**

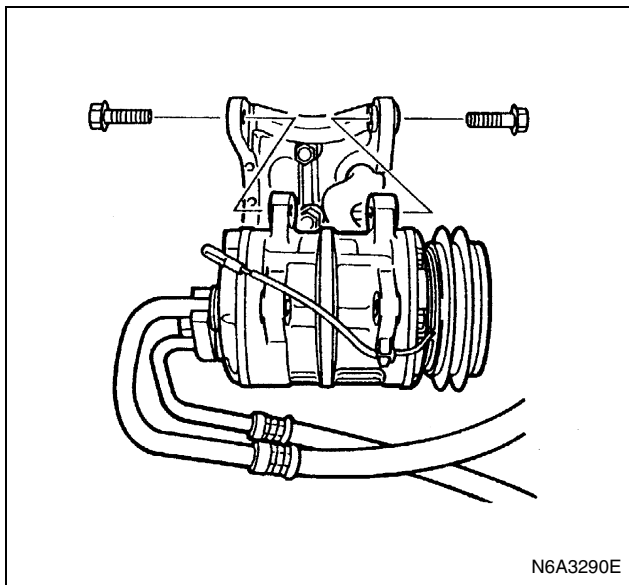
- Install the vacuum hose to the vacuum actuator.

**9. A/C Compressor Assembly (A/C Model)**

- Install the A/C compressor fixing bolts and tighten bolts to the specified torque.

Tighten:

- Compressor bolts to 37 N·m (3.8 kg·m / 27 lb·ft)

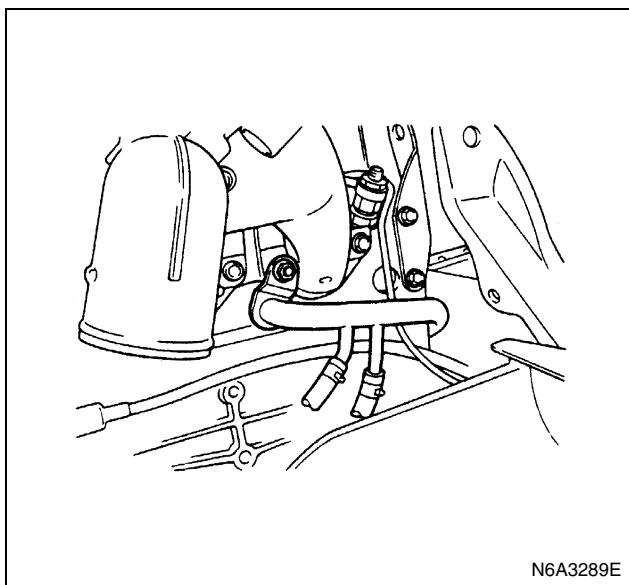


10. Oil Cooler Water Pipe (Oil Cooler Model)

- Install the water pipe bolt and tighten bolt to the specified torque.

Tighten:

- Water pipe nut to 19 N·m (1.9 kg·m / 1.4 lb·ft)
- Pipe bracket bolt to 40 N·m (4.1kg·m / 30 lb·ft)

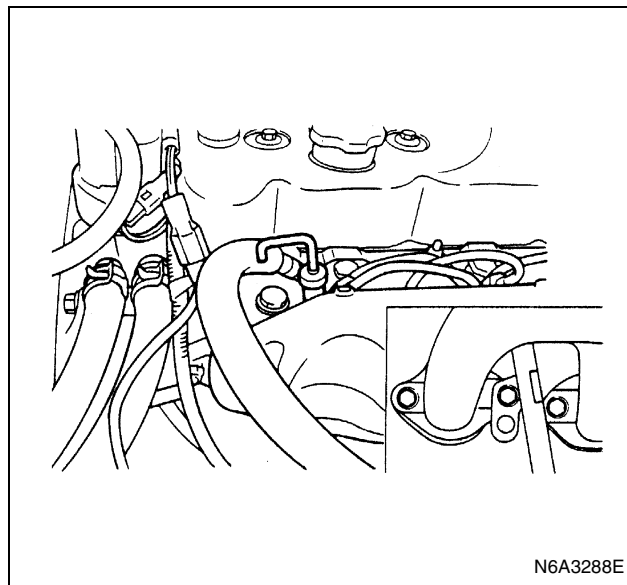


11. Oil Level Gauge Guide Tube

- Install the guide tube bolt and tighten bolt to the specified torque.

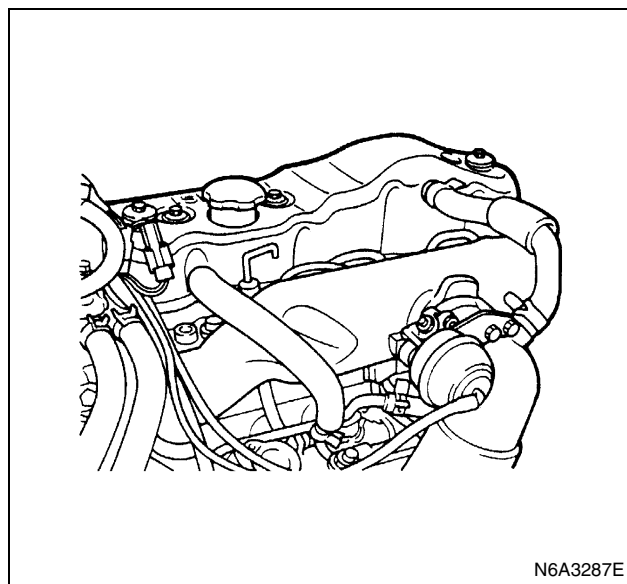
Tighten:

- Guide tube bolt to 19 N·m (1.9 kg·m / 1.4 lb·ft)



12. Glow Plug Harness

13. PCV Hose



14. Leak Off Pipe

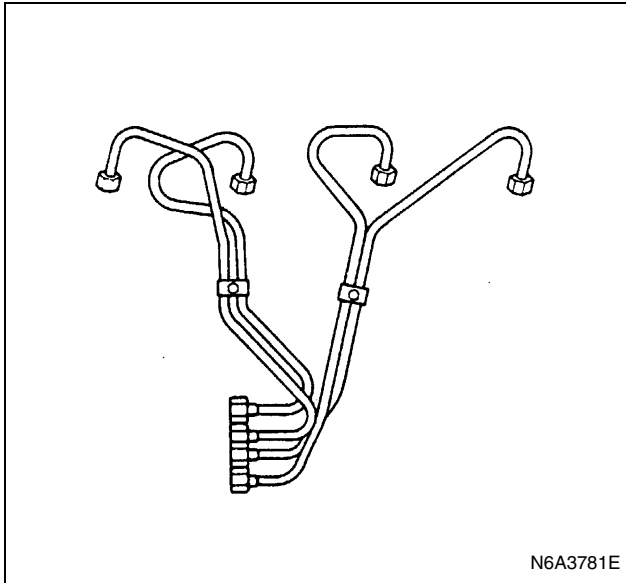
- Mount using a new copper washer.

15. Injection Pipe

- Install the flare nut to injection pump side.
- Install the flare nut to injection nozzle side.
- Tighten the flare nut to the specified torque.

Tighten:

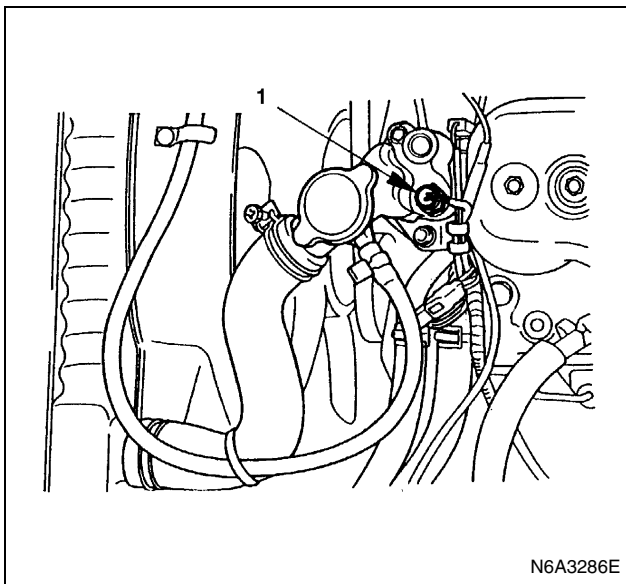
- Flare nut to 29 N·m (3.0 kg·m / 22 lb·ft)



- Fit pipe clip in specified torque.

Tighten:

- Sleeve nut to 29 N·m (3.0 kg·m / 22 lb-ft)
16. Air Intake Duct
 17. Engine Harness
 - Connect the thermo-sensor harness and thermometer unit harness.



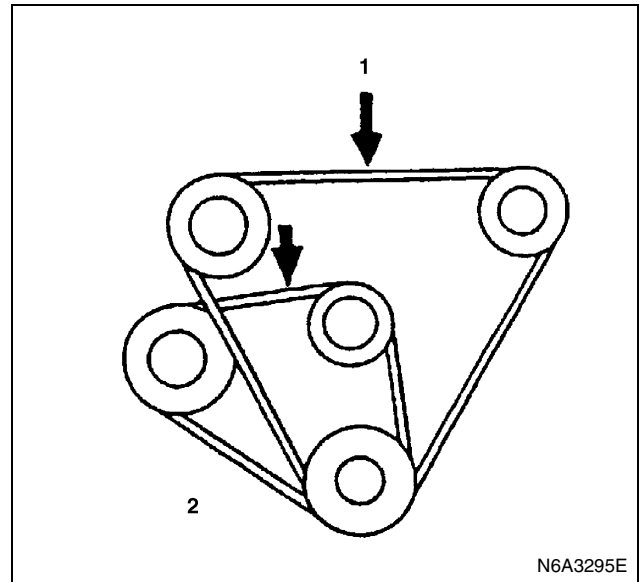
Legend

1. Thermo-sensor

18. A/C Compressor Drive Belt (A/C Model)
Check drive belts for wear or damage, and replace with new ones as necessary. Check belts for tension, and adjust as necessary.
 - Check drive belts tension.
 - Push the middle of belts with a force of 10 kg and check each belt for deflection.
 - Standard deflection

mm (in)	
	Initial tension
AC generator & fan pulley drive belt	8 — 12 (0.31 — 0.47)
A/C compressor drive belt	
P/S pump drive belt	

4JB1



Legend

1. A/C compressor drive belt & P/S pump drive belt
2. AC generator & fan pulley drive belt

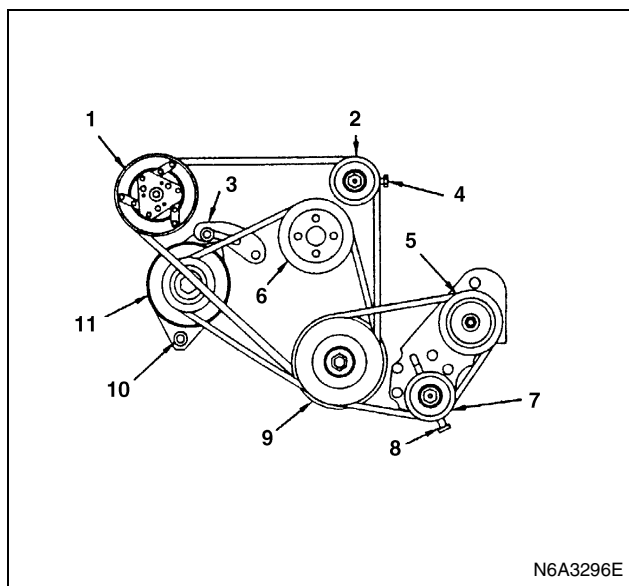
Tension Adjustment

P/S oil pump and A/C compressor pulley belt

- With P/S pump lock bolt loose, adjust belt tension with adjust belt.

Cooling fan pulley belt

- With AC Generator mounting and lock bolts loose, adjust belt tension with adjuster's adjust bolt.



Legend

1. A/C compressor drive belt
2. P/S pump drive belt
3. AC generator fan pulley

19. Heater Core

- Connect the heater hose then tighten the clip securely.

20. Radiator Hose Upper

- Connect the radiator hose then tighten clip securely.
- Pour coolant.
- Connect the battery ground cable.
- Start the engine and check coolant leakage.

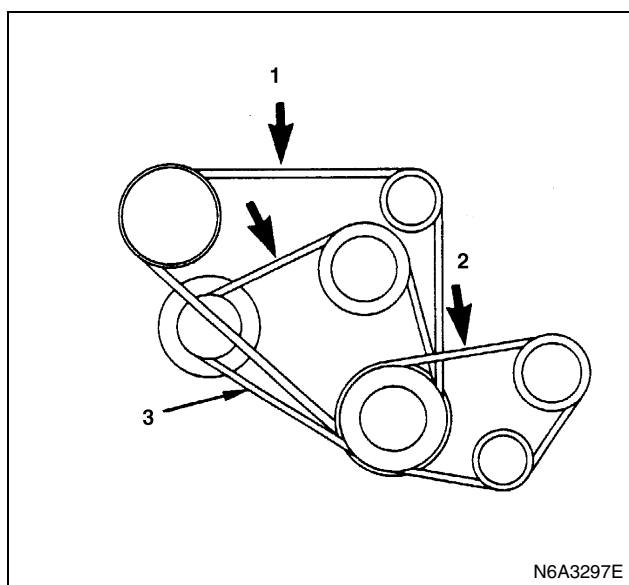
Legend

1. A/C compressor
2. Idle pulley
3. Adjust plate
4. Adjust bolt
5. P/S pump pulley
6. Fan pulley
7. Idle pulley
8. Adjust pulley
9. Crank pulley
10. ACG bolt
11. AC generator

Tighten:

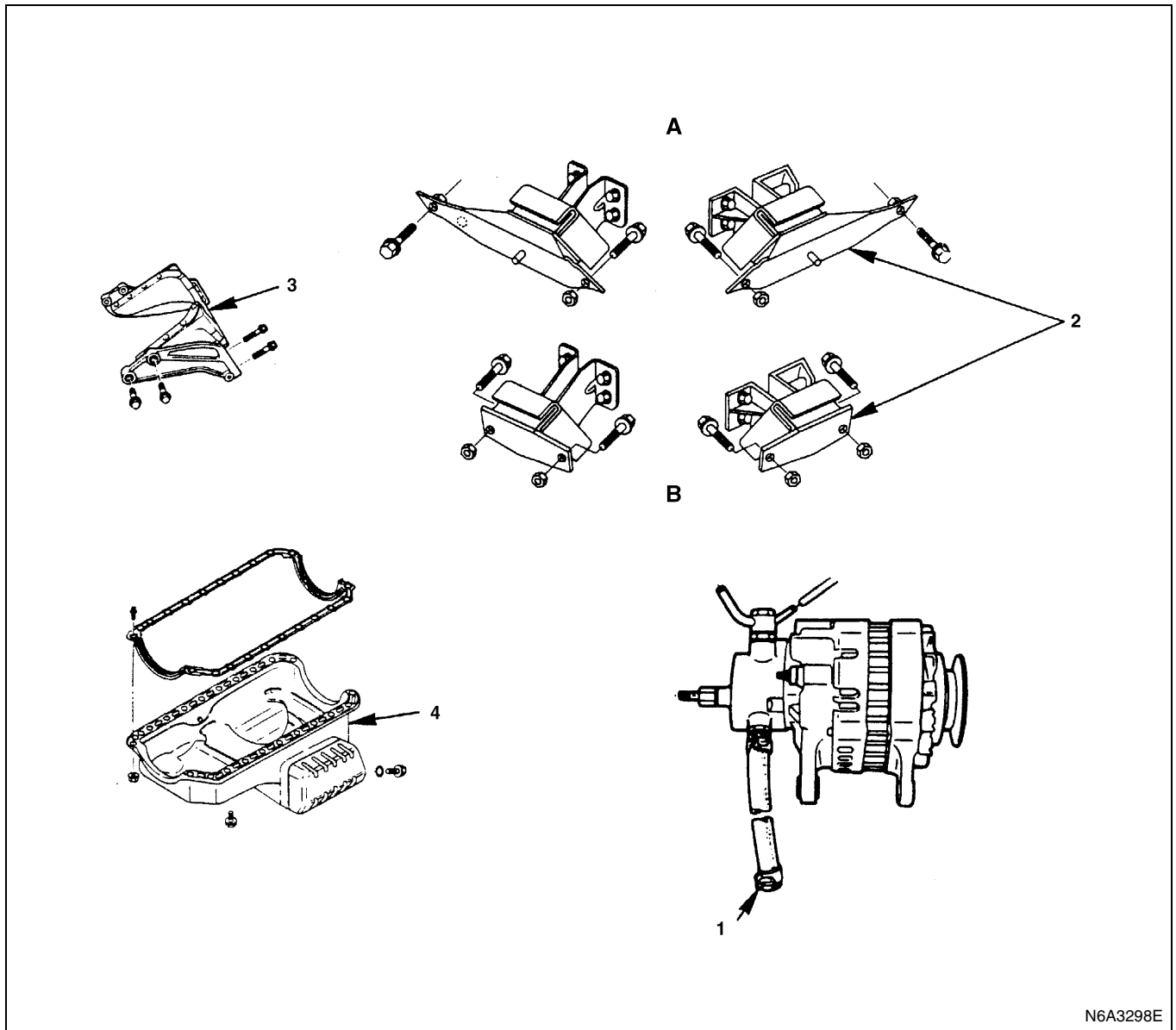
- AC generator fixing bolt to 40 N·m (4.1 kg·m / 30 lb·ft)
- Adjust plate fixing bolt to 19 N·m (1.9kg·m / 1.4 lb·ft)
- Adjust plate lock bolt to 19 N·m (1.9 kg·m / 1.4 lb·ft)

4JG2



OIL PAN

Component



Legend

- | | |
|-----------------------------------|-------------------------------|
| A. Independent suspension (4 × 2) | 2. Engine mount bolts |
| B. Rigid suspension (4 × 2) | 3. Stiffener and space rubber |
| 1. Vacuum pump oil hose | 4. Oil pan assembly |

Removal

Preparation

- Disconnect battery ground cable.
- Lift up car.
- Drain engine oil.

Notice:

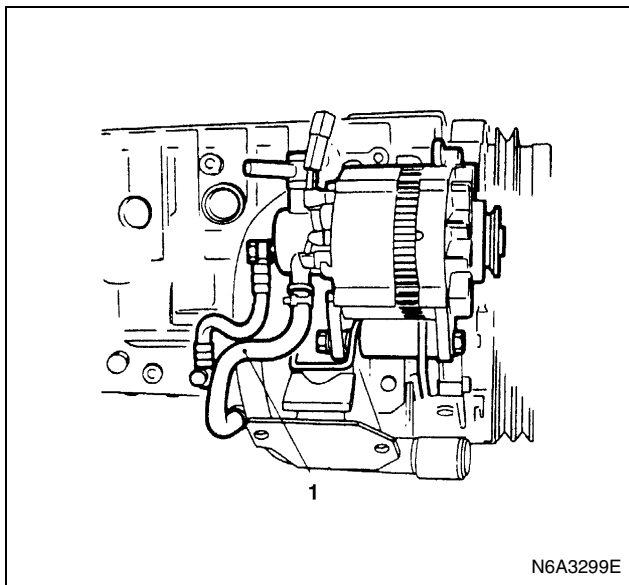
Install drain plug with new gasket.

Tighten:

- 44 N·m (4.5 kg·m / 33 lb·ft)

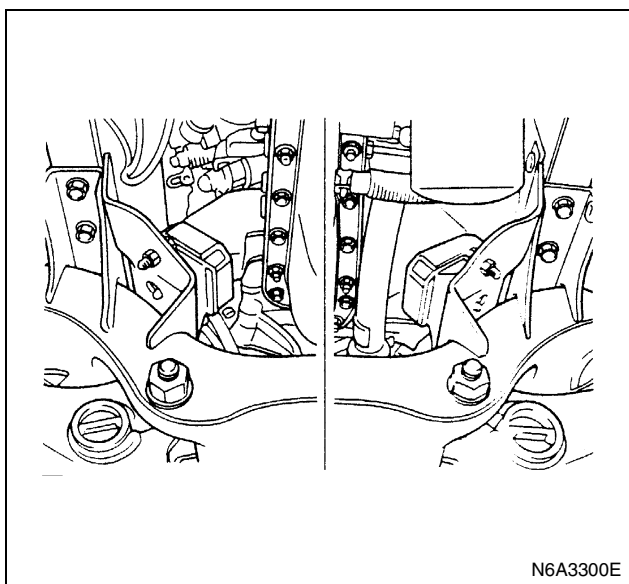
1. Vacuum Pump Oil Hose

- Remove oil hose (1) from oil pan.



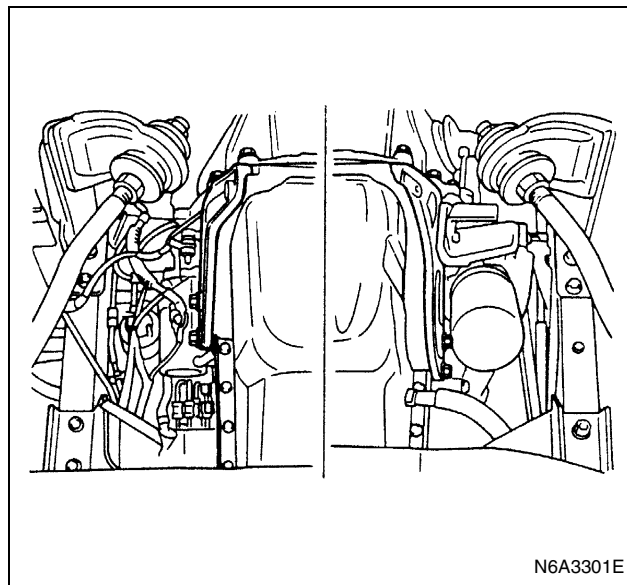
2. Engine Mount Bolts

- Remove the engine mount bolts right & left side.



3. Stiffener & Space Rubber

- Remove the exhaust pipe bracket.
- Remove the stiffener from of the oil pan left & right side.
- Take out space rubber.



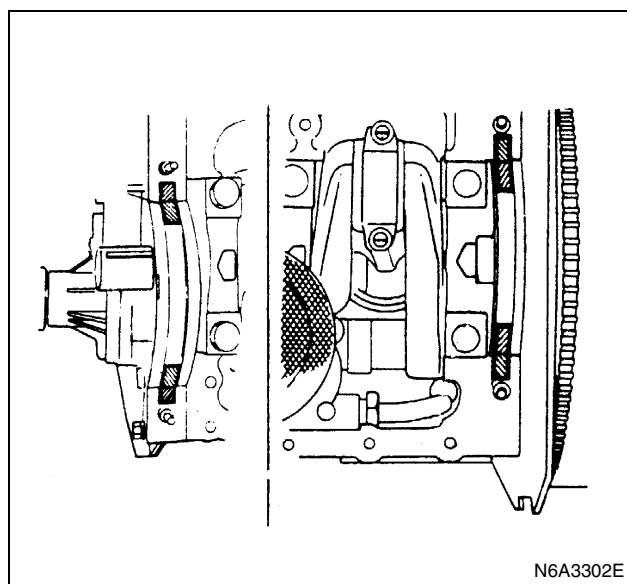
4. Oil Pan Assembly

- Raising the engine about 50mm.
- Remove the oil pan from cylinder block.

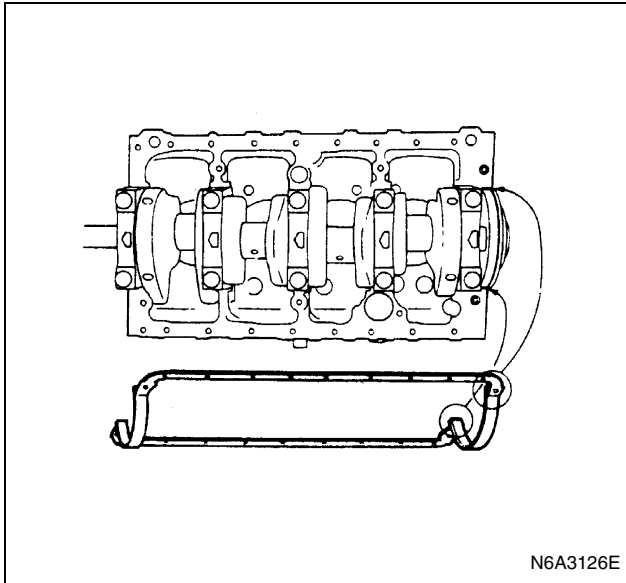
Installation

1. Oil Pan Assembly

- Apply the recommended liquid gasket or its equivalent to the No.5 bearing cap arches, the grooves, and the timing gear case arches at the positions shown in the illustration.



- Fit the gasket rear lipped portion into the No.5 groove.



- Be absolutely sure that the lipped portion is fitted snugly in to the groove.
- Install the oil pan to the cylinder body.
- Tighten the oil pan bolts to the specified torque.

Tighten:

- Oil pan bolt to 19 N·m (1.9 kg·m / 14 lb·ft)
2. Stiffener and Space Rubber
 - Install the space rubber.
 - Install the stiffener left side and right side tighten bolt to the specified torque.

Tighten:

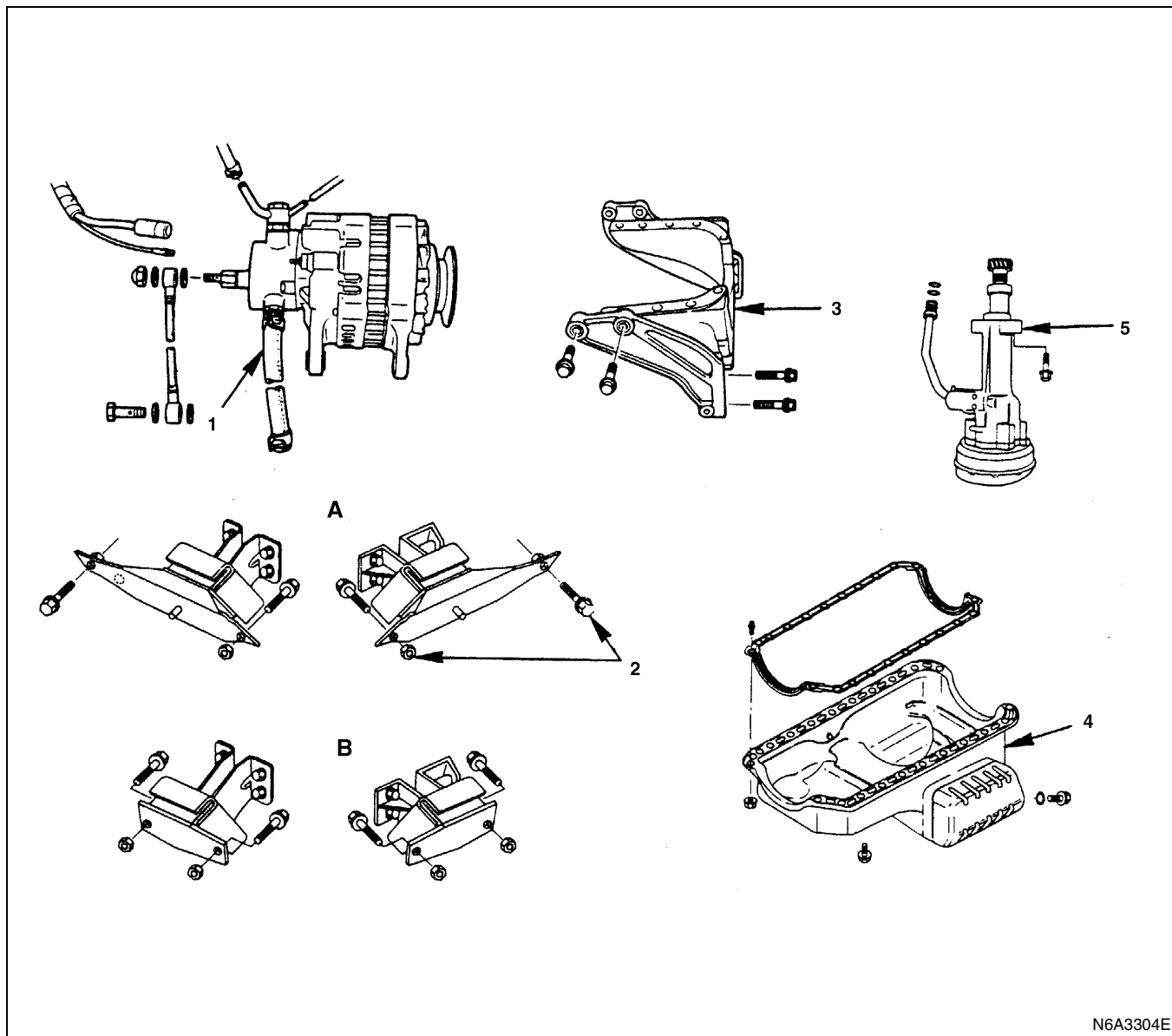
- Engine body side to 37 N·m (3.8 kg·m / 27 lb·ft)
 - Clutch housing side to 78 N·m (8.0 kg·m / 58 lb·ft)
 - Install exhaust pipe bracket.
3. Engine Mount Bolts
 - Install the mount bolts and tighten to the specified torque.

Tighten:

- Mount bolt to 40 N·m (4.1 kg·m / 30 lb·ft)
 - Install the oil hose to oil pan.
4. Vacuum Pump Oil Hose
 - Pour engine oil
 - Connect battery ground cable.
 - Start the engine and check coolant leakage.

OIL PUMP ASSEMBLY

Component



N6A3304E

Legend

- A. Independent suspension (4 × 2)
- B. Rigid suspension (4 × 2)
- 1. Vacuum pump oil hose
- 2. Engine mount bolts

- 3. Stiffener and space rubber
- 4. Oil pan assembly
- 5. Oil pump assembly

Removal

Preparation

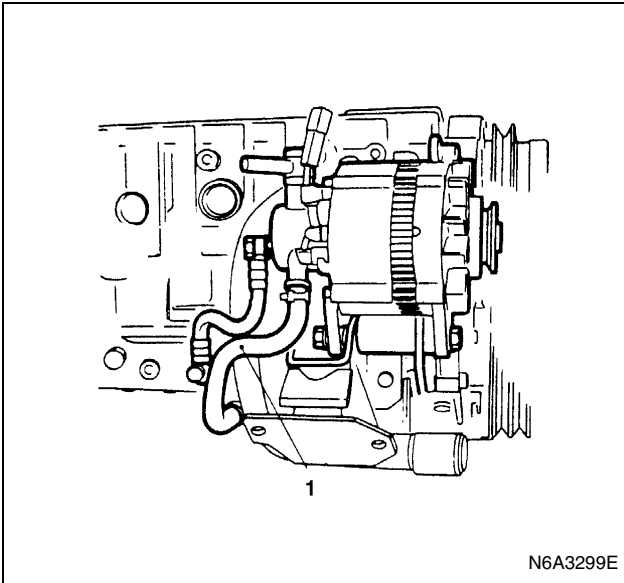
- Disconnect battery ground cable.
- Lift up car.
- Drain engine oil.

Notice:

Install drain plug with new washer.

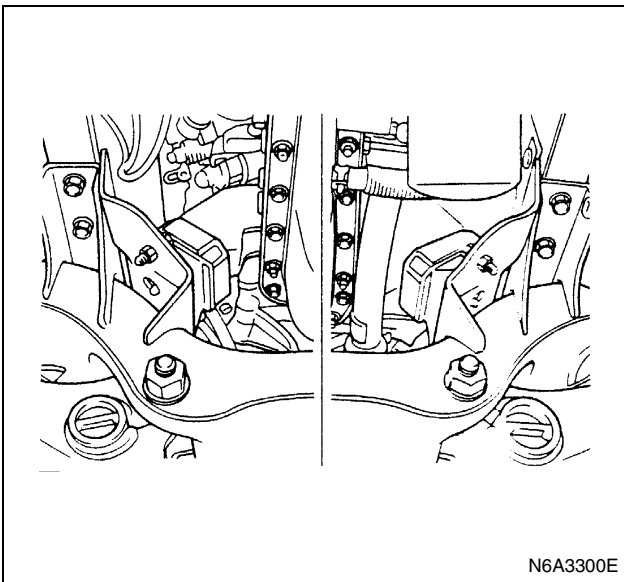
Tighten:

- 44 N·m (4.5 kg·m / 33 lb·ft)
- 1. Vacuum Pump Oil Hose
 - Remove the oil hose (1) from oil pan.



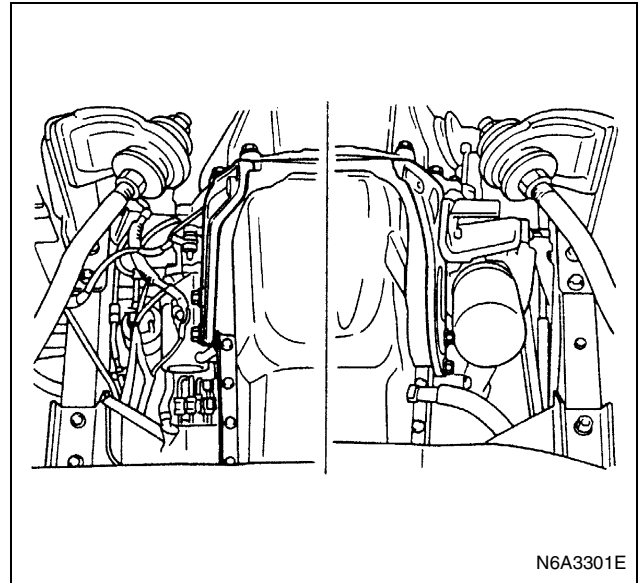
2. Engine Mount Bolts

- Remove the engine mount bolts right & left side.



3. Stiffener & Space Rubber

- Remove the exhaust pipe bracket.
- Remove the stiffener from of the oil pan left & right side.
- Take out space rubber.



4. Oil Pan Assembly

- Raise the engine about 50mm.
- Remove the oil pan from cylinder block.

5. Oil Pump Assembly

- Remove the oil pump from cylinder block.

Installation

- Prepare a solution of 80% engine oil and 20% molybdenum disulfide.
- Apply and ample coat of the solution to the teeth of the oil pump pinion.

1. Oil Pump Assembly

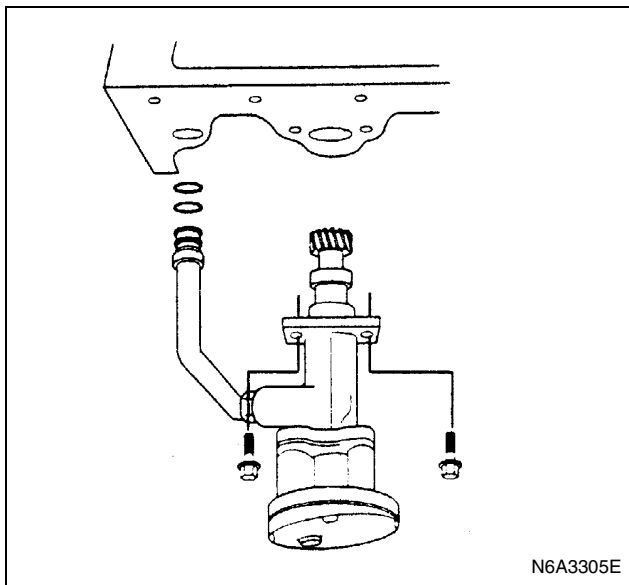
- Apply engine oil to oil pipe O-ring and insert the O-ring in O-ring hold on cylinder block.
- Install oil pump asm with oil pipe in cylinder block and tighten fixing bolts to the specified torque.

Tighten:

- 19 N·m (1.9 kg·m / 14 lb·ft)
- Tighten sleeve nut to the specified torque.

Tighten:

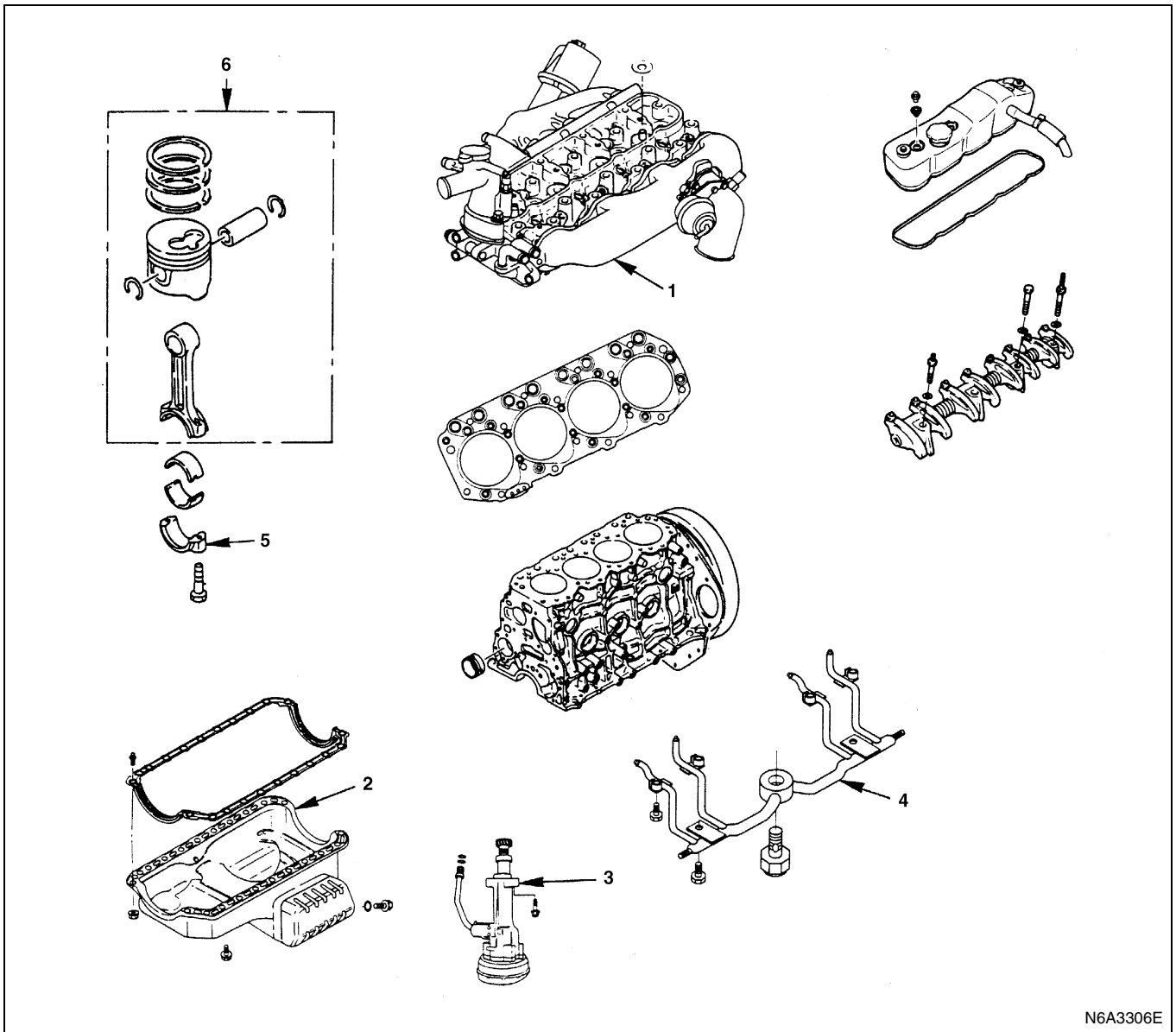
- 25 N·m (2.5 kg·m / 18 lb·ft)



2. Oil Pan Assembly
 3. Stiffener & Space Rubber
 4. Engine Mount Bolts
 5. Vacuum Pump Oil Hose
- Above works refer to "OIL PAN" Section in this manual.

PISTON, PISTON RING AND CONNECTING ROD

Component



N6A3306E

Legend

- | | |
|---------------------------|---------------------------------------|
| 1. Cylinder head assembly | 4. Piston cooling oil pipe |
| 2. Oil pan assembly | 5. Connecting rod bearing cap |
| 3. Oil pan assembly | 6. Piston and connecting rod assembly |

Removal

Preparation

- Disconnect battery ground cable
- Drain coolant
- Drain engine oil

Notice:

Install drain plug with new washer.

Tighten:

- 44 N·m (4.5 kg·m / 33 lb·ft)

1. Cylinder Head Assembly
 - 1) Radiator hose upper
 - 2) Heater hose
 - 3) A/C compressor drive belt
 - 4) Engine harness
 - 5) Air intake duct
 - 6) Injection pipe
 - 7) Leak off pipe
 - 8) PCV hose
 - 9) Glow plug harness

- 10) Oil level gauge guide tube
- 11) Oil cooler water pipe (Oil Cooler Model)
- 12) A/C compressor assembly (A/C Model)
- 13) Vacuum actuator hose (Exhaust Brake Model)
- 14) Front exhaust pipe
- 15) By-pass hose
- 16) Cylinder head cover
- 17) Rocker arm shaft
- 18) Push rod
- 19) Cylinder head assembly
- 20) Cylinder head gasket

Above works refer to "CYLINDER HEAD ASSEMBLY AND GASKET" Section in this manual.

2. Oil Pan Assembly

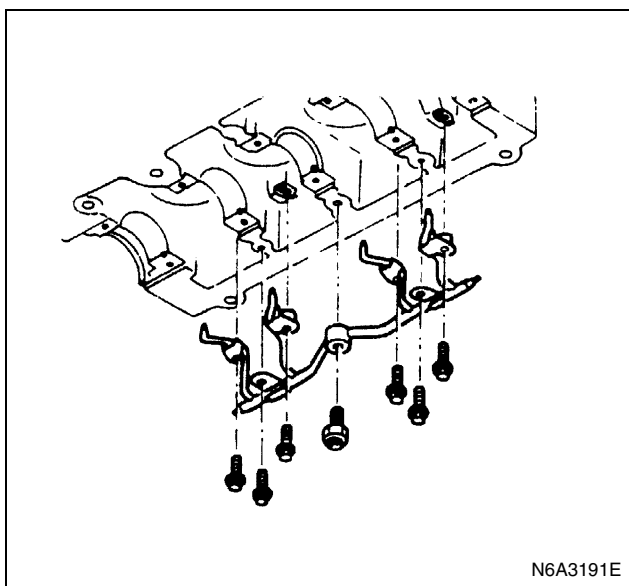
- 1) Vacuum pump oil hose
- 2) Engine mount bolt
- 3) Stiffener and spacer rubber
- 4) Oil pan

Above works refer to "OIL PAN" Section in this manual.

3. Oil Pump Assembly

4. Piston Cooling Oil Pipe

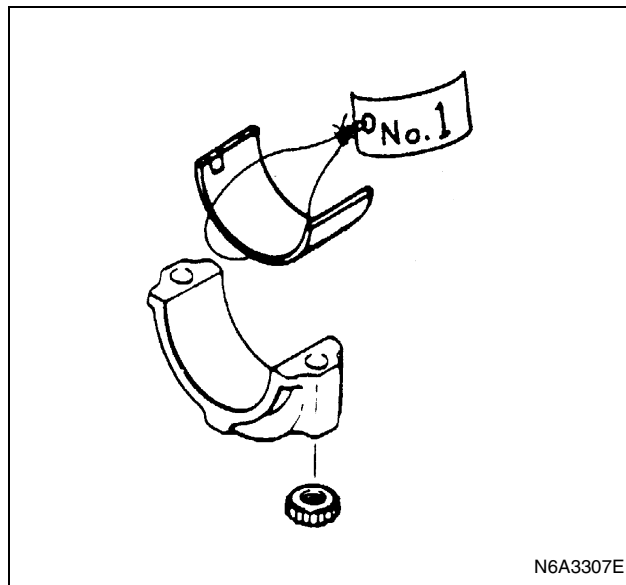
- Remove the relief valve and oil pipe.



N6A3191E

5. Connecting Rod Bearing Cap

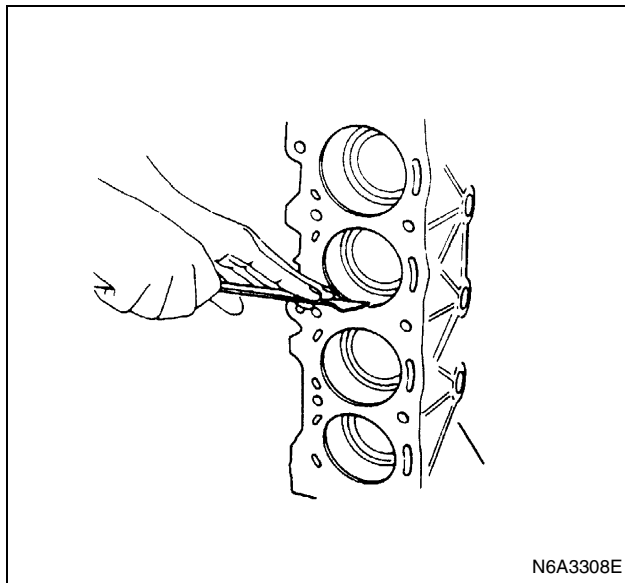
- If the connecting rod lower bearings are to be reinstalled, mark their fitting positions by tagging each bearing with the cylinder number from which it was removed.



N6A3307E

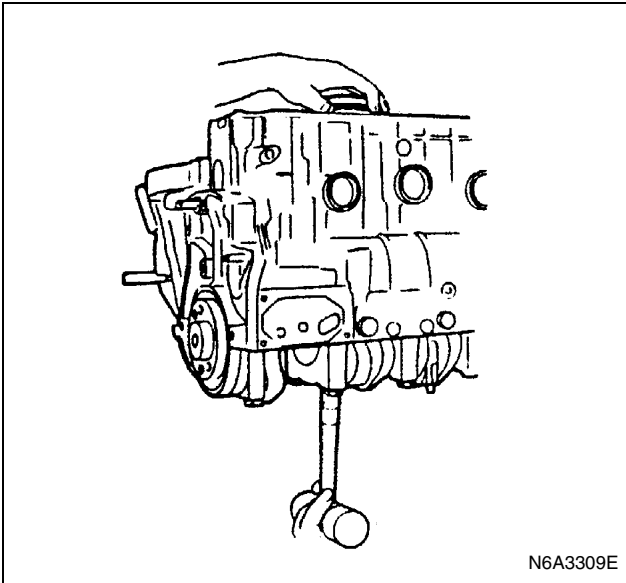
6. Piston and Connecting Rod Assembly

- 1) Remove carbon deposits from the upper portion of the cylinder wall with a scraper before removing the piston and connecting rod.

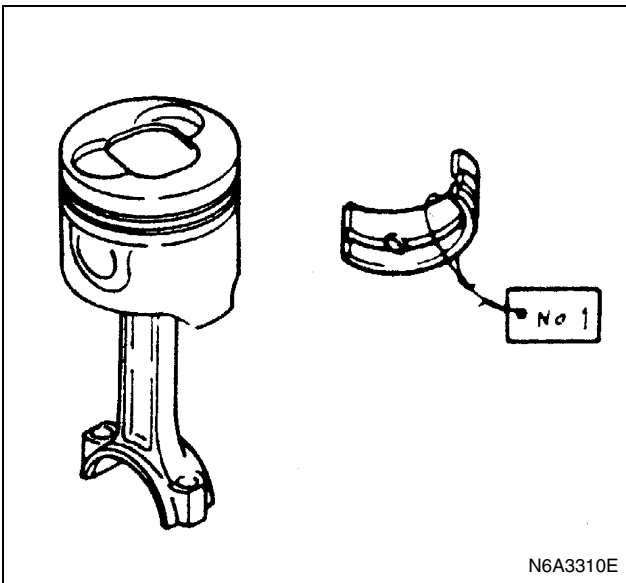


N6A3308E

- 2) Move the piston to the top of the cylinder and tap it with a hammer grip or similar object from the connecting rod lower side to drive it out.



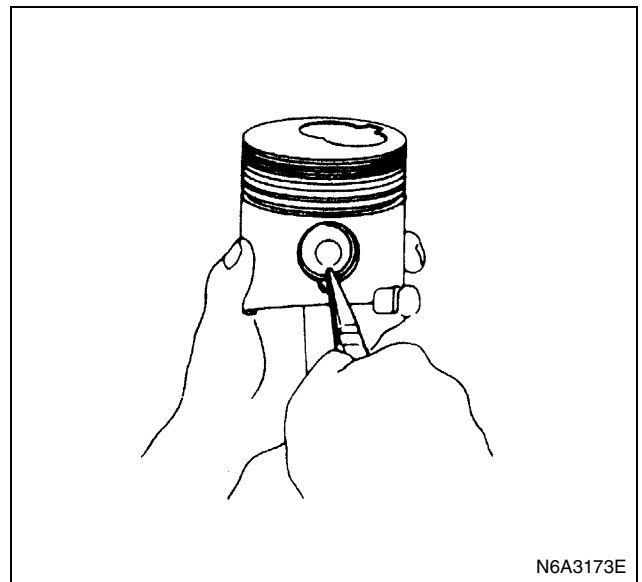
- 3) If the connecting rod upper bearings are to be reinstalled, mark their fitting positions by tagging each bearing with the cylinder number from which it was removed.



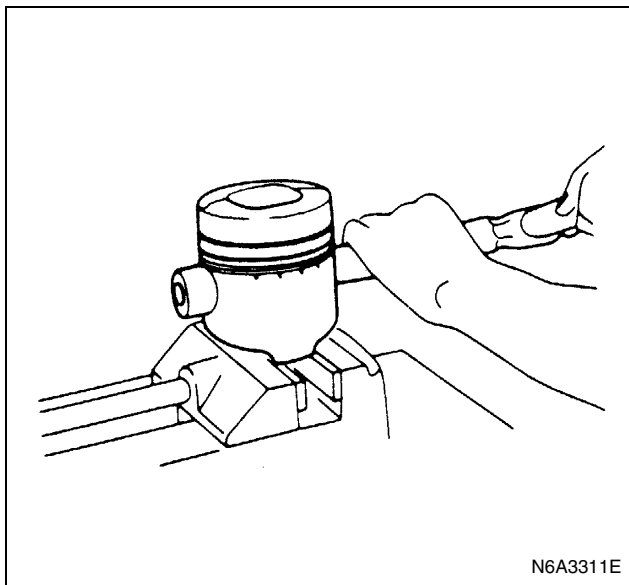
- 4) Clamp the connecting rod in a vise. Take care not to damage the connecting rod. Use a piston ring replacer to remove the piston rings.
- Piston Ring Replacer**
- Do not attempt to use some other tool to remove the piston rings. Piston ring stretching will result in reduced piston ring tension.



- 5) Use a pair of pliers to remove the piston pin snap rings.



- 6) Tap the piston pin out with a hammer and a brass bar. If the pistons and piston pins are to be reinstalled, mark their installation positions by tagging each piston and piston pin with the cylinder number from which it was removed.



N6A3311E

Installation

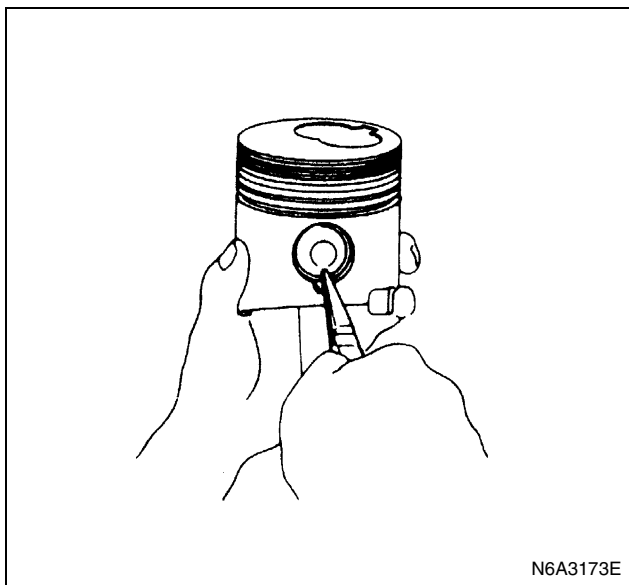
1. Piston and Connecting Rod Assembly

- 1) Try to insert the piston pin into the piston pin hole with normal finger pressure. Weigh each piston and connecting rod assembly.

Select piston and connecting rod combinations so that the weight variation of the different assemblies is held within the specified limits.

g (oz)	
Variance in weight	Less than
after assembly	3 (0.1058)

- 2) Clamp the connecting rod in a vise. Take care not to damage the connecting rod.
- 3) Use a pair of pliers to install the piston pin snap ring to the piston.

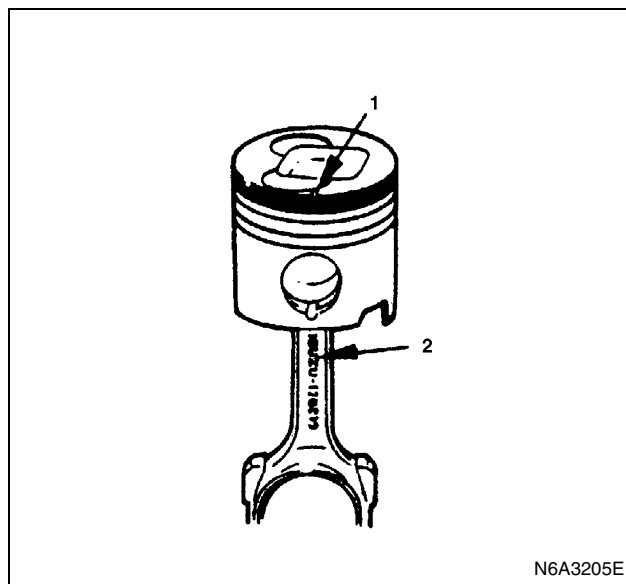


N6A3173E

Notice:

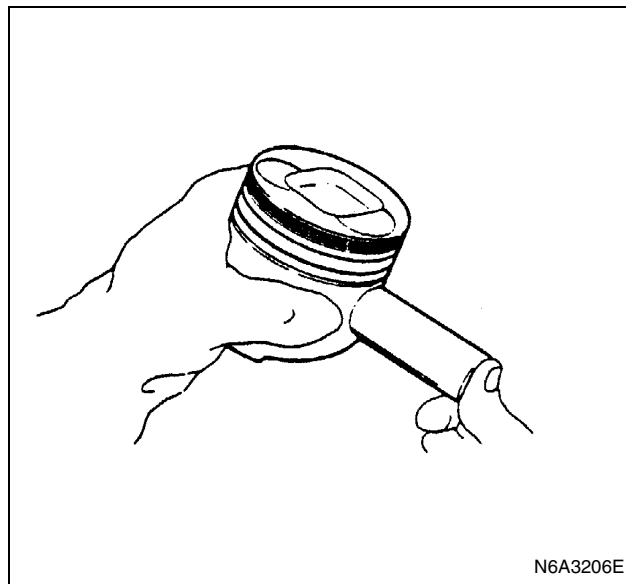
When changing piston/connecting rod combinations, do not change the piston/piston pin combination.

- 4) Install the piston to the connecting rod. The piston head front mark (1) and the connecting rod "ISUZU" casting mark (2) must be facing the same direction.



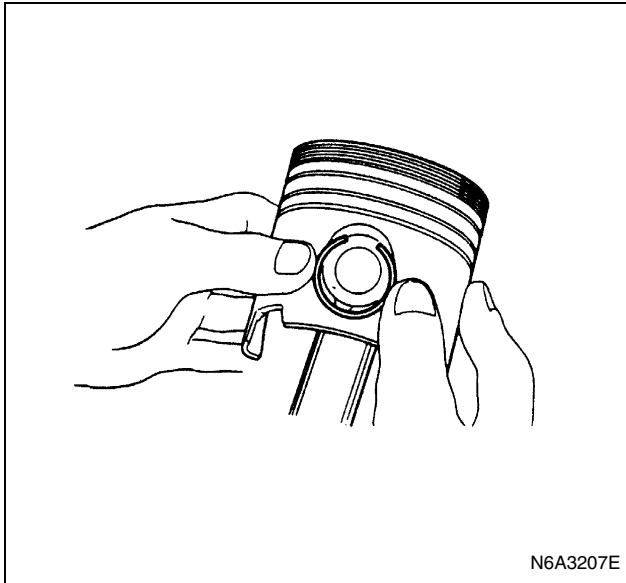
N6A3205E

- 5) Apply a coat of engine oil to the piston pin and the piston pin hole. Use your fingers to force the piston pin into the piston until it makes contact with the snap ring.

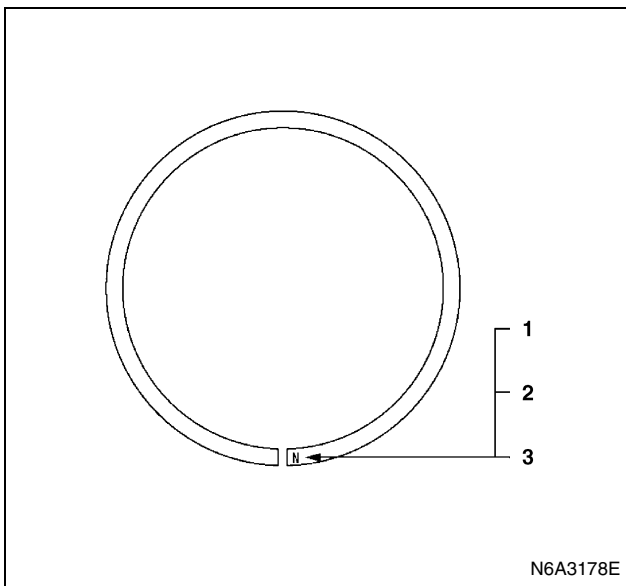


N6A3206E

- 6) Use your fingers to force the piston pin snap ring into the piston snap ring groove. Check that the connecting rod moves smoothly on the piston pin.



- 7) Install the piston rings with the piston ring expander.
The compression ring must be set with the 1N, 2N, R mark facing up.
Discrimination mark is painted as shown in the illustration.

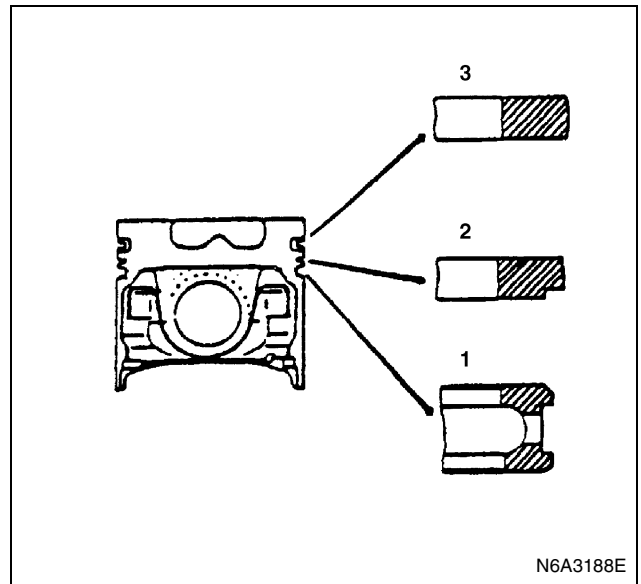


Legend

1. N mark (Top ring) (2nd ring) (4JB1)
2. 1N mark (Top ring) 2N mark (2nd ring) (4JG2)
3. R mark (Top ring) (2nd ring) (4JH1-TC)

- 8) Use a piston ring replacer to install the three piston rings.
Piston Ring Replacer
Install the piston rings in the numerical order shown in the illustration.

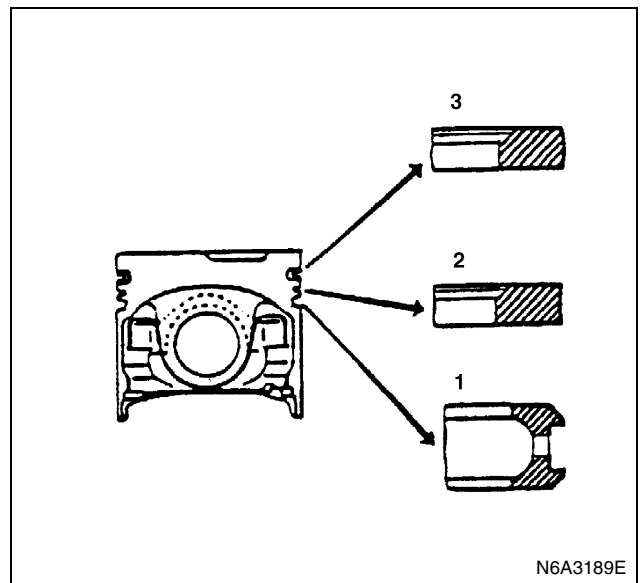
4JH1-TC, 4JB1



Legend

1. Oil ring
2. 2nd compression ring
3. 1st compression ring

4JG2



Legend

1. Oil ring
2. Compression ring No. 2
3. Compression ring No. 1

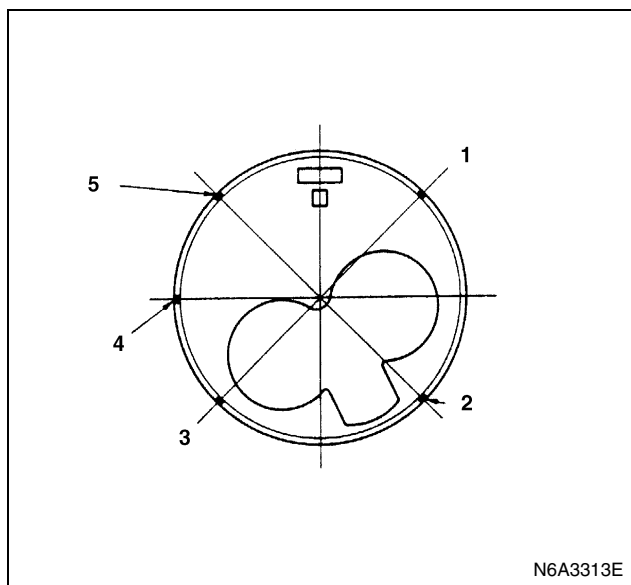
Notice:

Install the compression rings with the stamped side facing up.

Insert the expander coil into the oil ring groove so that there is no gap on either side of the expander coil before installing the oil ring.

- 9) Apply engine oil to the piston ring surfaces.

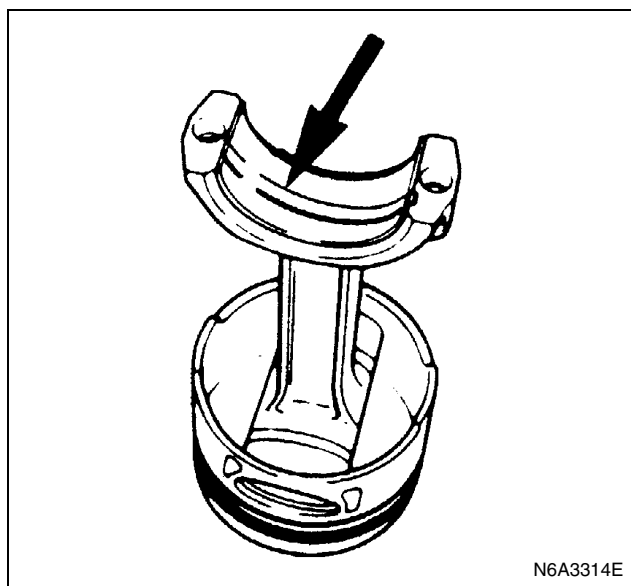
- 10) Check that the piston rings rotate smoothly in the piston ring grooves.
- 11) Position the piston ring gaps as shown in the illustration.



Legend

1. Expand ring
2. No. 1 compression ring
3. Oil ring
4. Front mark
5. No. 2 compression ring

- 12) Carefully wipe any oil or other foreign material from the connecting rod bearing back face and the connecting rod bearing fitting surface.

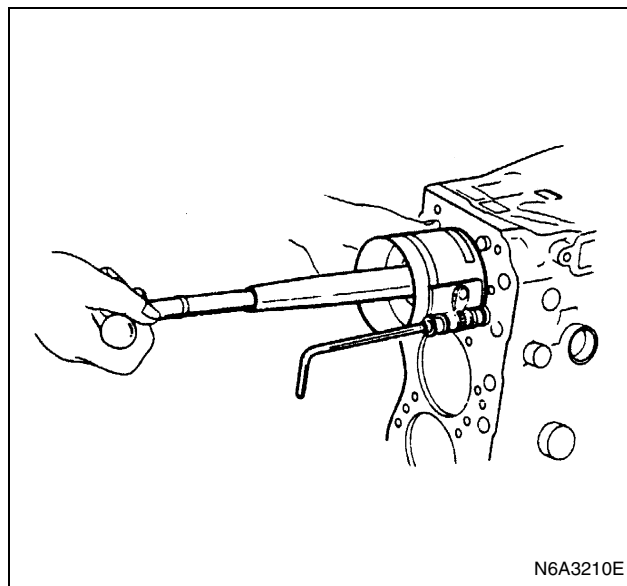


- 13) Apply a coat of engine oil to the upper bearing surfaces.
Apply a coat of engine oil the cylinder wall.

- 14) Position the piston head front mark so that it is facing the front of the engine.
Use the piston ring compressor to compress the piston rings.

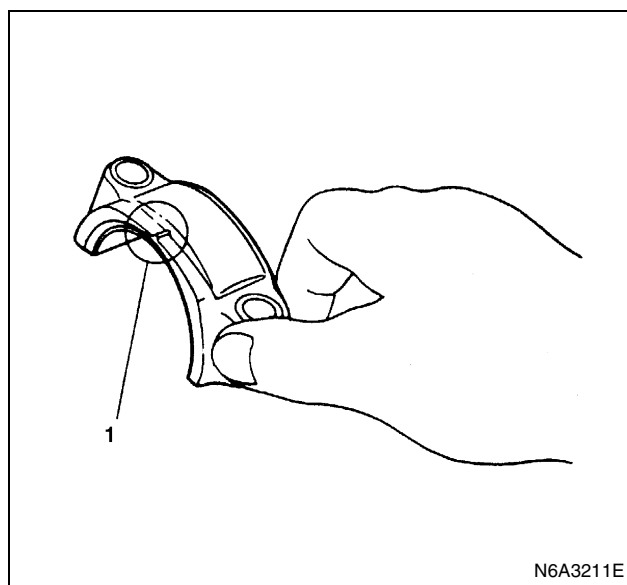
Piston Ring Compressor: 5-8840-9018-0(J-8037)

- 15) Use a hammer grip to push the piston in until the connecting rod makes contact with the crankpin.
At the same time, rotate the crankshaft until the crankpin is at BDC.

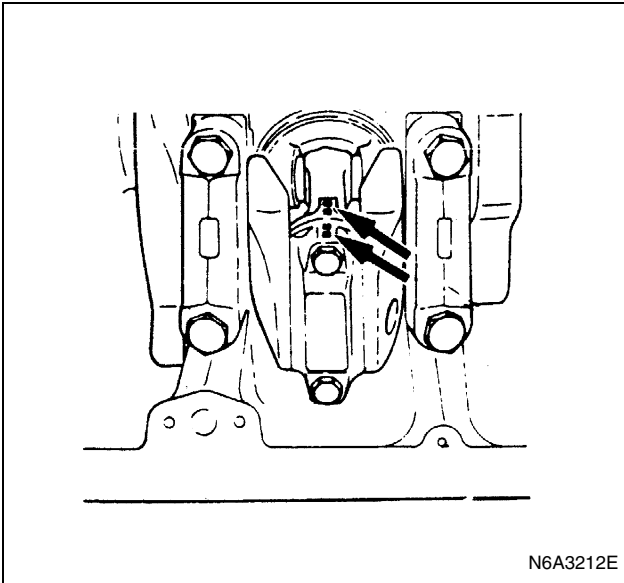


2. Connecting Rod Bearing Cap

- 1) Position the bearing cap front mark (1) so that it is facing the front of the engine.



- 2) Install the connecting rod bearing caps.
Align the bearing cap cylinder number marks and the connecting rod cylinder number marks.
- 3) Apply a coat of engine oil to the threads and setting faces of each connecting rod cap bolt.



- 4) Tighten the connecting rod bearing cap bolts to the specified torque in two steps using the Angular Tightening Method.

Tighten:

- 4JB1-TC, 4JG2, 4JH1-TC
Connecting rod bearing cap bolt to
1st step: 29 N·m (3.0 kg·m / 22 lb·ft)
2nd step: 45° — 60°
- 4JB1
Connecting rod bearing cap bolt to
83 N·m (8.5 kg·m / 61 lb·ft)

Notice:

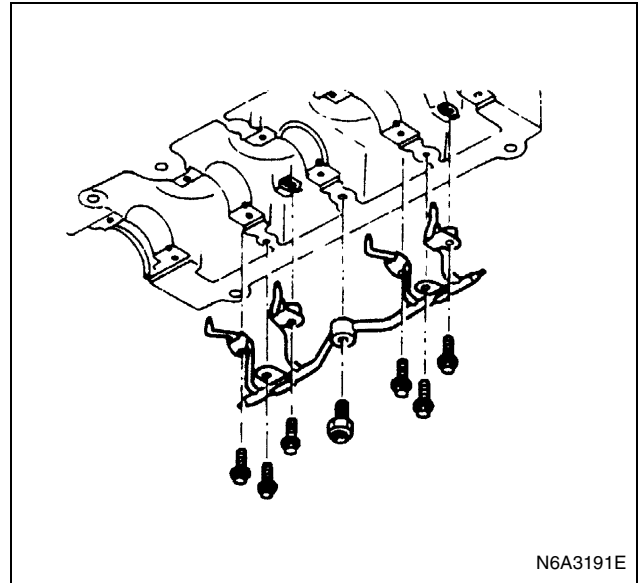
Check to see that the crankshaft turns smoothly by rotating it manually.

3. Piston Cooling Oil Pipe

- 1) Install the piston cooling oil pipe to the cylinder body.
- 2) Tighten the oil pipe bolts and relief valve to the specified torque.

Tighten:

- Oil pipe bolt to
M8 × 1.25: 19 N·m (1.9 kg·m / 14 lb·ft)
M6 × 1.00: 8 N·m (0.8 kg·m / 69 lb·in)
- Oil pressure regulating valve to
M6 × 1.5: 29 N·m (3.0 kg·m / 22 lb·ft)



Notice:

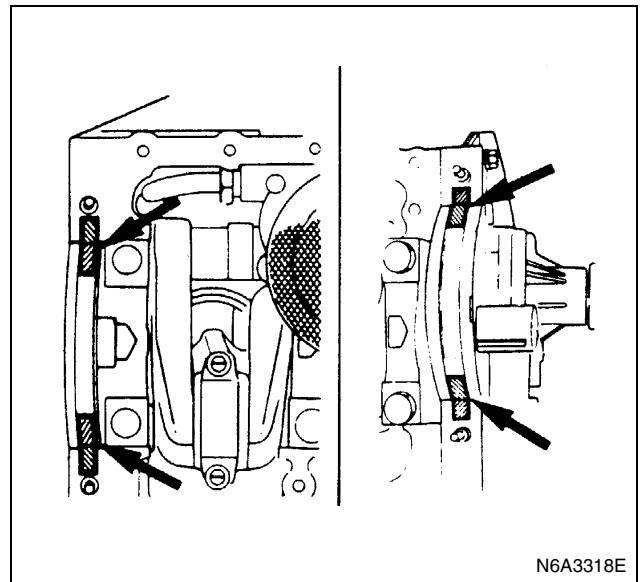
Check that there is no interference between the piston and the oiling jet pipe by slowly rotating the crankshaft.

4. Oil Pump Assembly

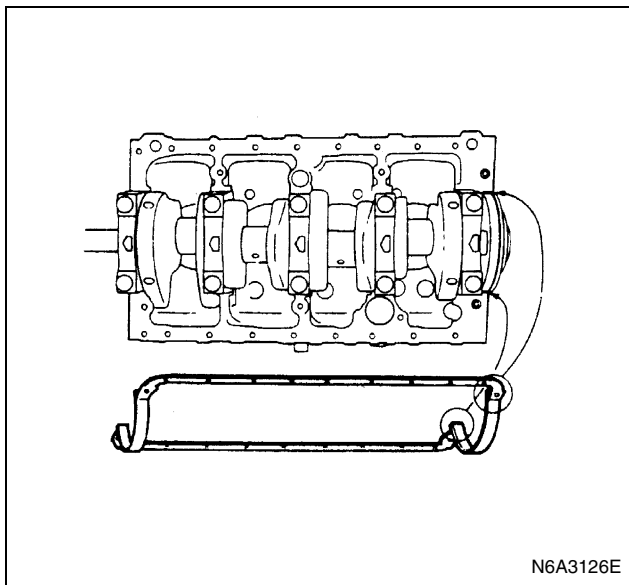
Above works refer to "OIL PUMP" Section in this manual.

5. Oil Pan Assembly

- 1) Apply the recommended liquid gasket or its equivalent to the No.5 bearing cap arches, the grooves, and the timing gear case arches at the positions shown in the illustration.



- 2) Fit the gasket rear lipped portion into the No.5 groove. Be absolutely sure that the lipped portion is fitted snugly into the groove.



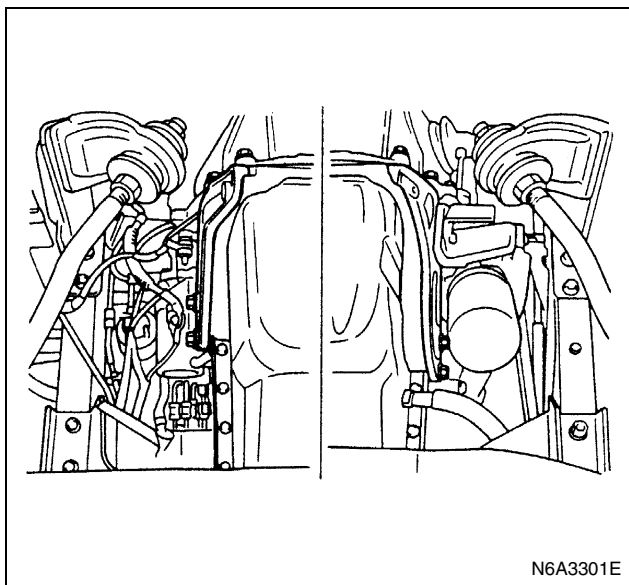
- 3) Install the oil pan to the cylinder body.
 - Tighten the oil pan bolts to the specified torque.

Tighten:

- Oil pan bolts to 19 N·m (1.9 kg·m / 14 lb·ft)
- 4) Install the space rubber and stiffener (right & left side) then tighten bolts to the specified torque.

Tighten:

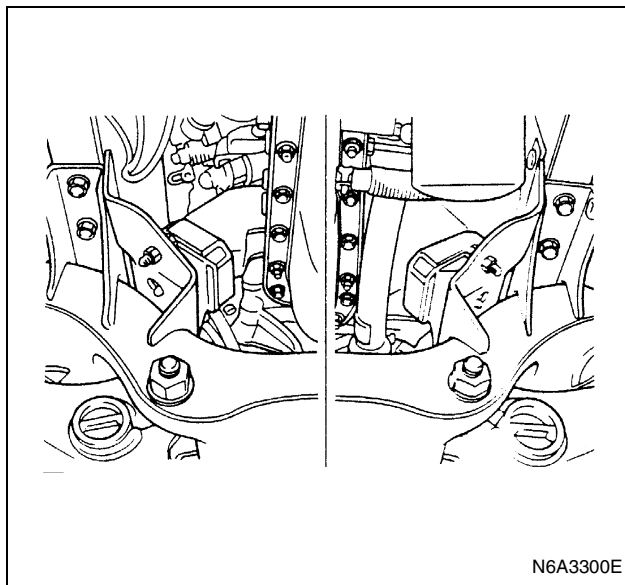
- Engine body side stiffener bolts to 37 N·m (3.8 kg·m / 27 lb·ft)
- Clutch housing side stiffener bolts to 78 N·m (8.0 kg·m / 58 lb·ft)



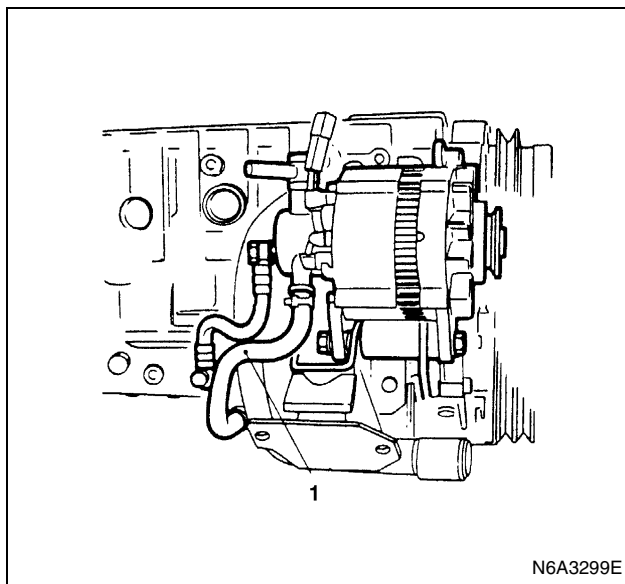
- 5) Install the exhaust pipe bracket.
- 6) Install the support rubber and tighten nuts to the specified torque.

Tighten:

- Support rubber nut to 40 N·m (4.1 kg·m / 30 lb·ft)



- 7) Install the vacuum pump oil hose (1) to oil pan.



6. Cylinder Head Assembly
 - 1) Cylinder head gasket
 - 2) Cylinder head assembly
 - 3) Push rod
 - 4) Rocker arm shaft
 - 5) Valve clearance adjustment
 - 6) Cylinder head cover
 - 7) By-pass hoses
 - 8) Front exhaust pipe
 - 9) Vacuum actuator hose (Exhaust Brake Model)
 - 10) A/C compressor assembly (A/C Model)
 - 11) Oil cooler water pipe (Oil Cooler Model)
 - 12) Oil level gauge guide tube
 - 13) Glow plug harness
 - 14) PCV hose
 - 15) Leak off pipe
 - 16) Injection pipe
 - 17) Air intake duct

18) Engine harness

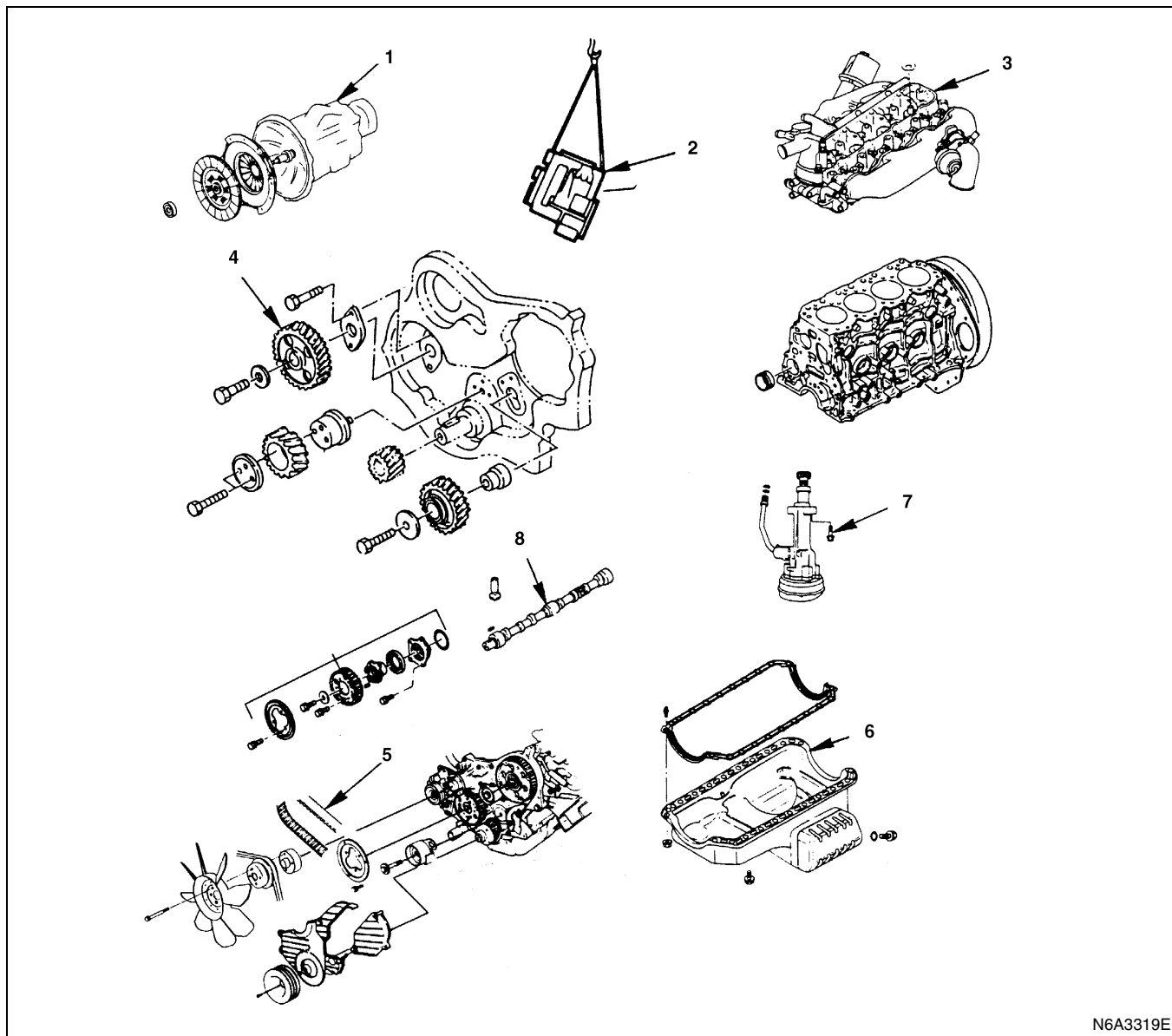
19) A/C compressor drive belt (With A/C Model)

20) Heater hose

Above works refer to "CYLINDER HEAD ASSEMBLY AND GASKET" Section in this manual.

CAMSHAFT AND TAPPET

Component



N6A3319E

Legend

- | | |
|--------------------------------------|-----------------------------------|
| 1. Transmission and clutch assembly | 5. Timing belt (Belt drive model) |
| 2. Engine assembly | 6. Oil pan |
| 3. Cylinder head assembly and gasket | 7. Oil pump |
| 4. Timing gear (Gear drive model) | 8. Camshaft and tappets |

Removal

Preparation

- Disconnect battery ground cable.
- Drain coolant.
- Drain engine oil.

Notice:

Install drain plug with new washer.

Tighten:

- Drain plug to 83 N·m (8.5 kg·m / 61 lb·ft)
1. Transmission and Clutch Assembly
 - 1) Transmission
 - 2) Clutch
 2. Engine Assembly
 - 1) Radiator assembly
 - 2) Intake air duct
 - 3) Heater hose

- 4) Engine control cable
- 5) Glow plug harness
- 6) Fuel hose
- 7) Oil pressure switch harness
- 8) A/C compressor assembly (A/C Model)
- 9) Power steering pump & bracket assembly (Power steering Model)
- 10) Actuator vacuum hose (Exhaust Brake Model)
- 11) Vacuum pump hose (Exhaust Brake Model)
- 12) Front exhaust pipe
- 13) Support rubber
- 14) Engine assembly

Above works refer to "ENGINE ASSEMBLY" Section in this manual.

3. Cylinder Head Assembly and Gasket

- 1) Injection pipe
- 2) Leak off pipe
- 3) PCV hose
- 4) Glow plug harness
- 5) Oil level gauge guide tube
- 6) Oil cooler water pipe (Oil Cooler Model)
- 7) By-pass hose
- 8) Cylinder head cover
- 9) Rocker arm shaft
- 10) Push rod
- 11) Cylinder head assembly

- 12) Cylinder head gasket
- Above works refer to "CYLINDER HEAD ASSEMBLY AND GASKET" Section in this manual.

4. Timing Gear (Gear Drive Model)

- 1) Cooling fan assembly
 - 2) Crankshaft damper pulley
 - 3) Noise shield cover
 - 4) Noise cover spacer
 - 5) Timing gear case cover
 - 6) Camshaft timing gear
- Above works refer to "TIMING GEAR (Gear Type)" Section in this manual.

5. Timing Belt (Belt Drive Model)

- 1) Cooling fan assembly
- 2) Crankshaft damper pulley
- 3) Timing pulley upper cover
- 4) Timing pulley lower cover
- 5) Flange: camshaft pulley
- 6) Flange: injection pump pulley

- 7) Timing belt
- Above works refer to "TIMING BELT (Belt Type)" Section in this manual.

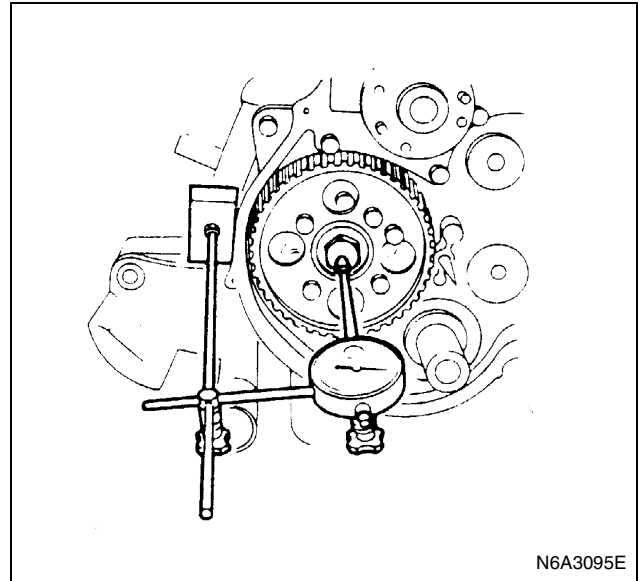
- 8) Camshaft timing pulley

- Use a dial indicator to measure the camshaft end play.

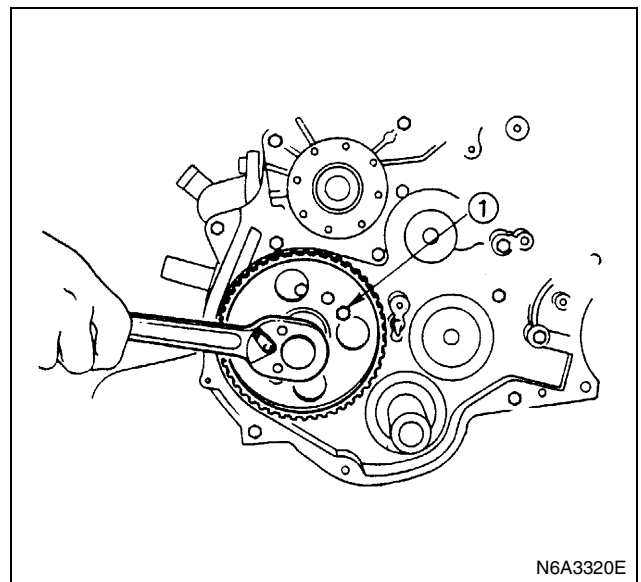
This must be done before removing the oil pump.

If the camshaft end play exceeds the specified limit, the camshaft and/or the driven gear must be replaced.

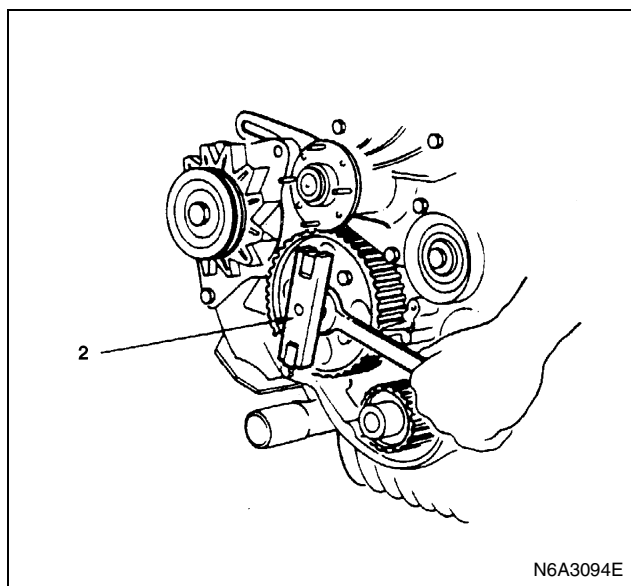
Camshaft End Play		mm (in)
Standard	Limit	
0.08 (0.003)	0.20 (0.008)	



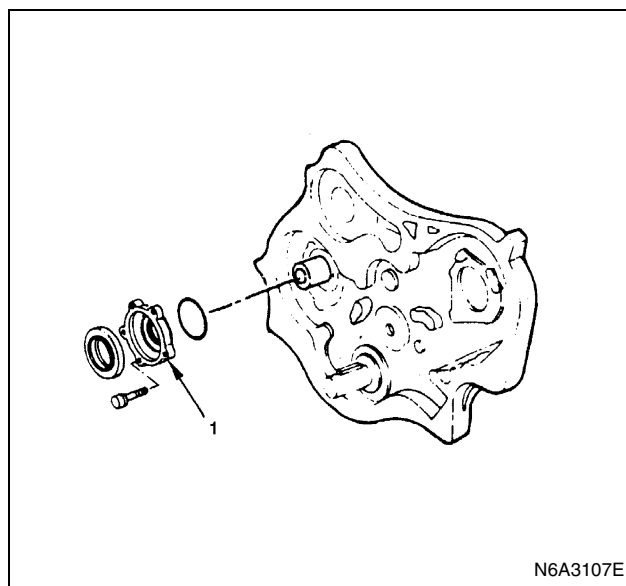
- Install the stopper bolt (1) to the timing pulley to prevent the pulley from turning.
- Loosen the center bolt.



- Use the timing pulley puller (2) to remove the pulley.
- Timing Pulley Puller: 5-8840-0086-0

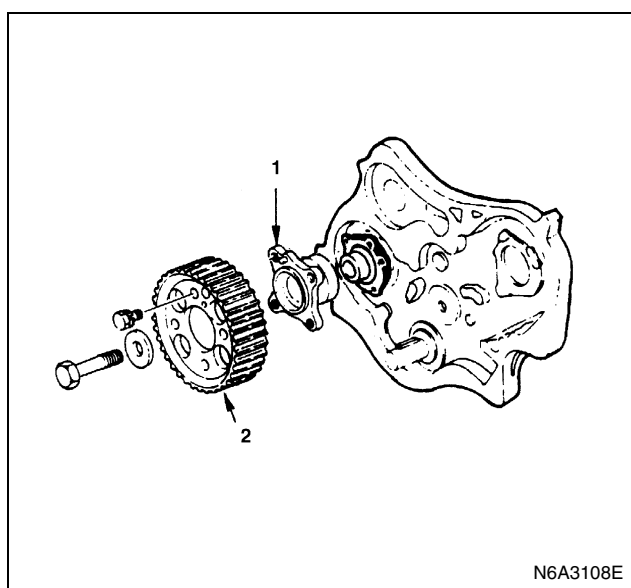


- Remove the stopper bolt.
- Remove the center bolt and remove the timing pulley (2) with pulley center (1).

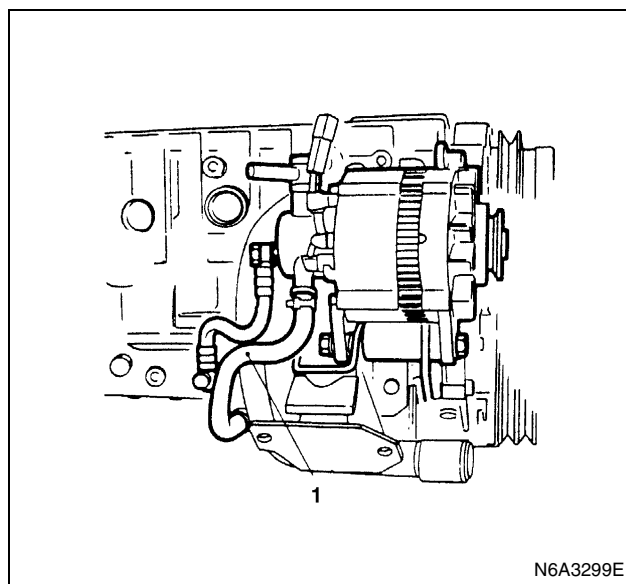


6. Oil Pan Assembly

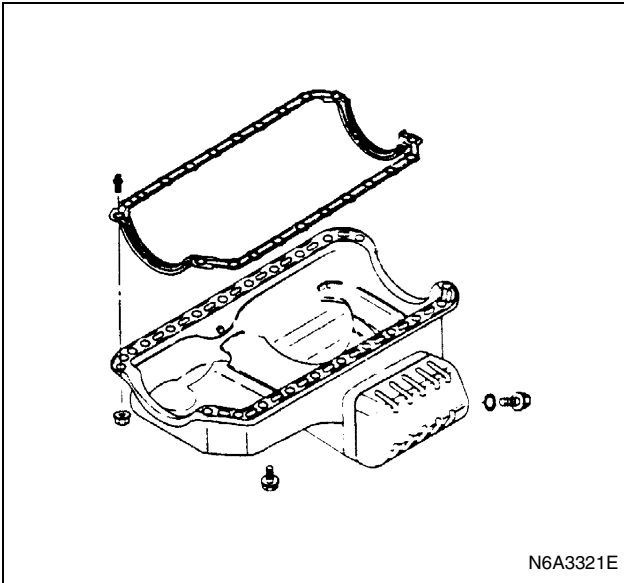
- Disconnect vacuum pump oil hose (1) from oil pan.



- Remove the oil seal retainer (1).



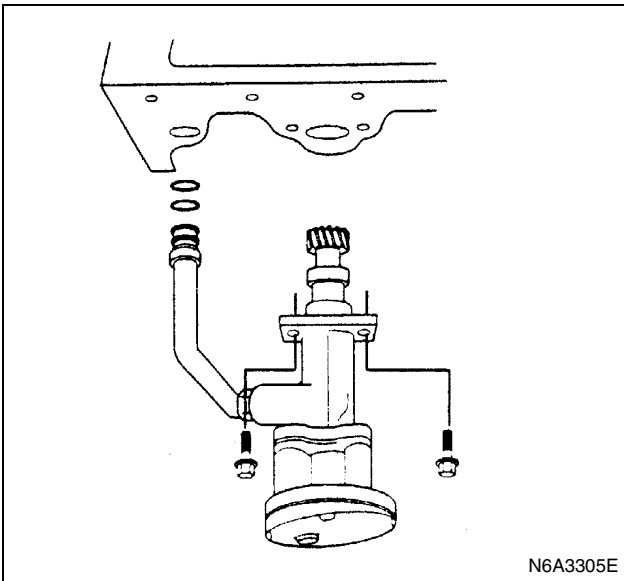
- Remove the stiffener and space rubber from oil pan both side.



- Remove the oil pan bolts and remove oil pan from cylinder body.

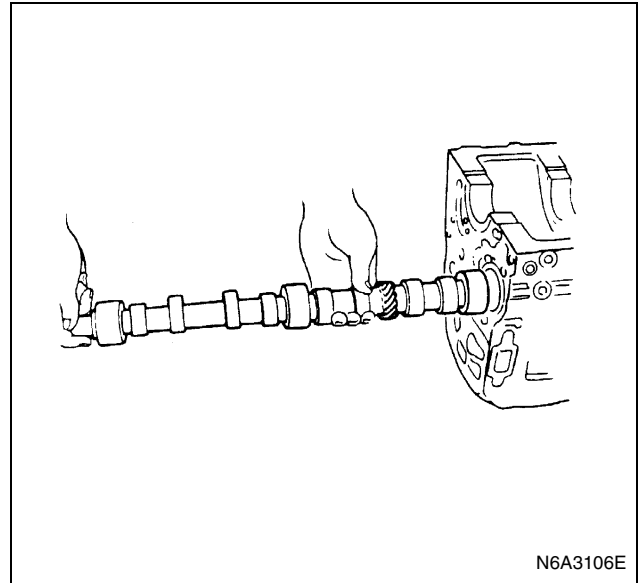
7. Oil Pump Assembly

- Remove the oil pump assembly from cylinder body.

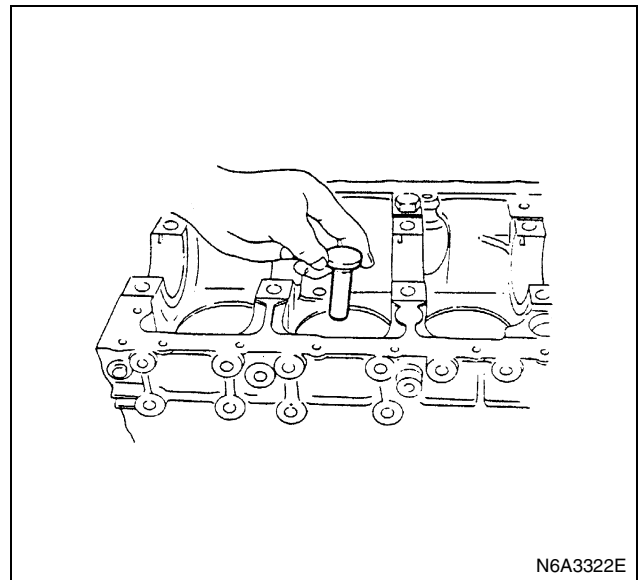


8. Camshaft and Tappets

- Remove the camshaft from cylinder body.



- Take care not to damage the camshaft bearings.
- Take out the tappets from cylinder body.



Installation

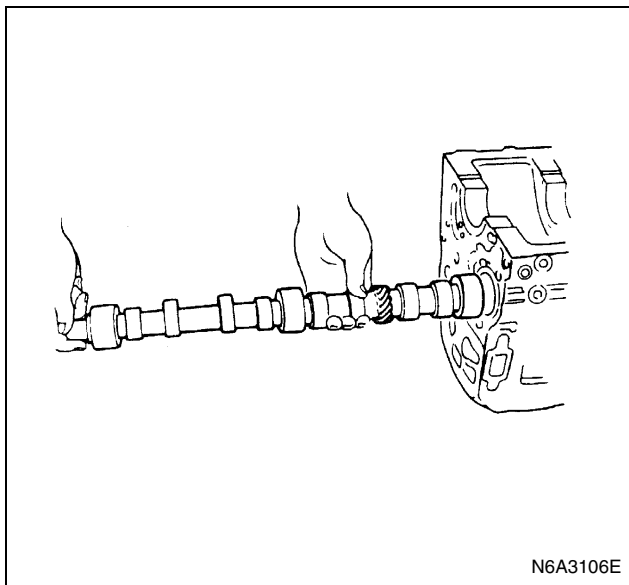
1. Camshaft and Tappets

- Apply a coat of engine oil to the tappet and the cylinder body tappet insert holes.
- Locate the position mark applied at disassembly (if the tappet is to be reused).

Notice:

The tappet must be installed before the camshaft.

- Apply a coat of engine oil to the camshaft and the camshaft bearings.
- Install the camshaft to the cylinder body.
Take care not to damage the camshaft bearings.

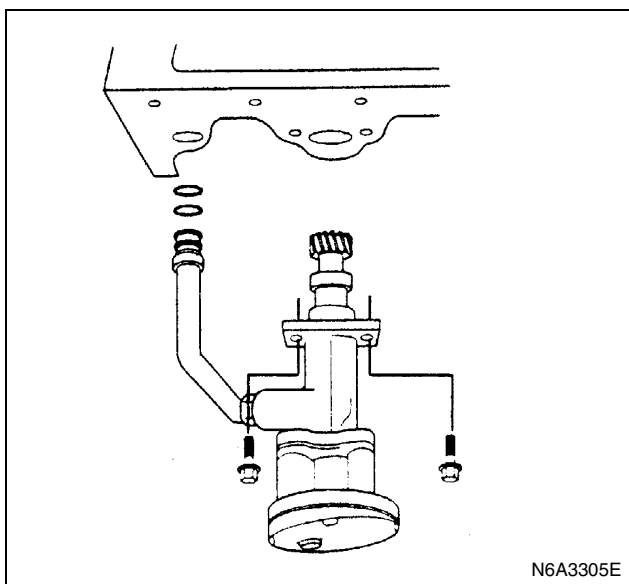


2. Oil Pump Assembly

- Prepare a solution of 80% engine oil and 20% molybdenum disulfide.
- Apply ample coat of the solution to the teeth of the oil pump pinion.
- Apply engine oil to oil pipe O-ring and insert the O-ring in O-ring hold on cylinder block.
- Install oil pump asm with oil pipe in cylinder block and tighten fixing bolts to the specified torque.

Tighten:

- Oil pump bolt to 19 N·m (1.9 kg·m / 14 lb·ft)



- Tighten sleeve nut to the specified torque.

Tighten:

- Oil pump bolt to 25 N·m (2.5 kg·m / 18 lb·ft)

3. Oil Pan Assembly

Above works refer to "OIL PAN" Section in this manual.

4. Timing Belt

- 1) Camshaft timing pulley

- 2) Timing belt

- 3) Flange: injection pump pulley

- 4) Flange: camshaft pulley

- 5) Timing pulley lower cover

- 6) Timing pulley upper cover

- 7) Crankshaft damper pulley

- 8) Cooling fan assembly

Above works refer to "TIMING BELT (Belt Type)" Section in this manual.

5. Timing Gear (Gear Type)

- 1) Camshaft timing gear

- 2) Timing gear case cover

- 3) Noise cover spacer

- 4) Noise shield cover

- 5) Crankshaft damper pulley

- 6) Cooling fan assembly

Above works refer to "TIMING GEAR (Gear Type)" Section in this manual.

6. Cylinder Head Assembly and Gasket

- 1) Cylinder head gasket

Piston Head Projection Measurement Point

- 2) Cylinder head assembly

- 3) Push rod

- 4) Rocker arm shaft

Valve Clearance Adjustment

- 5) Cylinder head cover

- 6) By-pass hose

- 7) Oil cooler water pipe (Oil cooler Model)

- 8) Oil level gauge guide tube

- 9) Glow plug harness

- 10) PCV hose

- 11) Fuel leak off pipe

- 12) Injection pipe

Above works refer to "CYLINDER HEAD ASSEMBLY AND GASKET" Section in this manual.

7. Engine Assembly

- 1) Engine assembly

- 2) Support rubber

- 3) Front exhaust pipe

- 4) Vacuum pump hose

- 5) Actuator vacuum hose

- 6) Power steering pump & bracket assembly (With Power Steering Model)

- 7) A/C compressor assembly (A/C Model)

- 8) Oil pressure switch harness

- 9) Fuel hose

- 10) Glow plug harness

- 11) Engine control cable

- 12) Heater hose

- 13) Intake air duct

- 14) Radiator assembly

8. Transmission and Clutch Assembly

1) Clutch

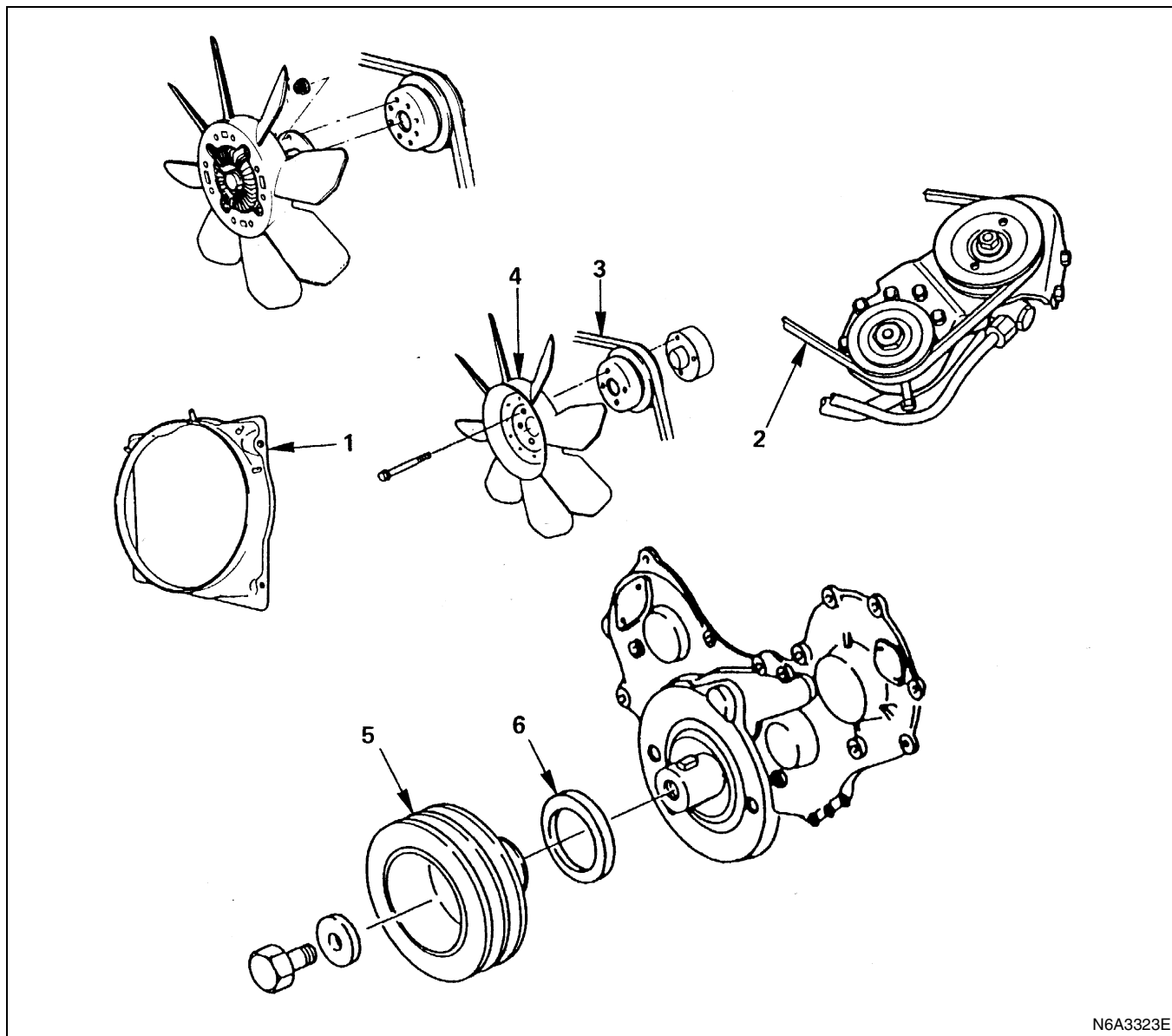
2) Transmission

Above works refer to "ENGINE ASSEMBLY"
Section in this manual.

- Connect the battery ground cable.
- Pour coolant
- Pour engine oil
- Start the engine and check coolant leakage.

CRANKSHAFT FRONT OIL SEAL (Gear Drive Type)

Component



N6A3323E

Legend

- | | |
|-----------------------------------|-----------------------------|
| 1. Fan shroud | 4. Cooling fan assembly |
| 2. Power steering pump drive belt | 5. Crankshaft damper pulley |
| 3. AC generator drive belt | 6. Front oil seal |

Removal

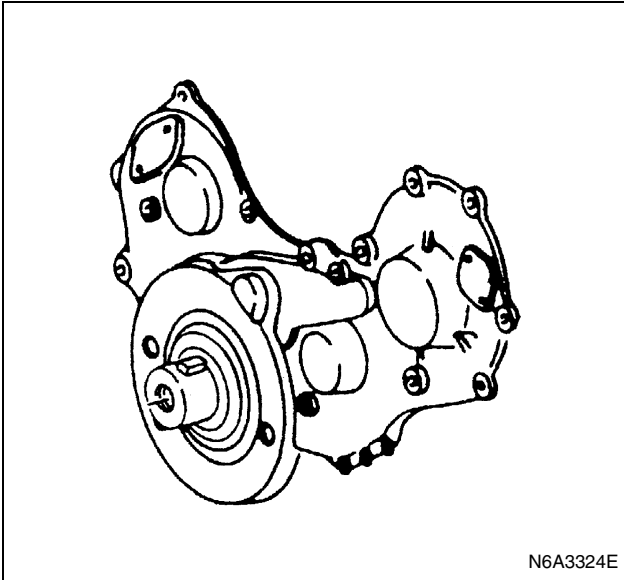
Preparation

- Disconnect battery ground cable.
 - Drain coolant.
1. Fan Shroud
 2. Power Steering Pump Drive Belt
 - Loosen power steering pump mounting bolt and adjust bolt, and remove the drive belt.
 3. AC Generator Drive Belt

- Loosen AC Generator mounting bolt (under side) and adjust plate lock bolt, and remove the drive belt.
4. Cooling Fan Assembly
 - Remove clamp nut, and remove cooling fan assembly, distant pipe, and fan pulley.
 5. Crankshaft Damper Pulley

6. Front Oil Seal

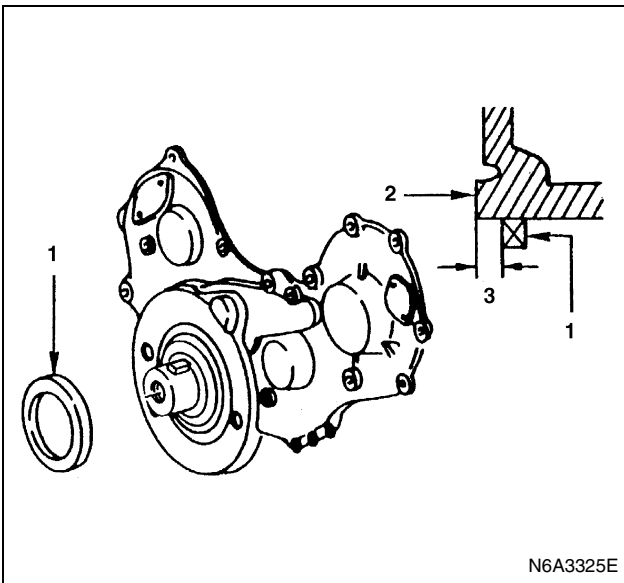
- Use a plastic hammer and a screwdriver to tap around the oil seal to free it from the gear case cover. Take care not to damage the oil seal fitting surfaces.



Installation

1. Front Oil Seal

- Use the installer to install the front oil seal (1) to the gear case cover (2).
- Oil Seal Installer: 5-8840-2061-0
 Note the oil seal installation depth (3) shown in the illustration.
 Depth (3) = 1 mm (0.039 in.)



2. Crankshaft Damper Pulley

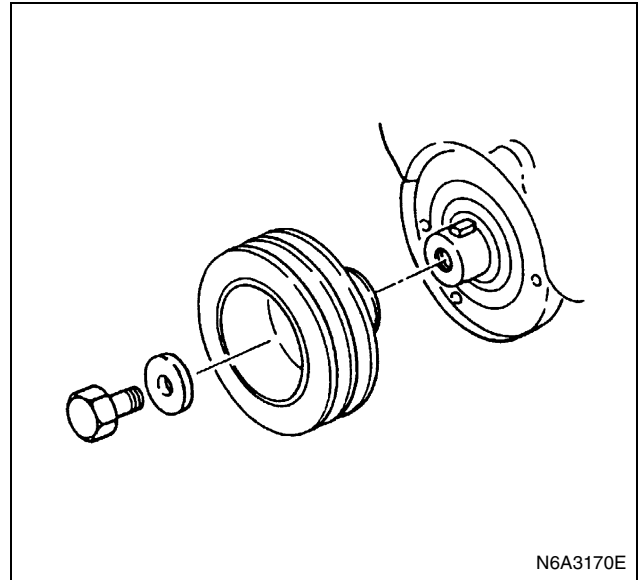
Tighten the crankshaft damper pulley bolt to the specified torque.

Notice:

Hold the flywheel ring gear stationary to prevent the crankshaft from turning when tightening the damper pulley.

Tighten:

- Pulley boss bolt to 206 N·m (21 kg·m / 152 lb·ft)



3. Cooling Fan Assembly

- Mount fan pulley, distance piece, and cooling fan assembly (in this order) on the water pump, and tighten to the specified torque.

Tighten:

- Pulley boss bolt to 8 N·m (0.8 kg·m / 69 lb·in)

4. AC Generator Drive Belt

- Install AC Generator drive belt and adjust belt tension.
- Refer to Drive Belt Adjustment in this section.

5. Power Steering Pump Drive Belt

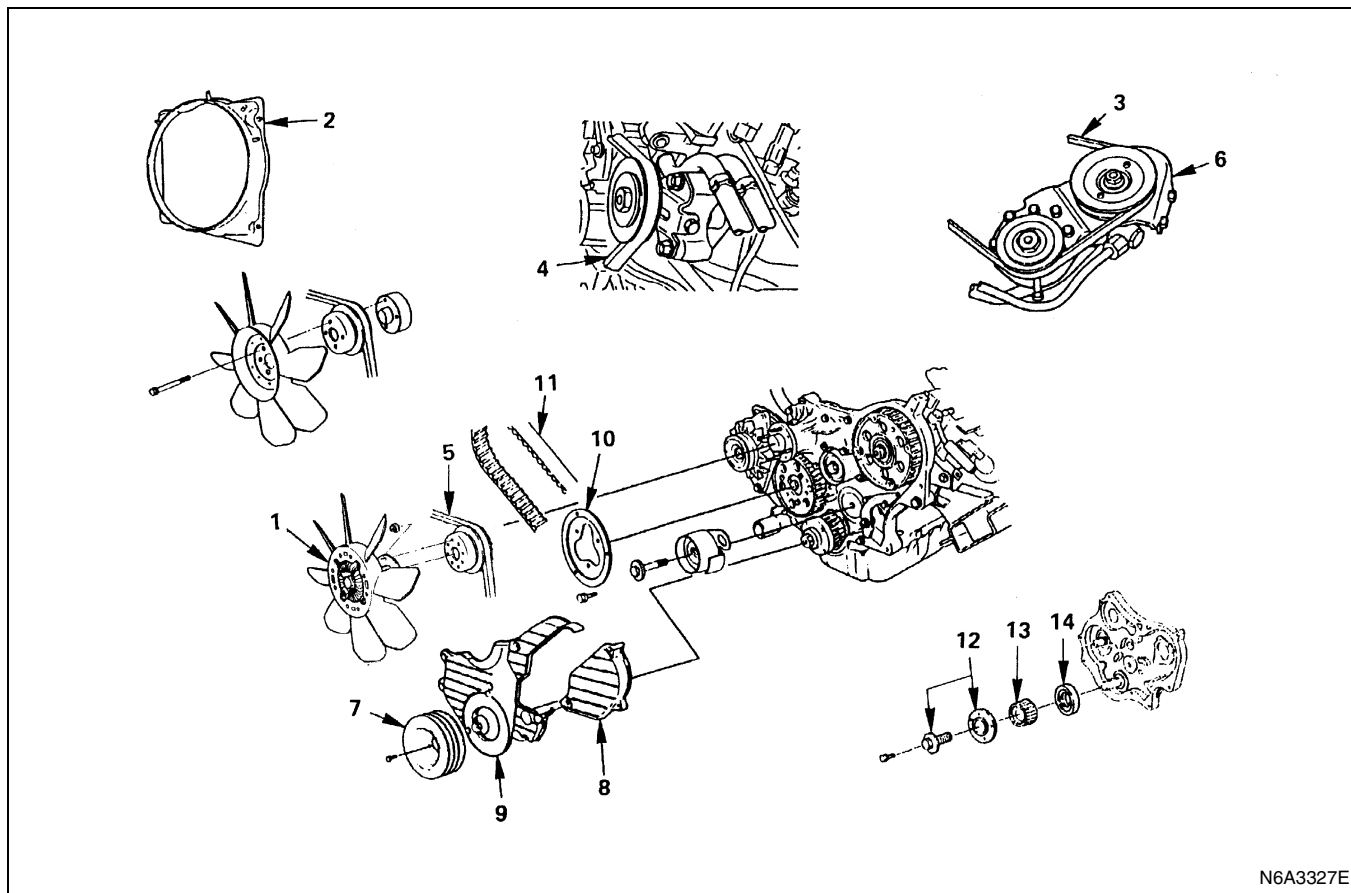
- Install power steering pump drive belt and adjust belt tension.
- Refer to "Drive Belt Adjustment" in this section.

6. Fan Shroud

- Install the fan shroud and reservoir tank hose.
- Pour coolant
- Start the engine and check coolant leakage.

CRANKSHAFT FRONT OIL SEAL (Belt Drive Type)

Component



N6A3327E

Legend

- | | |
|---|------------------------------|
| 1. Cooling fan assembly | 8. Timing pulley upper cover |
| 2. Fan shroud | 9. Timing pulley lower cover |
| 3. Power steering pump drive | 10. Flange; Camshaft pulley |
| 4. A/C compressor drive belt | 11. Timing belt |
| 5. AC Generator drive belt | 12. Crankshaft pulley center |
| 6. Power steering pump bracket assembly | 13. Crankshaft timing pulley |
| 7. Crankshaft damper pulley | 14. Front oil seal |

Removal

Preparation

- Disconnect battery ground cable.
- Drain coolant.

1. Cooling Fan Assembly
2. Fan Shroud
3. Power Steering Pump Drive Belt (P/S Model)
4. A/C Compressor Drive Belt (A/C Model)
5. AC Generator Drive Belt
6. Power Steering Pump Bracket Assembly (P/S Model)
7. Crankshaft Damper Pulley
8. Timing Pulley Upper Cover
9. Timing Pulley Lower Cover

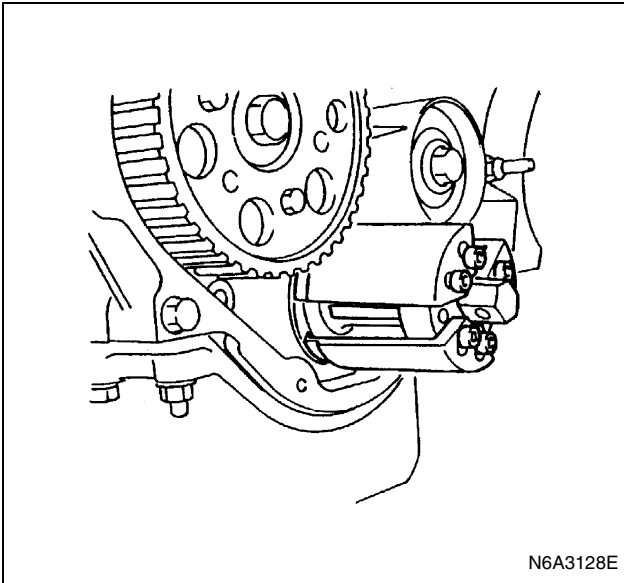
10. Flange; Camshaft Pulley
11. Timing Belt

Above works refer to "TIMING BELT (Belt Type)" Section in this manual.

12. Crankshaft Pulley Center
13. Crankshaft Timing Pulley
14. Front Oil Seal

- Remove the pulley center by using special tool. Remover: 5-8840-0161-0
- Remove the oil seal by using special tool.
- With the oil seal pushed in deep, install the special tool as shown in the illustration to remove the oil seal.

Front oil seal remover: 5-8840-2362-0

**Notice:**

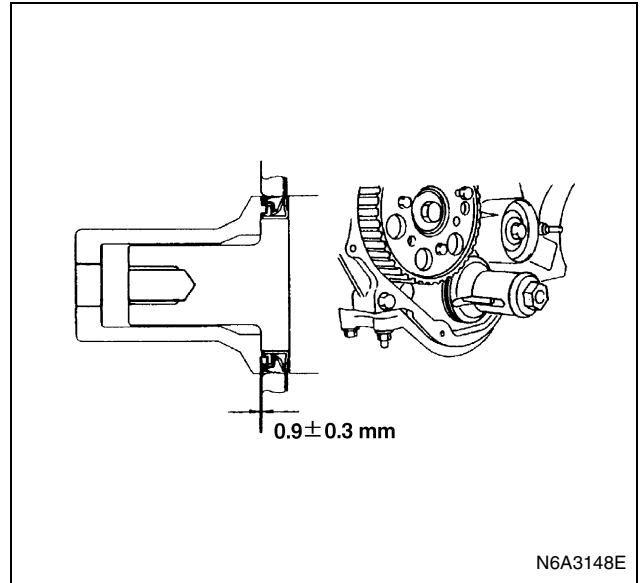
Take care not to damage sealing surface of front plate and crankshaft when removing oil seal.

Installation

1. Front Oil Seal

- Install the oil seal by using special tool.
Installer: Front oil seal: 5-8840-2361-0
- 1) With the sleeve attached to the oil seal, put it in the front end of the crankshaft.
- 2) With the edge portion of the oil seal attached securely to the crankshaft, tighten it with the center bolt until the sleeve hits securely against the reference plane at the front end of the crankshaft.
- 3) Remove the sleeve.
- 4) After pressing in the seal, check the measurement of the oil seal.

Standard	mm (in)
0.6 — 1.2 (0.024 — 0.047)	

**Notice:**

- Install the oil seal after assembling the timing pulley housing.
- The lip portion of the oil seal is applied with oil.
- Take note of the press-in direction of the oil seal.

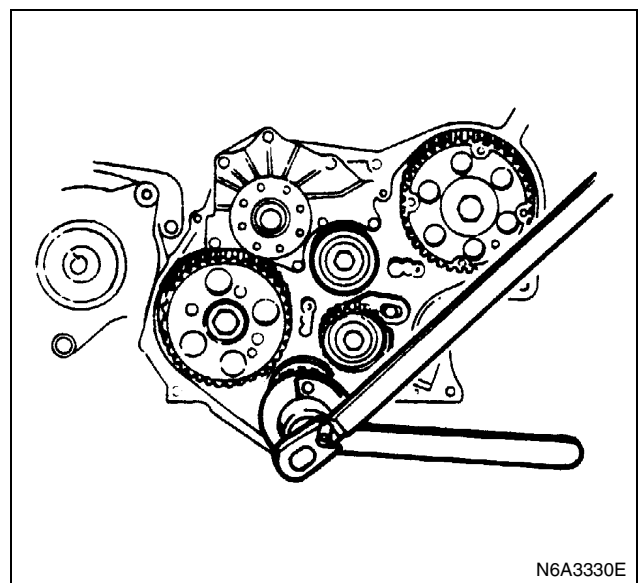
2. Crankshaft Timing Pulley

3. Crankshaft Pulley Center

- Install the timing pulley center and tighten bolt to the specified torque.

Tighten:

- Pulley center bolt to 206 N·m (21 kg·m / 152 lb·ft)



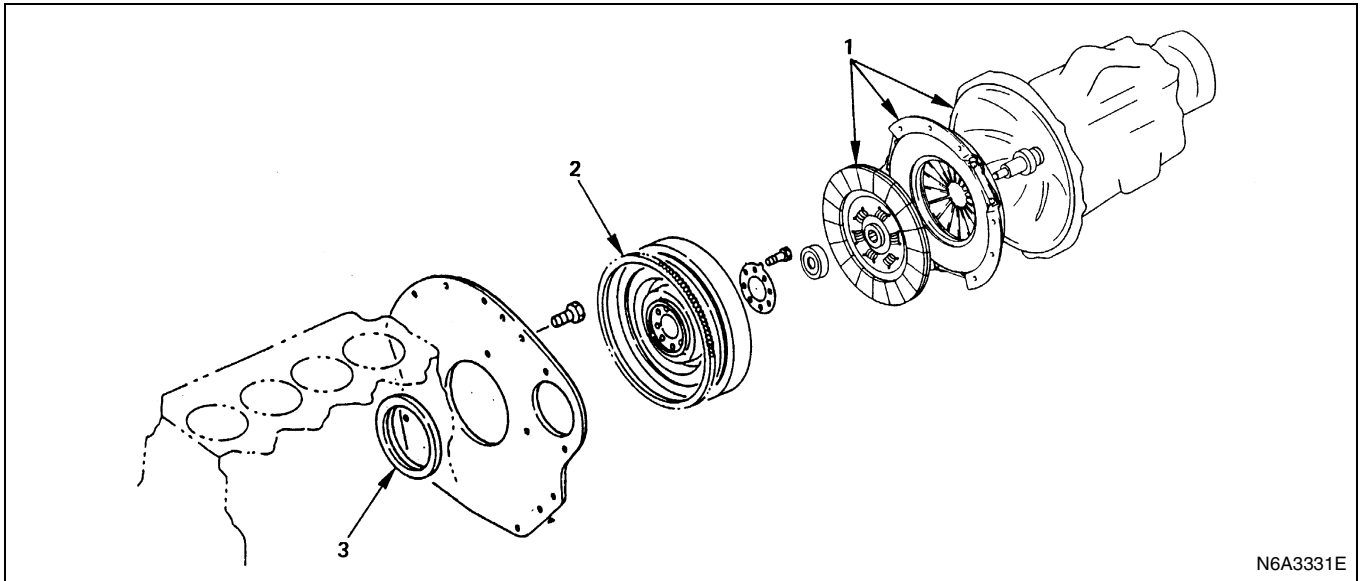
4. Timing Belt
5. Flange; Camshaft Pulley
6. Timing Pulley Lower Cover
7. Timing Pulley Upper Cover
8. Crankshaft Damper Pulley
9. Power Steering Pump Bracket Assembly (P/S Model)

6A1-74 4JB1/4JB1-TC/4JG2/4JH1-TC - ENGINE

10. AC Generator Drive Belt
11. A/C Compressor Drive Belt (A/C Model)
12. Power Steering Pump Drive Belt (P/S pump Model)
13. Fan Shroud
14. Cooling Fan Assembly
Above works refer to "TIMING BELT (Belt Type)"
Section in this manual.

CRANKSHAFT REAR OIL SEAL (Gear & Belt Drive Type)

Component



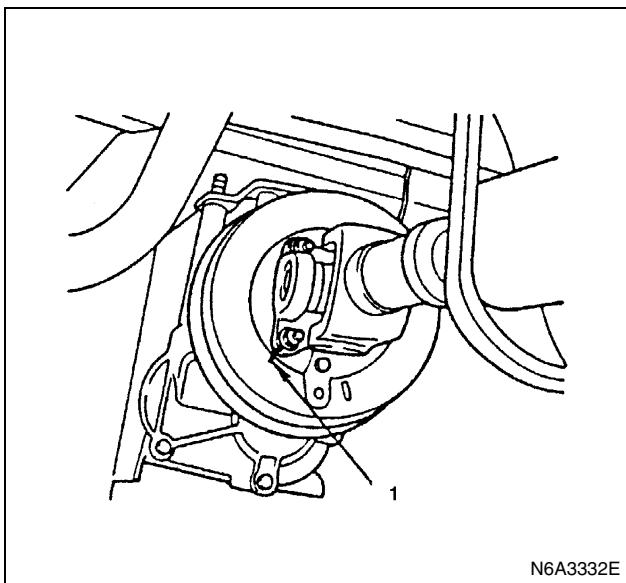
Legend

- | | |
|-------------------------------------|------------------|
| 1. Transmission and clutch assembly | 3. Rear oil seal |
| 2. Flywheel | |

Removal

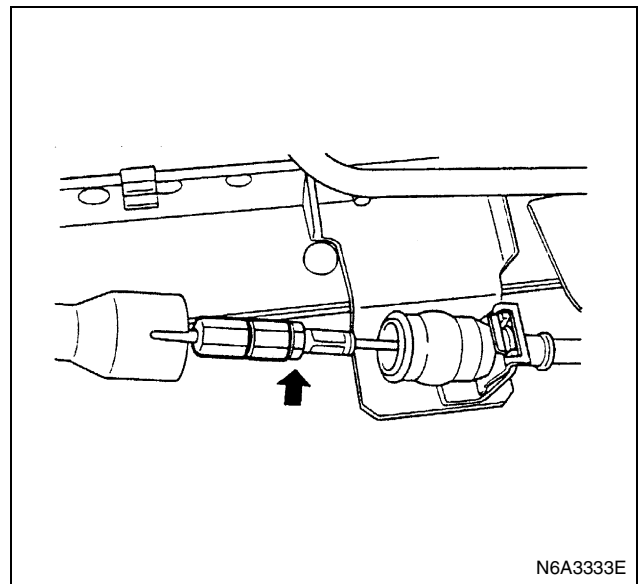
Preparation

- Disconnect battery ground cable
- 1. Transmission and Clutch Assembly
 - Raise vehicle and support with suitable safely.
 - 1) Transmission
 - Reference mark (1) the flange yoke to the parking brake drum.



2) Parking Brake Cable

- Move the joint cover.
- Disconnect the joint bolt.
- Remove the clip then disconnect the cable from the bracket.



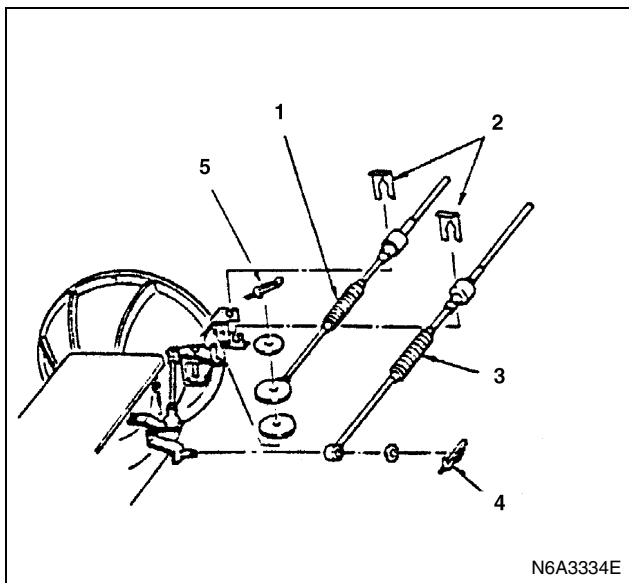
3) Wiring Connector

- Disconnect the wiring connectors from the car speed sensor, the neutral switch and the back-up light switch.

- Disconnect the propeller shaft at flange yoke.
- Put aside the propeller shaft and tie it to the frame so that it does not interface with servicing work.

4) Shift Cable and Select Cable

- Disconnect the shift cable and select cable on the transmission side.



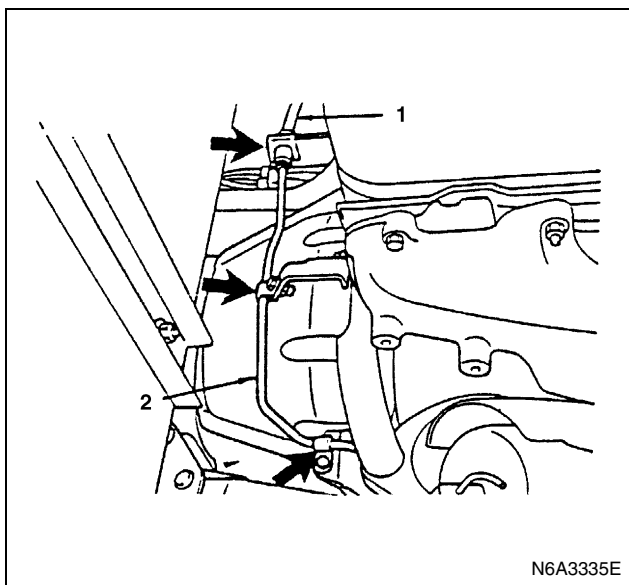
N6A3334E

Legend

1. Shift cable
2. Clip
3. Select cable
4. Snap pin
5. Snap pin

5) Clutch Slave Cylinder

- Remove the clutch pipe fixing clips and the clip bracket (Right hand drive models only).



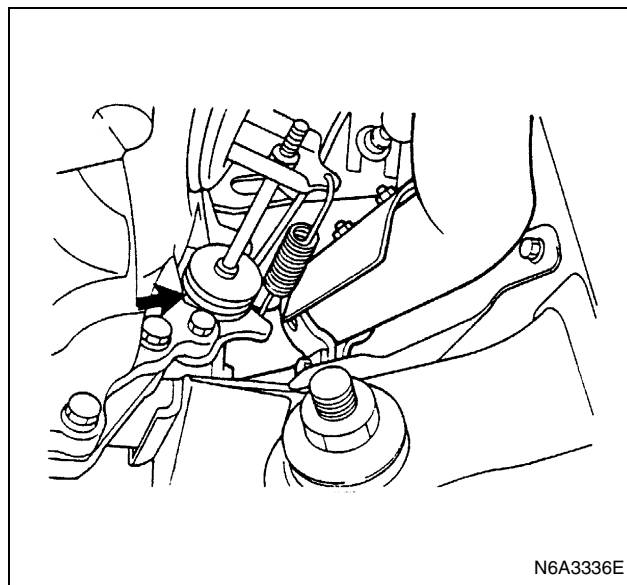
N6A3335E

Legend

1. Flexible hose
2. Clutch pipe

- Remove the slave cylinder assembly with the flexible hose attached, and then tie it to the

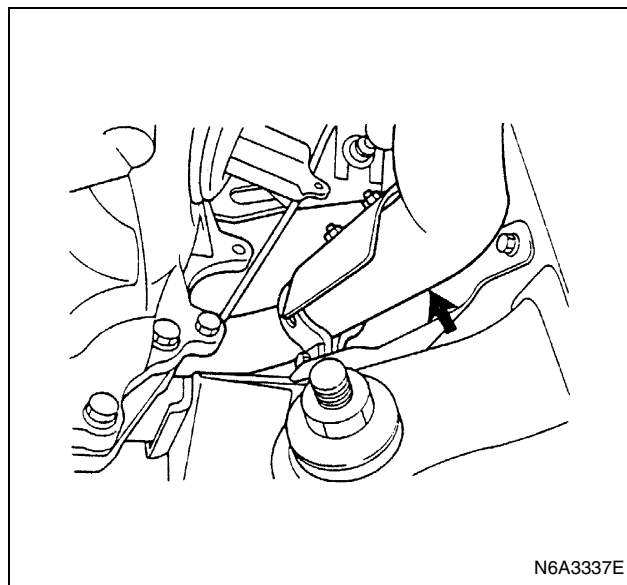
frame so that it does not interface with servicing work.



N6A3336E

6) Exhaust Brake Assembly

7) Front Exhaust Pipe



N6A3337E

8) Transmission Assembly

Notice:

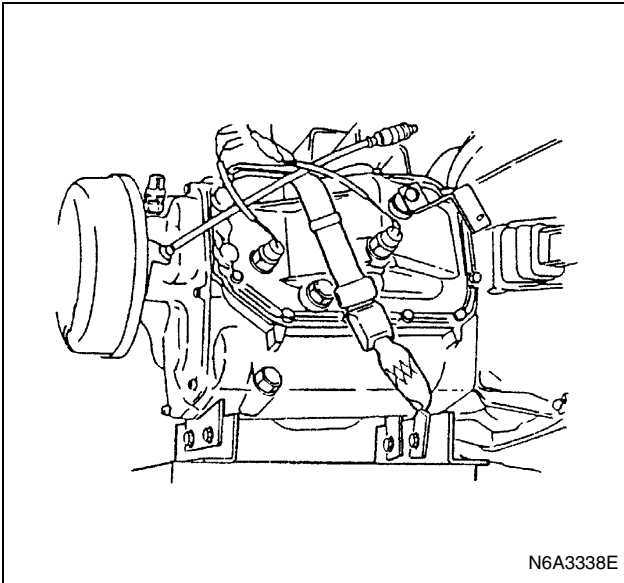
The exhaust pipe bracket, the gear control bracket and the clips are sometimes installed in the wrong position or direction confusedly. To prevent incorrect installation of these parts, put a correct installation mark on them.

- Support the transmission with mission jack.

Caution:

To prevent the falling of the transmission, tie it firmly to the jack with a chain or belt.

Do not allow transmission to hang unsupported from clutch. Damage to the clutch assembly will result.



- Remove the nuts of the transmission mounting bracket on the crossmember side.
- Engine and transmission angles may need to be adjusted for removal.
- Hold the rear section of the engine by the jack or hoist.

Caution:

When lifting the engine by the jack, use wood blocks to prevent any possible damage to the oil pan.

- Remove transmission fastening bolts.
- Pull out the transmission assembly rearward.

9) Mounting Bracket

- Raise vehicle and support with suitable safety stands.

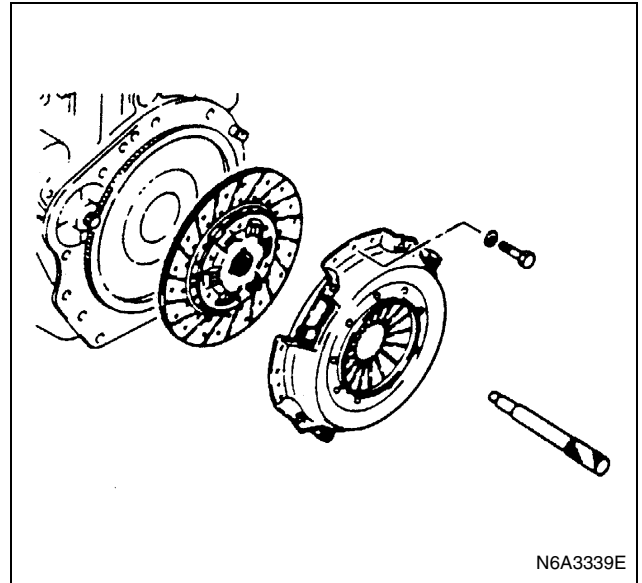
Caution:

Do not let clutch fluid remain on a painted surface, wash it off immediately.

10) Pressure Plate Assembly

11) Driven Plate Assembly

- Use the pilot aligner to prevent the driven plate assembly from falling free.
Pilot Aligner: 5-5825-3001-0

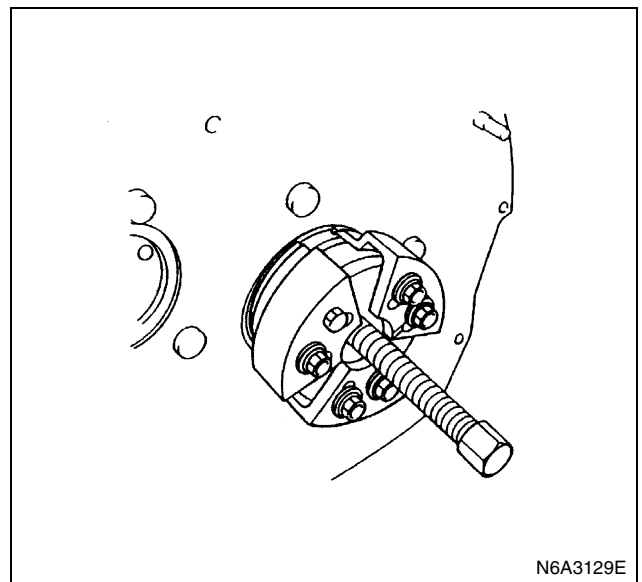


- Mark the flywheel and pressure plate lug for alignment when installing.
- Loosen the pressure plate assembly fixing bolts.

2. Flywheel

3. Rear Oil Seal

- With the oil seal pushed in deep, install the special tool as shown in the illustration to remove the oil seal.
- Rear oil seal Remove: 5-8840-2360-0



Notice:

Take care not to damage the crankshaft or oil seal retainer when removing oil seal.

Installation

1. Rear Oil Seal

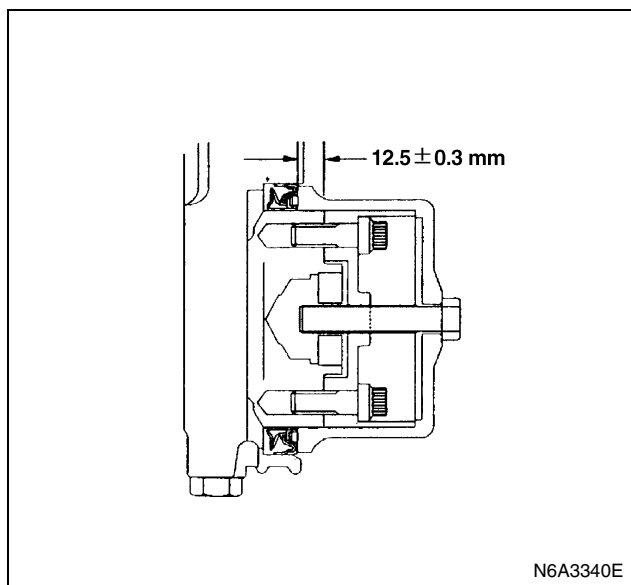
- Use the oil seal installer the oil seal to the cylinder body.
Rear oil seal Install: 5-8840-2359-0

Notice:

Wipe off rust and scraps clean from the press-in portion of the oil seal.

- 1) Take note of the press-in direction of the oil seal.
- 2) Install the adapter of the special tool to the rear end of the crankshaft with two bolts.
- 3) Install the oil seal to the outer circumference of the adapter.
- 4) Insert the sleeve into the adapter portion, and tighten it in with the bolt (M12 × 1.75L = 70) until the adapter section hits the sleeve.
- 5) Remove the adapter and the sleeve.
- 6) After installing the oil seal, check the measurement of the oil seal.

Standard	mm (in)
12.2 — 12.8 (0.48 — 0.50)	

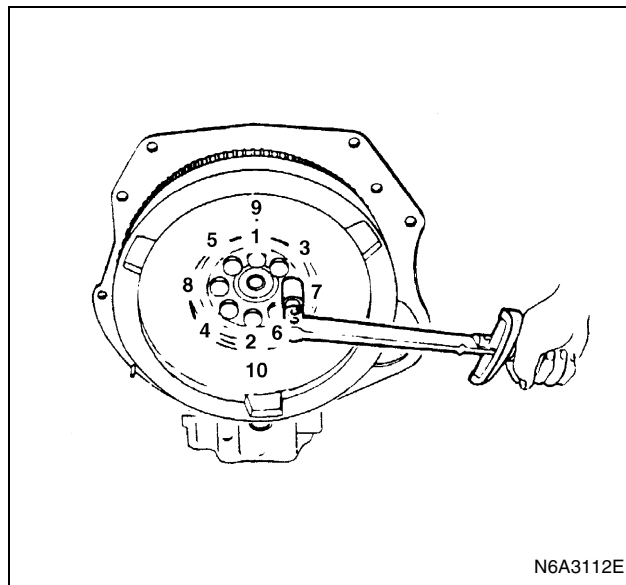


2. Flywheel

- Apply engine oil to fixing bolts.
- Tighten the flywheel bolts to the specified torque in two steps using the Angular Tightening Method. Follow the numerical order shown in the illustration.

Tighten:

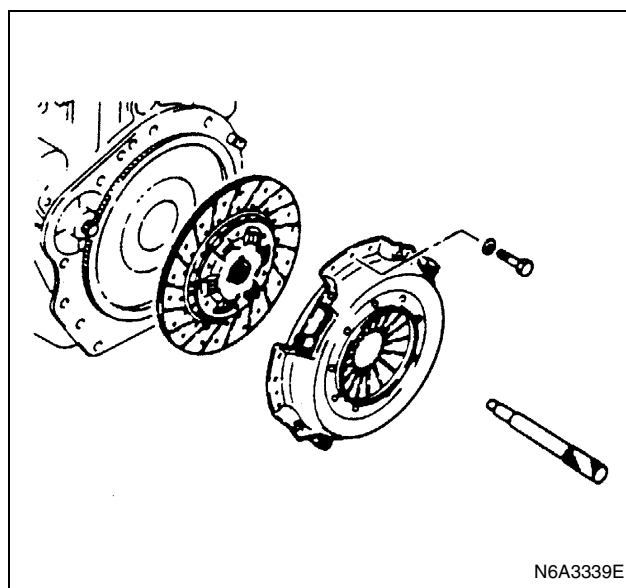
- Flywheel bolt to
 - 1st step: 59 N·m (6.0 kg·m / 43 lb·ft)
 - 2nd step: 60° — 90°



3. Transmission and Clutch Assembly

1) Driven Plate Assembly

- Apply multi-purpose with MOS2 type grease to the driven plate hub spline.
 - Use the pilot aligner to install the driven plate assembly.
- Pilot Aligner: 5-5825-3001-0

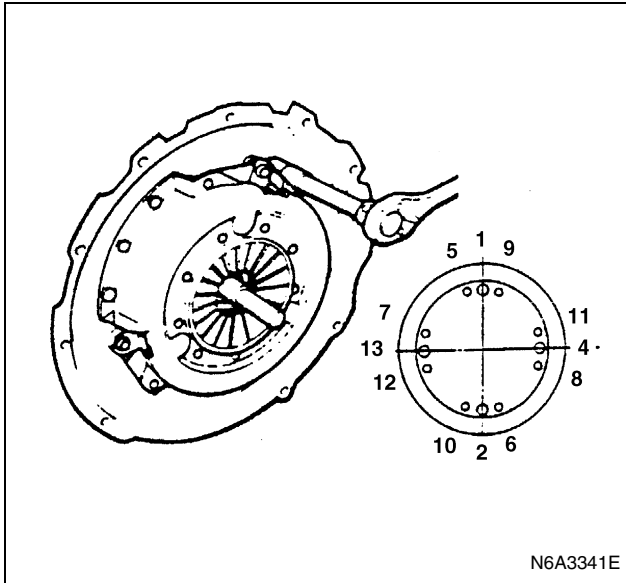


2) Pressure Plate Assembly

- Tighten pressure plate assembly fixing bolts in numerical order.

Tighten:

- Pressure plate fixing bolt to 18 N·m (1.3 kg·m / 13 lb·ft)



- Remove the pilot aligner.

Notice:

In case a new pressure plate assembly is mounted, after tightening a pressure plate at the specified torque, be sure to remove the wiring for protection of a diaphragm spring.

3) Mounting Bracket

Tighten:

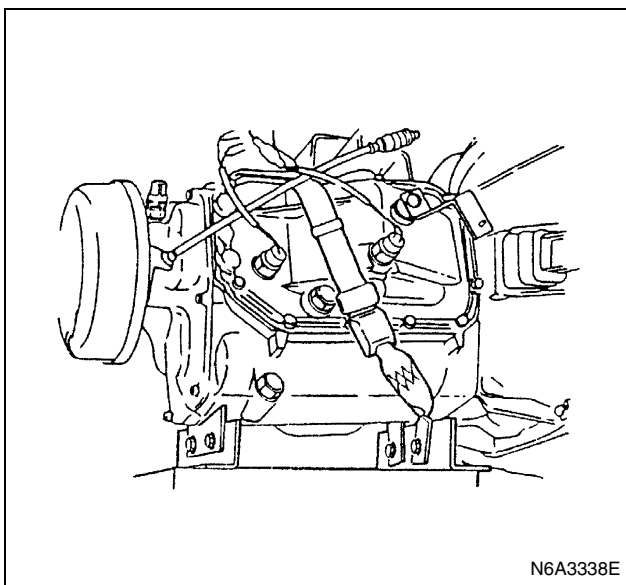
- Mounting bracket nuts to 69 N·m (7.0 kg·m / 51 lb·ft)

4) Transmission Assembly

- Support the transmission with mission jack.

Caution:

To prevent the falling of the transmission, tie it securely to the jack with a chain or belt.



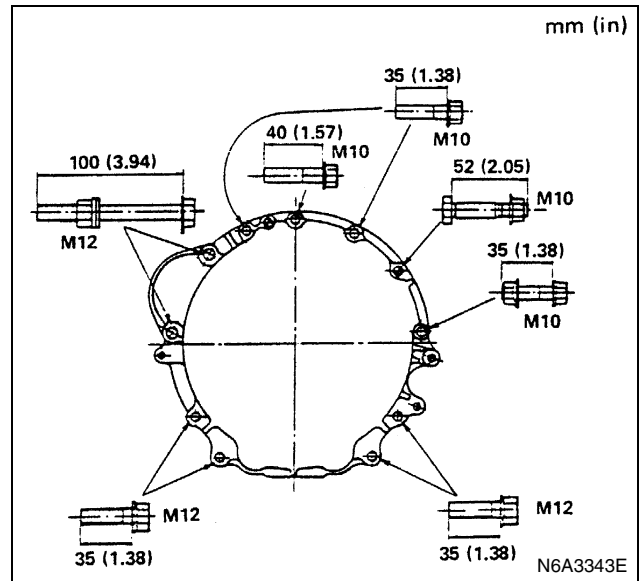
- Shift transmission into high gear.
- Align transmission with engine slope.
- Turn output parking brake drum to aid clutch spring engagement.

Tighten:

- Clutch housing to flywheel hosing bolts to
M10: 46 N·m (4.7 kg·m / 34 lb·ft)
M12: 91 N·m (9.3 kg·m / 67 lb·ft)
- Raise engine and transmission up into rear transmission mount.

Tighten:

- Engine rear mounting nuts and bolts to
M10: 40 N·m (4.1 kg·m / 30 lb·ft)
M12: 69 N·m (7.0 kg·m / 51 lb·ft)



5) Front Exhaust Pipe

Tighten:

- Front exhaust pipe bolts to 37 N·m (3.8 kg·m / 27 lb·ft)

6) Exhaust Brake Assembly

Tighten:

- Exhaust brake bolts to 17 N·m (1.8 kg·m / 12 lb·ft)

7) Clutch Slave Cylinder

Tighten:

- Slave cylinder bolts to 19 N·m (1.9 kg·m / 14 lb·ft)
- Perform slave cylinder adjustment before installation of the return spring.
 - a. Loosen the lock nut of the push rod.
 - b. Turn the adjust nut until it reaches the shift fork.
 - c. Back off the adjust nut 1.5 turns. (shift fork free play Approximately 2 mm / 0.1 in).
 - d. Tighten the lock nut.

Tighten:

- Push rod lock nut to 16 N·m (1.6 kg·m / 12 lb·ft)

8) Shift Cable and Select Cable

9) Wiring Connector

- Color of Connector
Back-up Light Switch: Brown
Neutral Switch: Gray

6A1-80 4JB1/4JB1-TC/4JG2/4JH1-TC - ENGINE

10) Parking Brake Cable

11) Propeller Shaft

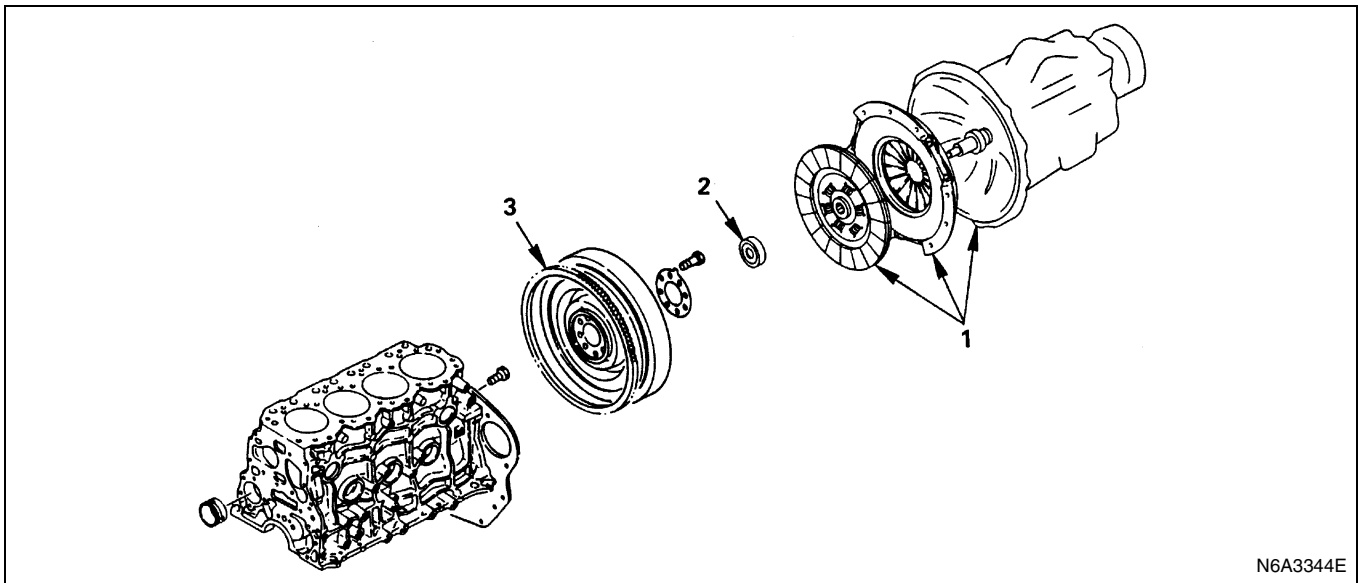
- Line up reference mark.

Tighten:

- Propeller shaft nuts to 66 N·m (6.7 kg·m / 48 lb·ft)
 - Connect battery ground cable.

FLYWHEEL AND PILOT BEARING

Component



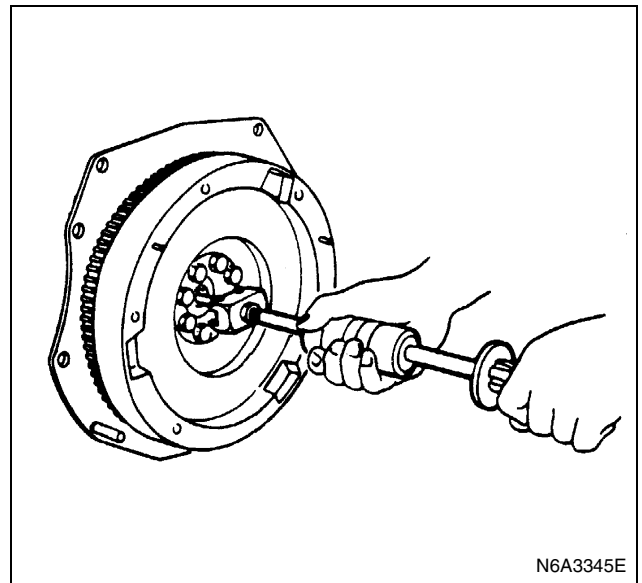
Legend

- | | |
|-------------------------------------|-------------|
| 1. Transmission and clutch assembly | 3. Flywheel |
| 2. Pilot bearing | |

Removal

Preparation

- Disconnect battery ground cable.
1. Transmission and Clutch Assembly
 - 1) Transmission
 - 2) Clutch
 Above works refer to "ENGINE ASSEMBLY" Section in this manual.
 2. Pilot Bearing
 - Remove pilot bearing using remover.
Pilot Bearing Puller: 5-8840-2000-0
Sliding hammer: 5-8840-0019-0



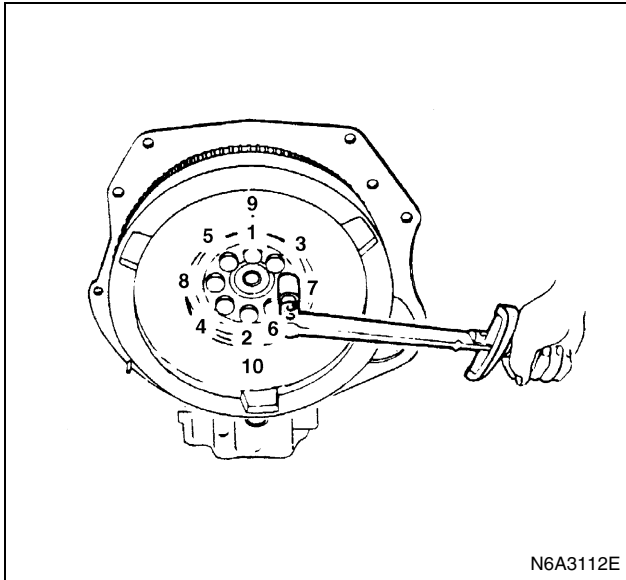
3. Flywheel
 - Set the flywheel stopper.
 - Loosen flywheel fixing bolts then remove the flywheel.

Installation

1. Flywheel
 - Apply engine oil to fixing bolts.
 - Tighten the flywheel bolts to the specified torque in two steps using the Angular Tightening Method. Follow the numerical order shown in the illustration.

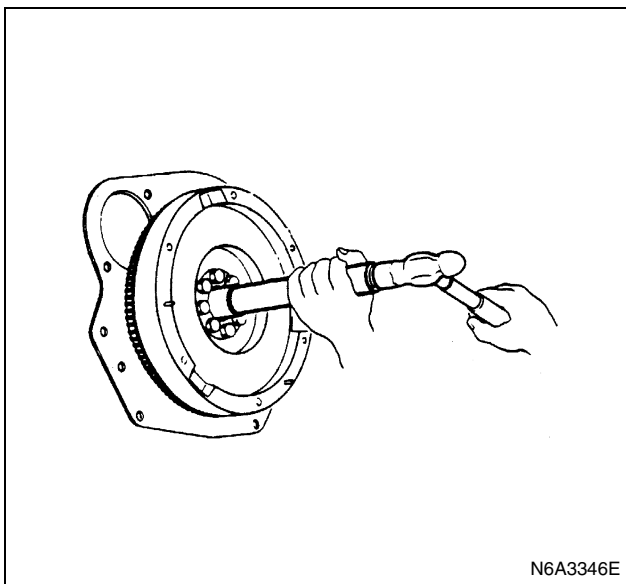
Tighten:

- Flywheel bolt to
 - 1st step: 59 N·m (6.0 kg·m / 43 lb·ft)
 - 2nd step: 60° — 90°



2. Pilot Bearing

- Install the pilot bearing using installer.
Pilot bearing Installer: 5-8522-0024-0

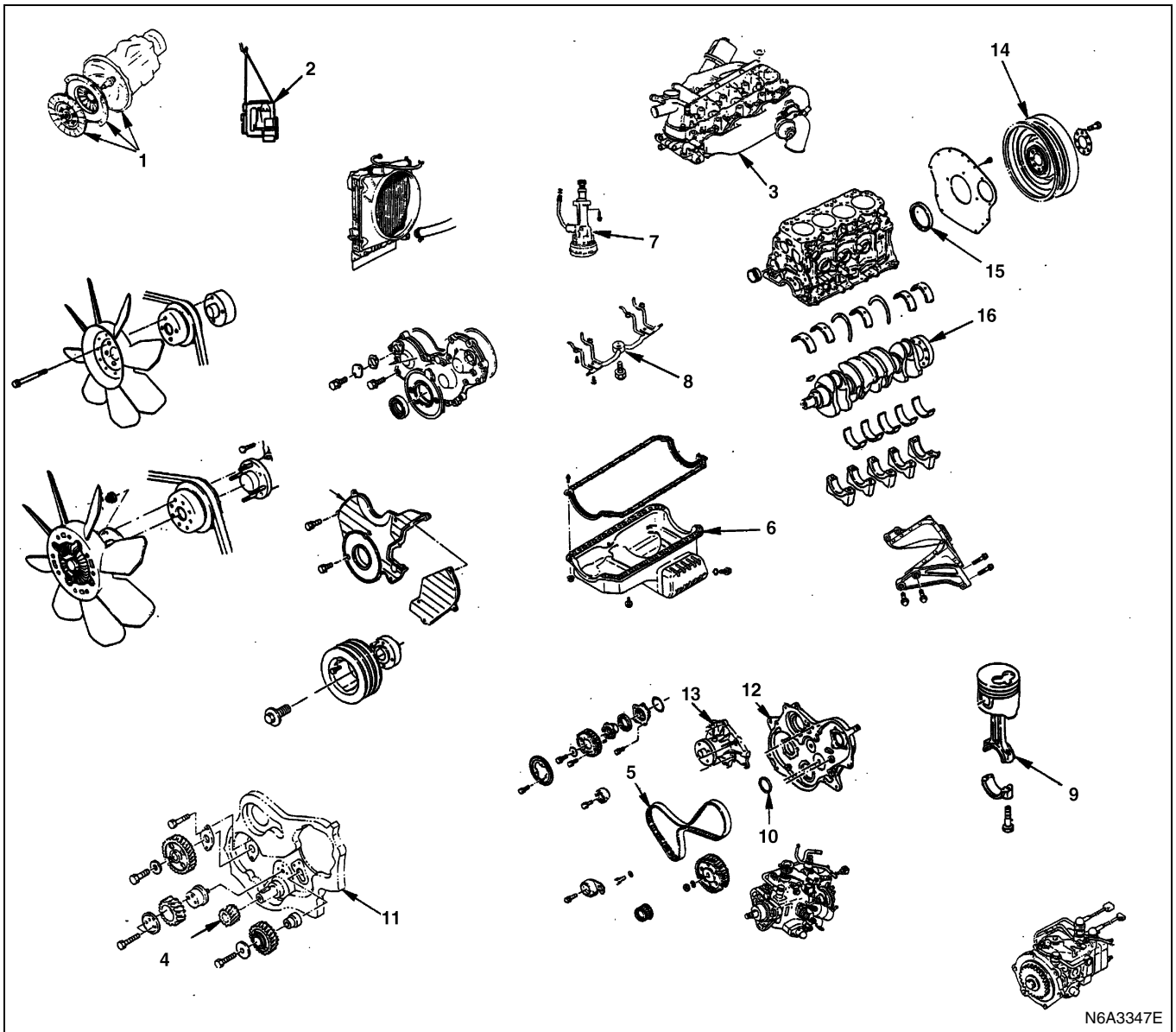


3. Transmission and Clutch Assembly

- 1) Clutch
 - 2) Transmission
- Above works refer to "ENGINE ASSEMBLY" Section in this manual.

CRANKSHAFT AND MAIN BEARINGS

Component



N6A3347E

Legend

- | | |
|--------------------------------------|---------------------------------------|
| 1. Transmission and clutch assembly | 9. Piston and connecting rod assembly |
| 2. Engine assembly | 10. Front oil seal |
| 3. Cylinder head assembly and gasket | 11. Timing gear housing |
| 4. Timing gear (Gear drive model) | 12. Timing pulley housing |
| 5. Timing belt (Belt drive model) | 13. Water pump assembly |
| 6. Oil pan assembly | 14. Flywheel and rear plate |
| 7. Oil pump assembly | 15. Rear oil seal |
| 8. Piston cooling oil pipe | 16. Crankshaft and main bearing |

Removal

Preparation

- Disconnect battery ground cable.
- Drain coolant from the radiator and engine.

1. Transmission and Clutch Assembly

1) Transmission

2) Clutch

Above works refer to "ENGINE ASSEMBLY" Section in this manual.

2. Engine Assembly

1) Radiator assembly

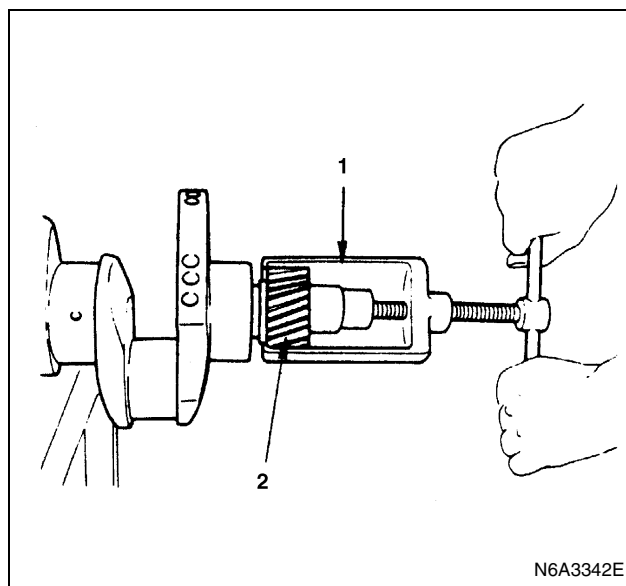
- 2) Intake air duct
 - 3) Heater hose
 - 4) Engine control cable
 - 5) Glow plug harness
 - 6) Fuel hose
 - 7) Oil pressure switch harness
 - 8) A/C compressor assembly
 - 9) Power steering pump bracket assembly (Power Steering Model)
 - 10) Actuator vacuum hose (Exhaust Brake Model)
 - 11) Vacuum pump hose (Exhaust Brake Model)
 - 12) Front exhaust pipe
 - 13) Support rubber
 - 14) Engine assembly
- Above works refer to "ENGINE ASSEMBLY" Section in this manual.

3. Cylinder Head Assembly and Gasket

- 1) Injection pipe
 - 2) Leak off pipe
 - 3) PCV hose
 - 4) Glow plug harness
 - 5) Oil level gauge guide tube
 - 6) Oil cooler water pipe (Oil Cooler Model)
 - 7) By-pass hose
 - 8) Cylinder head cover
 - 9) Rocker arm shaft
 - 10) Push rod
 - 11) Cylinder head assembly
 - 12) Cylinder head gasket
- Above works refer to "CYLINDER HEAD ASSEMBLY AND GASKET" Section in this manual.

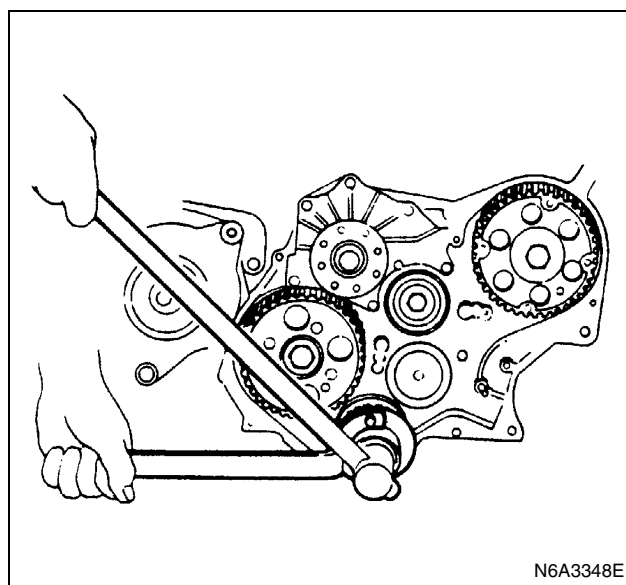
4. Timing Gear (Gear Drive Model)

- 1) Cooling fan assembly
 - 2) Crankshaft damper pulley
 - 3) Noise shield cover
 - 4) Noise cover spacer
 - 5) Timing gear case cover
 - 6) Oil pipe
 - 7) Idle gear
 - 8) Idle gear "B" and shaft
 - 9) Injection pump
 - 10) Camshaft timing gear
- Above works refer to "TIMING GEAR (Gear Type)" Section in this manual.
- 11) Crankshaft gear
- Use the crankshaft timing gear remover (1) to remove the crankshaft gear (2).
- Crankshaft Timing Gear Remover: 5-8840-2057-0



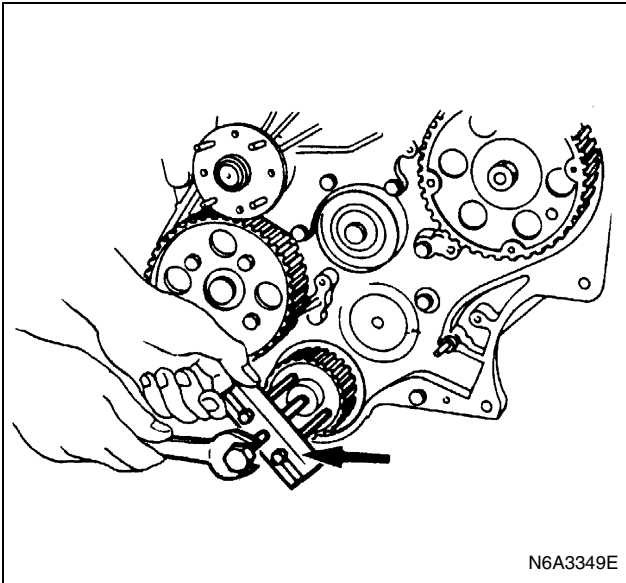
5. Timing Belt (Belt Drive Model)

- 1) Cooling fan assembly
 - 2) Crankshaft damper pulley
 - 3) Timing pulley upper cover
 - 4) Timing pulley lower cover
 - 5) Flange: camshaft pulley
 - 6) Flange: injection pump pulley
 - 7) Timing belt
- Above works refer to "TIMING BELT (Belt Type)" Section in this manual.
- 8) Crankshaft timing pulley center
- Use the fixing wrench to prevent the crankshaft from turning.
- Fixing Wrench: 5-8840-0161-0
- Remove the timing pulley center from the crankshaft.



- 9) Crankshaft timing pulley
- Block the crankshaft with a piece of hard wood.

- Use the crankshaft timing pulley puller to remove the timing pulley.
Crankshaft Timing Pulley Puller: 5-8840-2035-0



10) Injection pump timing pulley

11) Injection pump

Above works refer to "CYLINDER BLOCK ASSEMBLY" Section in this manual.

12) Camshaft timing pulley

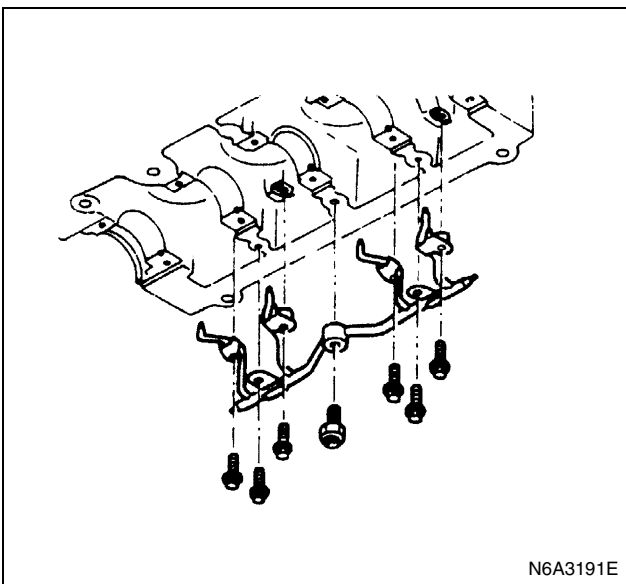
6. Oil Pan Assembly

7. Oil Pump Assembly

Above works refer to "CAMSHAFT AND TAPPET" Section in this manual.

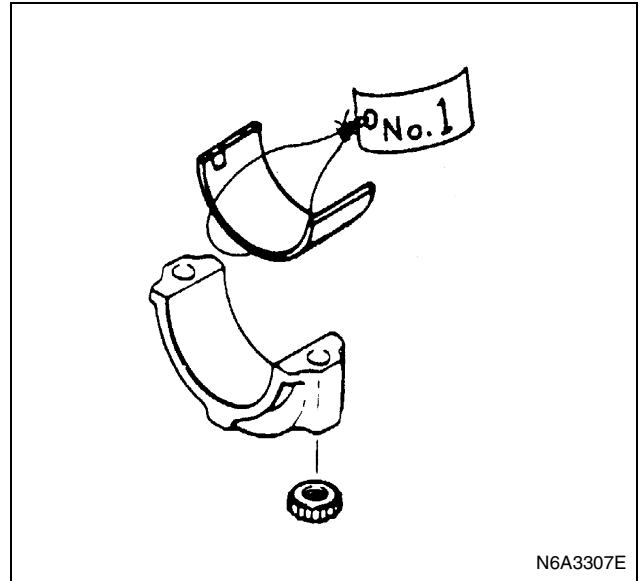
8. Piston Cooling Oil Pipe

- Remove the oil pipe from cylinder block.

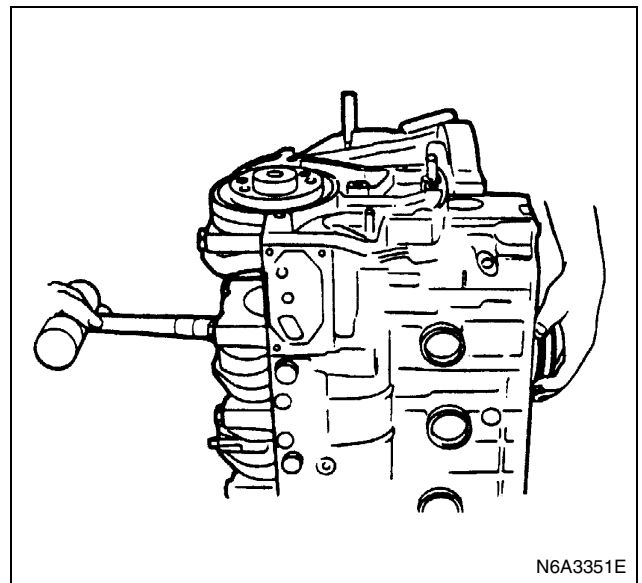


9. Piston and Connecting Rod Assembly

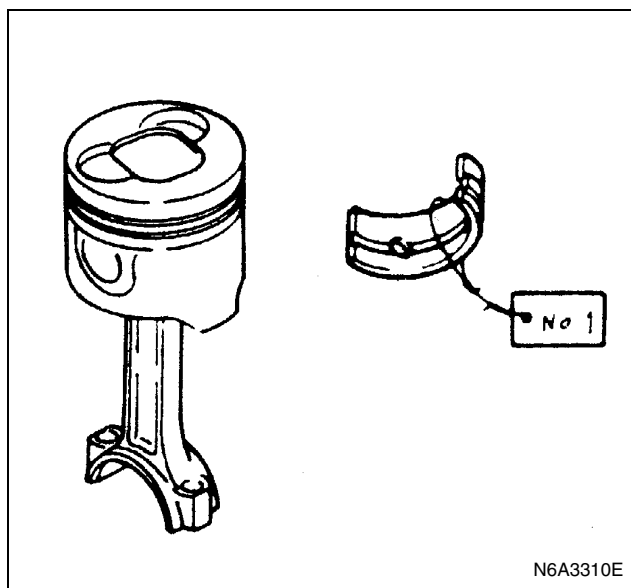
- If the connecting rod lower bearings are to be reinstalled, mark their fitting positions by tagging each bearing with the cylinder number from which it was removed.



- Remove carbon deposits from the upper portion of the cylinder wall with a scraper before removing the piston and connecting rod.
Move the piston to the top of the cylinder and tap it with a hammer grip or similar object from the connecting rod lower side to drive it out.



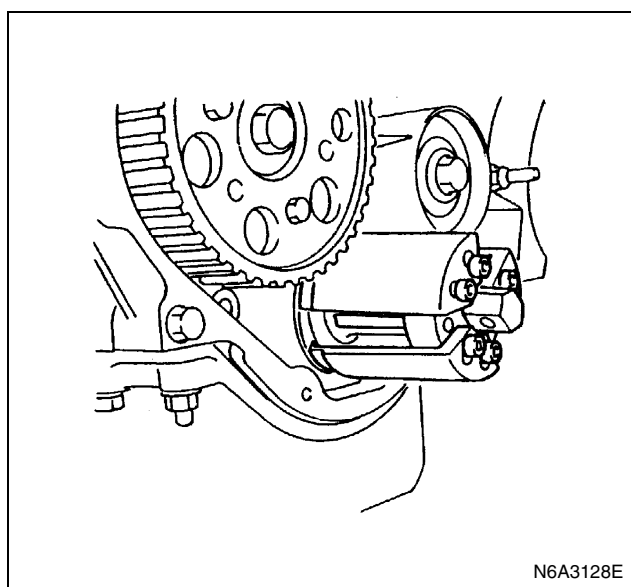
- If the connecting rod upper bearings are to be reinstalled, mark their fitting positions by tagging each bearing with the cylinder number from which it was removed.



10. Front Oil Seal (Belt Drive Model)

- With the oil seal pushed in deep, install the special tool as shown in the illustration to remove the oil seal.

Front Oil Seal Remover: 5-8840-2362-0



11. Timing Gear Housing

12. Timing Pulley Housing

13. Water Pump Assembly

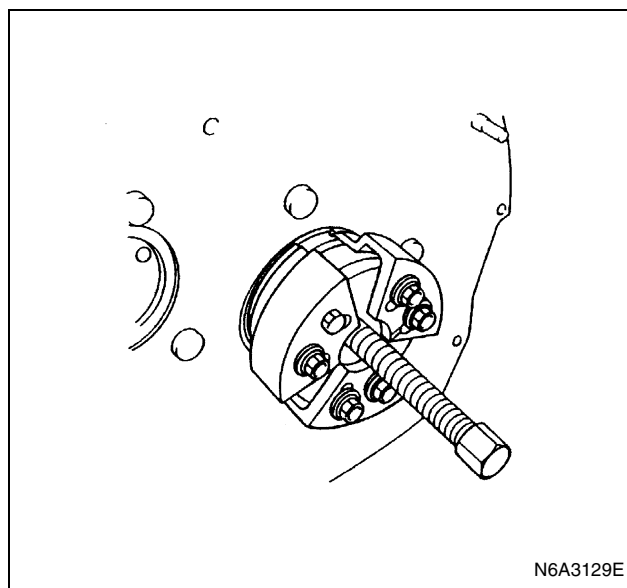
14. Flywheel and Cylinder Body Rear Plate

- Set the flywheel stopper.
- Loosen the flywheel fixing bolts then remove the flywheel.
- Remove the cylinder block rear plate.

15. Rear Oil Seal (Gear and Belt Drive Model)

- With the oil seal pushed in deep, install the special tool as shown in the illustration to remove the oil seal.

Rear Oil Seal Remover: 5-8840-2360-0

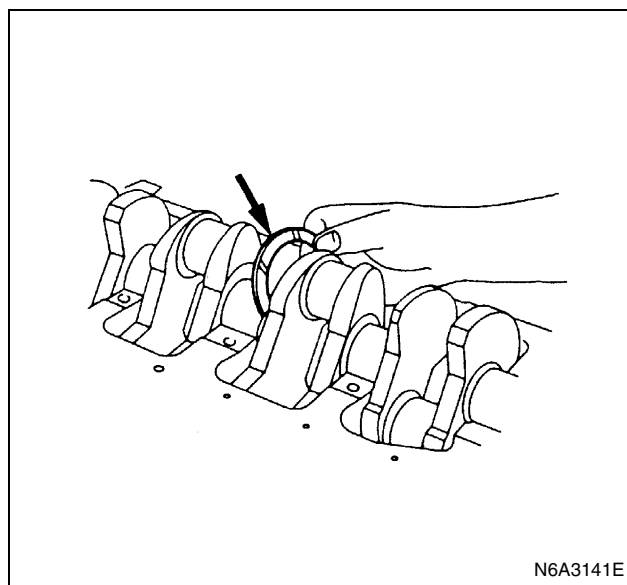


Notice:

Take care not to damage sealing surface of front plate and crankshaft when removing oil seal.

16. Crankshaft and Main Bearing

- 1) Remove the main bearing caps and thrust washer.



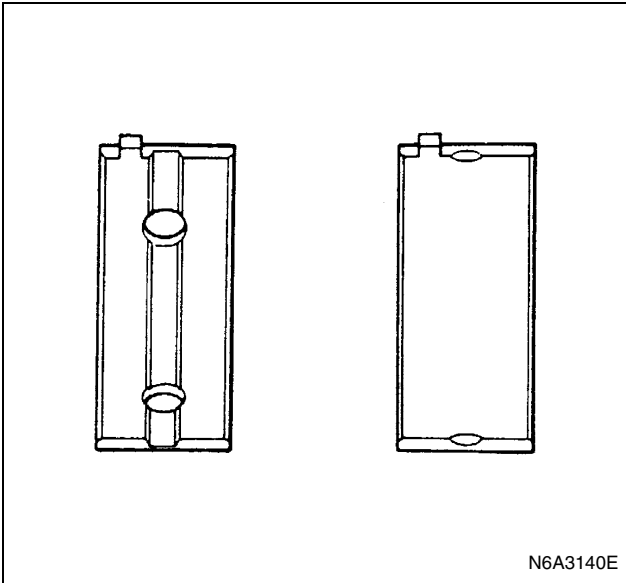
- 2) Remove the crankshaft with care.

- 3) Remove the crankshaft upper bearing.

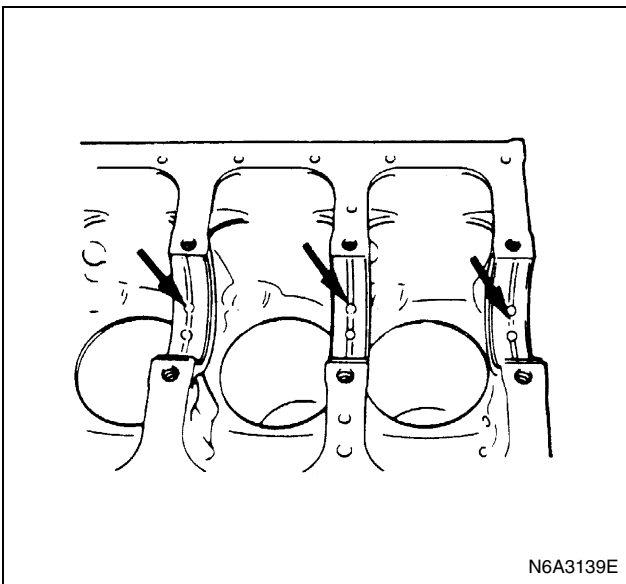
Installation

1. Crankshaft and Main Bearings

- The crankshaft upper bearings have an oil hole and an oil groove. The lower bearings do not.



- Install main bearings in the cylinder body and main bearing cap respectively.
- Apply new engine oil to upper and lower main bearings.
- Make sure that main bearing are in correct position.
- Carefully wipe any foreign material from the upper bearing.
- Install the main bearings to the cylinder body and the main bearing caps.

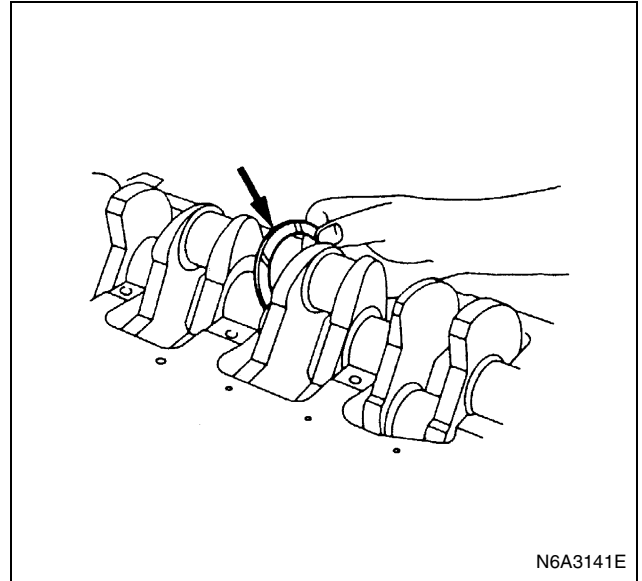


Notice:

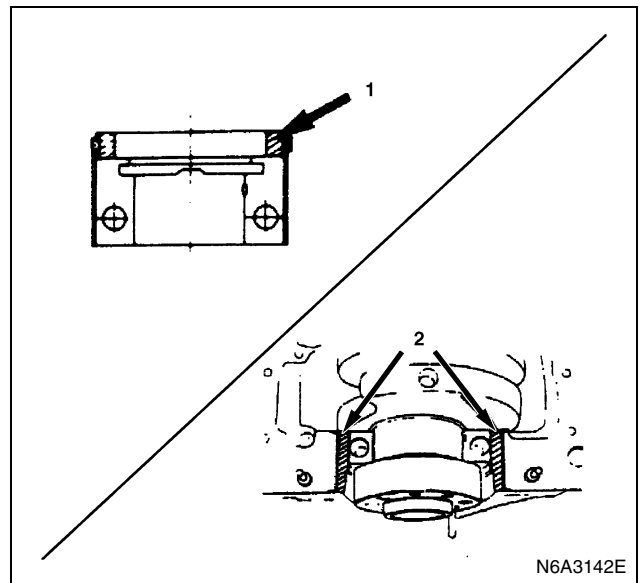
Do not apply engine oil to the bearing back faces and the cylinder body bearing fitting surfaces.

- Be sure that they are positioned correctly.
- Apply new engine oil to the upper and lower main bearing faces.
- Carefully mount the crankshaft.
- Apply engine oil to the thrust washer.

- Install thrust washer on No.3 journal. Oil grooves in thrust washer must face the crankshaft.



- Apply the recommended liquid gasket or its equivalent to the No.5 crankshaft bearing cap cylinder body fitting surfaces at points and shown in the illustration.



Notice:

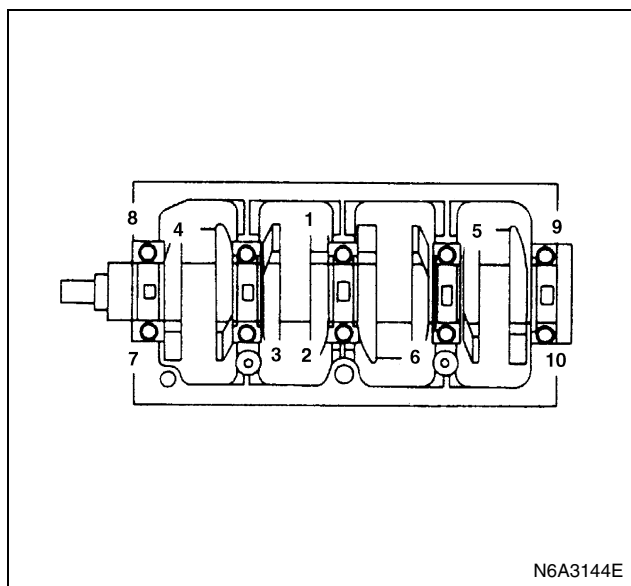
Be sure that the bearing cap fitting surface is completely free of oil before applying the liquid gasket.

Do not allow the liquid gasket to obstruct the cylinder thread holes and bearings.

- Install the bearing caps with the bearing cap head arrow mark facing the front of the engine.
- Apply engine oil to the front of the engine.
- Tighten the crankshaft bearing cap bolts to the specified torque a little at a time in the sequence shown in the illustration.

Tighten:

- 167 N·m (17.0 kg·m / 123 lb·ft)

**Notice:**

Check to see that the crankshaft turns smoothly by rotating it manually.

2. Crankshaft Rear Oil Seal

Use the oil seal installer to install the oil seal to the cylinder body.

Rear Oil Seal Installer: 5-8840-2361-0

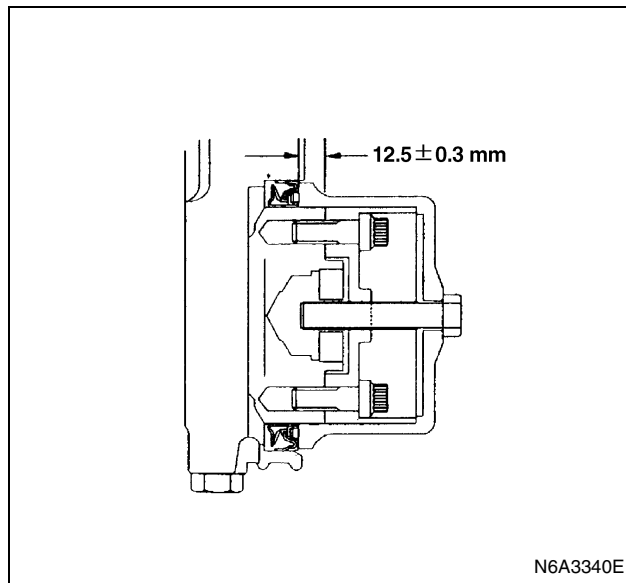
Notice:

Wipe off rust and scraps clean from the press-in portion of the oil seal.

Take note of the press-in direction of the oil seal.

- 1) Install the adapter of the special tool to the rear end of the crankshaft with two bolts.
- 2) Install the oil seal to the outer circumference of the adapter.
- 3) Insert the slave into the adapter portion, and tighten it in with the bolt (M12 × 1.75L = 70) until the adapter section hits the slave.
- 4) Remove the adapter and the slave.
- 5) After installing the oil seal, check the measurement of the oil seal.

Standard	mm (in)
12.2 — 12.8 (0.48 — 0.50)	

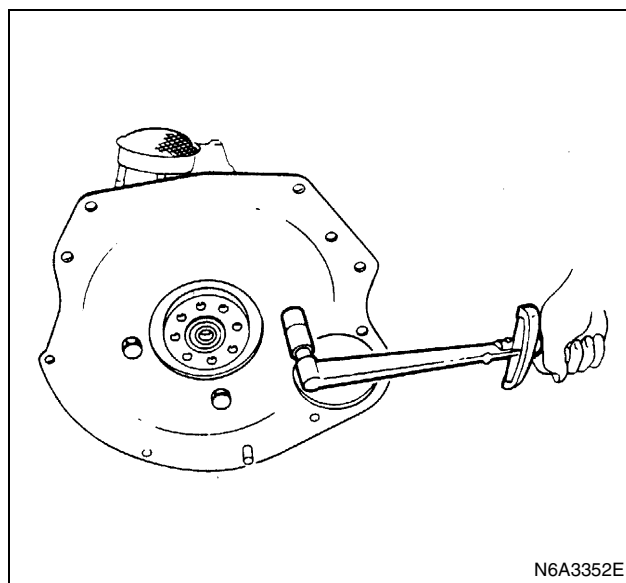


3. Flywheel and Cylinder Body Rear Plate

- Align the rear plate with the cylinder body knock pins.
- Tighten the rear plate to the specified torque.

Tighten:

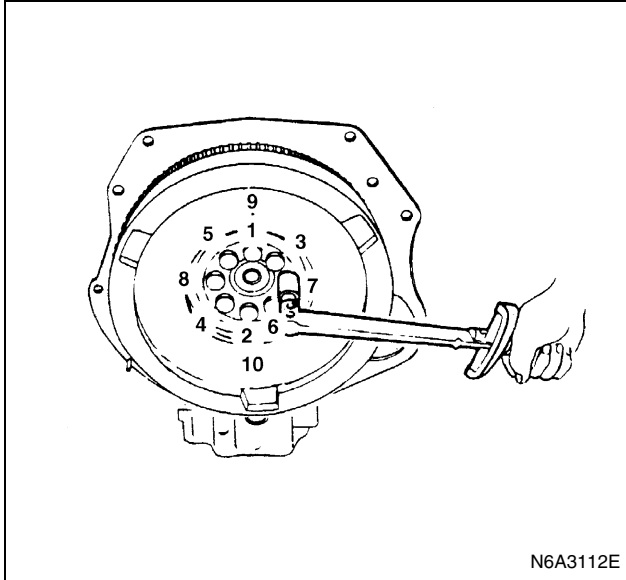
- Rear plate bolts to 82 N·m (8.4 kg·m / 61 lb·ft)



- Block the crankshaft with a piece of hard wood to prevent the flywheel from turning.
- Apply a coat of engine oil to the threads of the flywheel bolts.
- Align the flywheel with the crankshaft dowel pin.
- Tighten the flywheel bolts to the specified torque in two steps using the Angular Tightening Method.
- Follow the numerical order shown in the illustration.

Tighten:

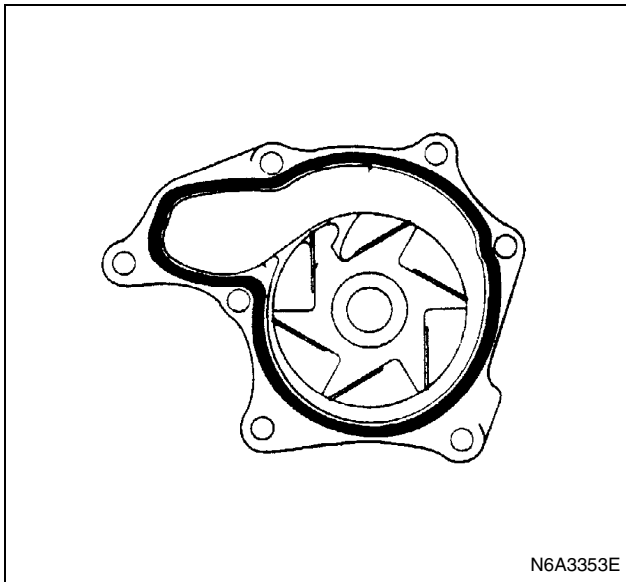
- Flywheel bolt to
 - 1st step: 59 N·m (6.0 kg·m / 43 lb·ft)
 - 2nd step: 60° — 90°

**4. Water Pump Assembly**

- Fit the O-ring to the water pump body.
- Remove the water pump assembly and tighten bolts to the specified torque.

Tighten:

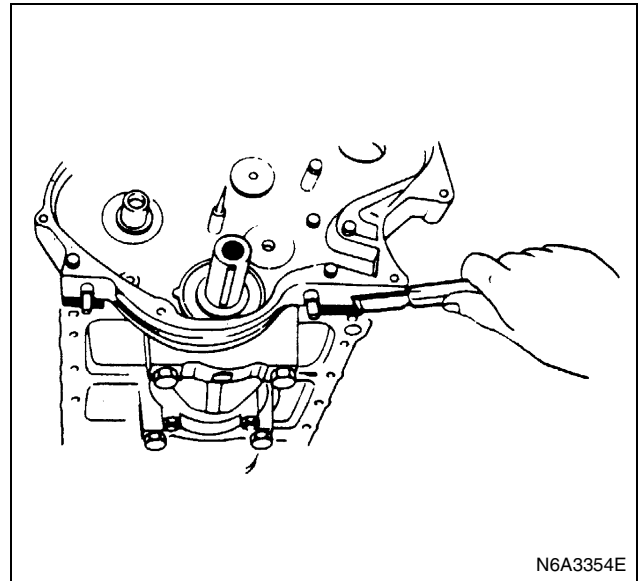
- Water pump bolts to 20 N·m (2.0 kg·m / 14 lb·ft)

**5. Timing Pulley Housing**

- Install the timing pulley housing the cylinder body. Take care not to twist the front oil seal.
- Tighten the timing pulley housing together with the timing pulley housing gasket to the specified torque.

Tighten:

- Timing pulley housing bolt to 19 N·m (1.9 kg·m / 14 lb·ft)



- Cut away the flash from the gasket.
- 6. Timing Gear Housing
 - Install the timing gear housing the cylinder body.
 - Tighten the timing gear housing together with the timing gear housing gasket to the specified torque.

Tighten:

- Timing gear housing bolt to 19 N·m (1.9 kg·m / 14 lb·ft)
 - Cut away the flash from the gasket.
- 7. Front Oil Seal (Belt Drive Model)
 - Install oil seal using special tool.
 - Front Oil Seal Installer: 5-8840-2361-0

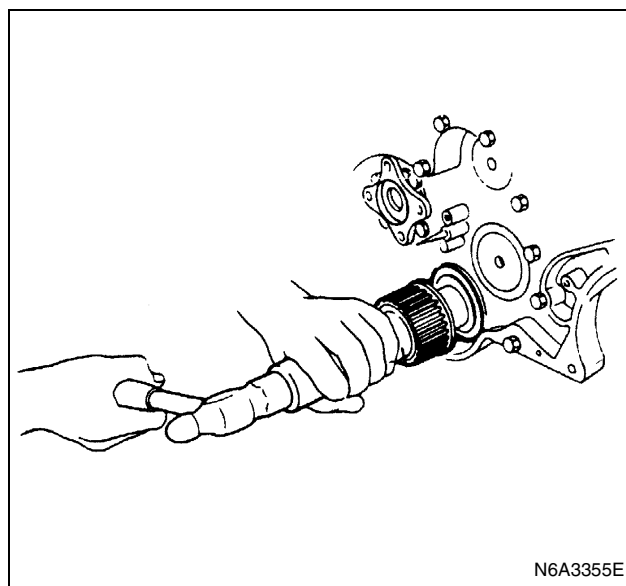
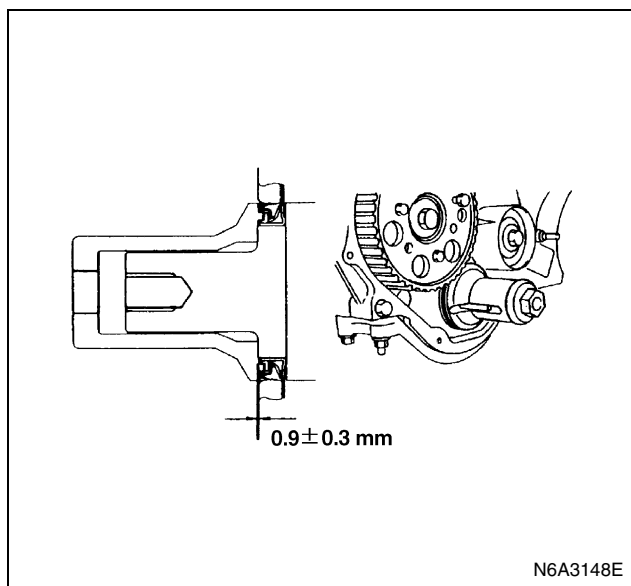
Notice:

Wipe off rust and scraps clean from the press-in portion of the oil seal.

Take note of the press-in direction of the oil seal.

- With the oil seal attached to the sleeve, put it in the front end of the crankshaft.
- With the edge of the oil seal attached securely to the crankshaft, tighten it with the center bolt until the sleeve hits securely against the reference plane at the front end of the crankshaft.
- Remove the sleeve.
- After pressing in the oil seal, check the measurement of the oil seal.

Standard	mm (in)
	0.6 — 1.2 (0.024 — 0.047)



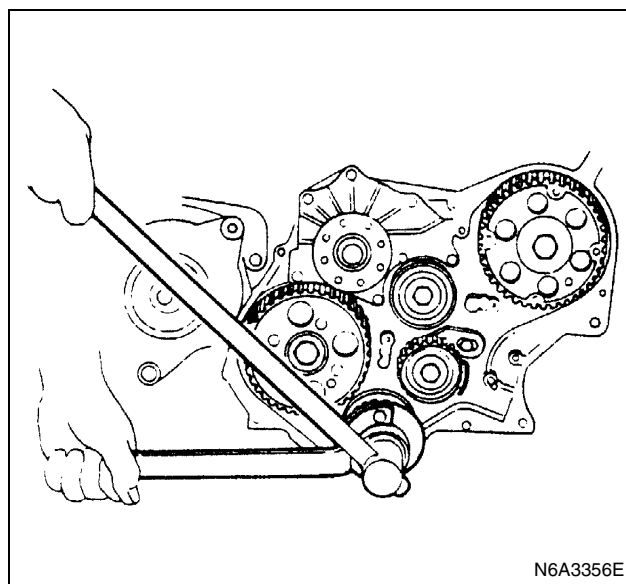
8. Piston and Connecting Rod Assembly
9. Piston Cooling Oil Pipe
Above works refer to "PISTON" Section in this manual.
10. Oil Pump Assembly
11. Oil Pan Assembly
Above works refer to "OIL PUMP AND OIL PAN" Section in this manual.
12. Timing Belt (Belt Drive Model)
 - 1) Camshaft timing pulley
Above works refer to "CAMSHAFT AND TAPPET" Section in this manual.
 - 2) Injection pump
 - 3) Injection pump timing pulley
Above works refer to "CYLINDER BLOCK ASSEMBLY" Section in this manual.
 - 4) Crankshaft timing pulley
 - Use the crankshaft timing pulley installer to install the timing pulley.
 - The timing pulley flange must be facing the cylinder body.

Crankshaft Timing Pulley Installer: 5-8522-0020-0

- 5) Crankshaft timing pulley center
 - Install the crankshaft pulley center.
 - Use the fixing wrench to prevent the crankshaft from turning.
Fixing Wrench: 5-8840-0161-0
 - Tighten the crankshaft pulley center bolt to the specified torque.

Tighten:

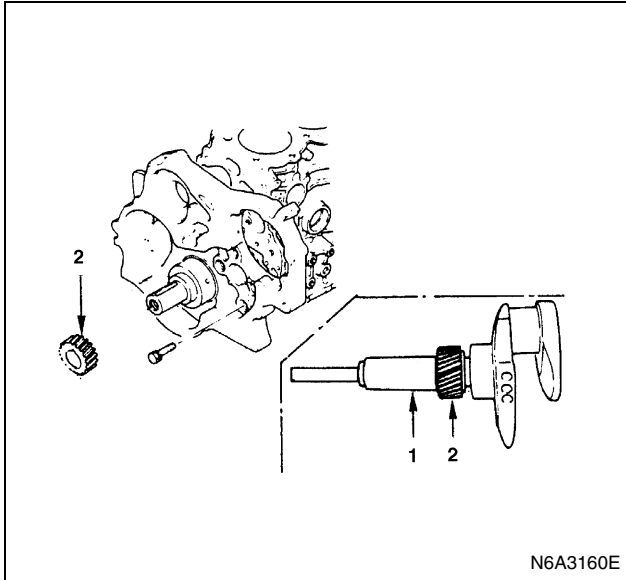
- Crankshaft pulley center bolt to 206 N·m (21 kg·m / 152 lb·ft)



- 6) Timing belt
- 7) Flange: camshaft pulley
- 8) Flange: injection pump pulley
- 9) Timing pulley lower cover
- 10) Timing pulley upper cover
- 11) Crankshaft damper pulley
- 12) Cooling fan assembly
Above works refer to "TIMING GEAR (Belt Type)" Section in this manual.

13. Timing Gear (Gear Drive Model)

- 1) Crankshaft gear
 - Install the crankshaft gear.
 - Use the crankshaft gear installer (1) to install the crankshaft gear (2).
 - The crankshaft gear timing mark ("X — X") or ("— .") must be facing outward.
- Crankshaft Gear Installer: 9-8522-0020-0



- 2) Camshaft timing gear
 - 3) Injection pump
 - 4) Idler gear "B" and shaft
 - 5) Idle gear
 - 6) Timing gear oil pipe
 - 7) Timing gear case cover
 - 8) Noise cover spacer
 - 9) Noise shield cover
 - 10) Crankshaft damper pulley
 - 11) Cooling fan assembly
- Above works refer to "TIMING GEAR (Gear Type)" Section in this manual.

14. Cylinder Head Assembly and Gasket

- 1) Cylinder head gasket
 - 2) Cylinder head assembly
 - 3) Push rod
 - 4) Rocker arm shaft assembly
- Valve Clearance Adjustment
- 5) Cylinder head cover
 - 6) By-pass hose
 - 7) Oil cooler water pipe (Oil Cooler Model)
 - 8) Oil level gauge guide tube
 - 9) Glow plug harness connector
 - 10) PCV hose
 - 11) Fuel leak off pipe
 - 12) Injection pipe

Above works refer to "CYLINDER HEAD ASSEMBLY AND GASKET" Section in this manual.

15. Engine Assembly

- 1) Support rubber
- 2) Front exhaust pipe
- 3) Vacuum pump hose
- 4) Actuator vacuum hose (Exhaust Brake Model)
- 5) Power steering pump & bracket assembly (Power Steering Model)
- 6) A/C compressor assembly (A/C Model)
- 7) Oil pressure switch harness
- 8) Fuel hose
- 9) Glow plug harness
- 10) Engine control cable
- 11) Heater hose
- 12) Intake air duct
- 13) Radiator assembly

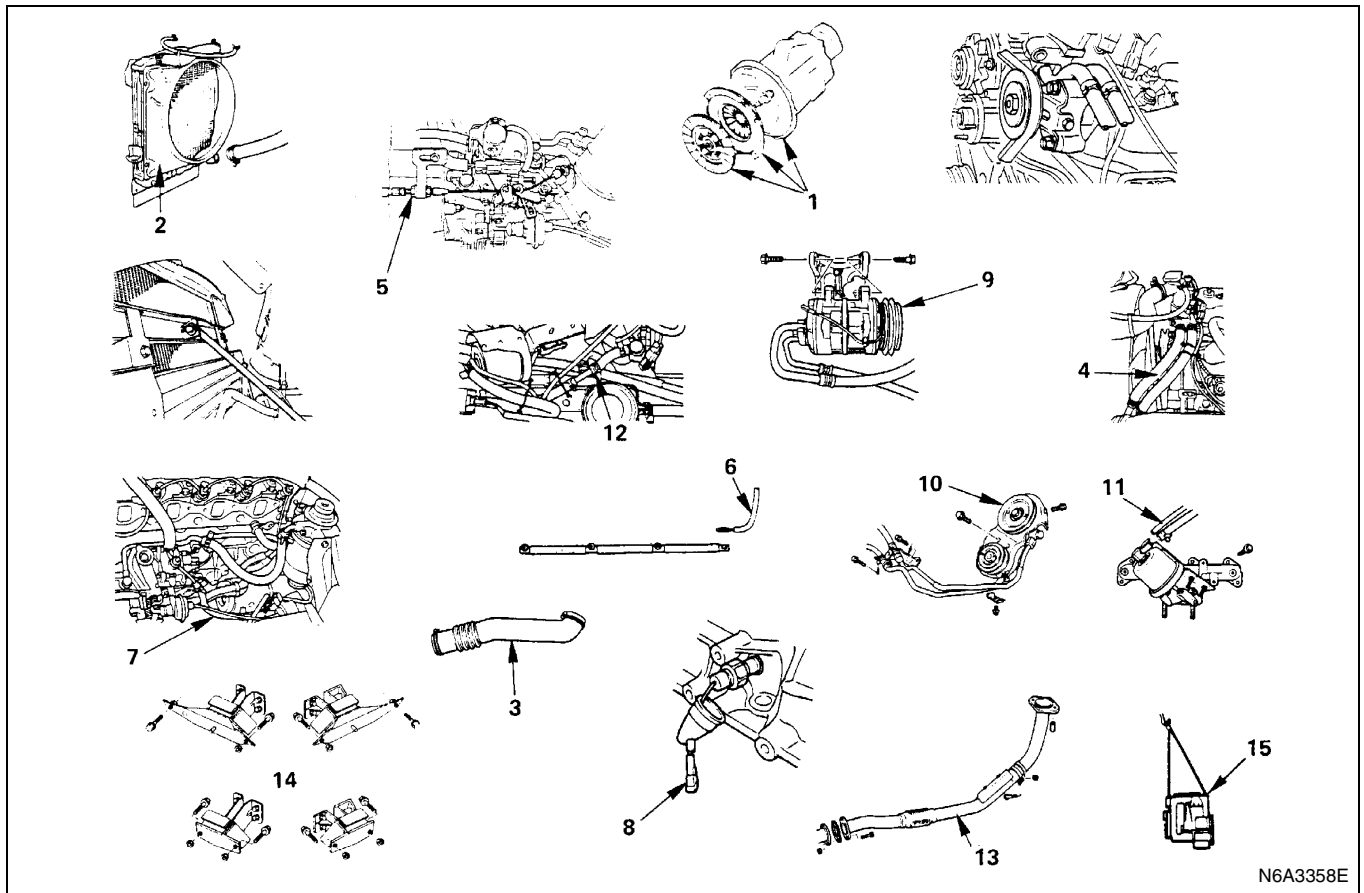
Above works refer to "ENGINE ASSEMBLY" Section in this manual.

16. Transmission and Clutch Assembly

- 1) Clutch
 - 2) Transmission
- Above works refer to "ENGINE ASSEMBLY" Section in this manual.

ENGINE ASSEMBLY

Component



N6A3358E

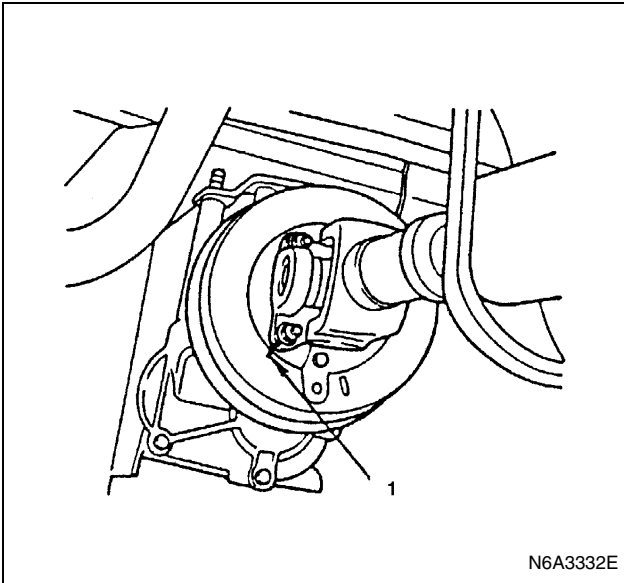
Legend

- | | |
|-------------------------------------|---|
| 1. Transmission and clutch assembly | 9. A/C Compressor assembly (A/C model) |
| 2. Radiator assembly | 10. Power steering pump & bracket assembly (Power steering model) |
| 3. Intake air duct | 11. Actuator vacuum hose (Exhaust brake model) |
| 4. Heater hose | 12. Vacuum pump hose |
| 5. Engine control cable | 13. Front exhaust pipe |
| 6. Glow plug harness | 14. Support rubber |
| 7. Fuel hose | 15. Engine assembly |
| 8. Oil pressure switch harness | |

Removal

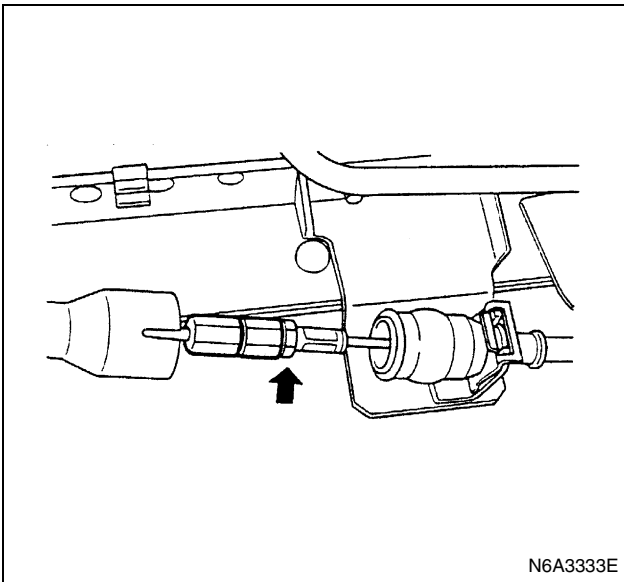
Preparation

- Disconnect battery ground cable.
 - Drain coolant.
1. Transmission and Clutch Assembly
- Raise vehicle and support with suitable safely.
- 1) Propeller Shaft
- Reference mark the flange yoke to the parking brake drum.
 - Disconnect the propeller shaft at flange yoke.
 - Put aside the propeller shaft and tie it to the frame so that it does not interface with servicing work.

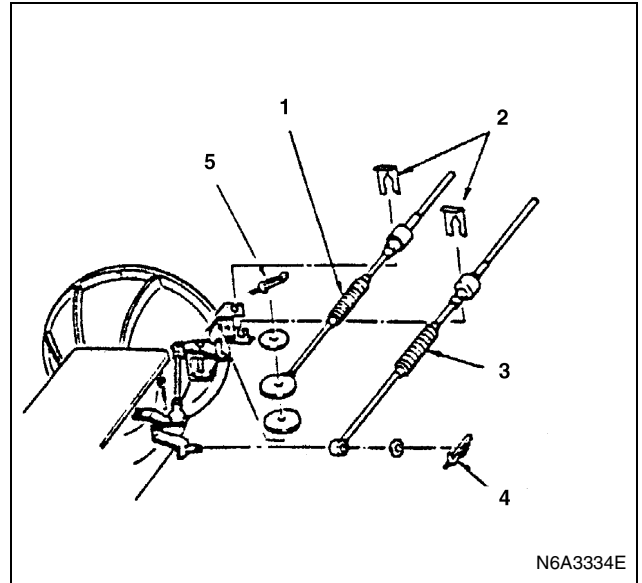


Legend

1. Reference mark
- 2) Parking Brake Cable
 - Move the joint cover.
 - Disconnect the joint bolt.
 - Remove the clip then disconnect the cable from the bracket.

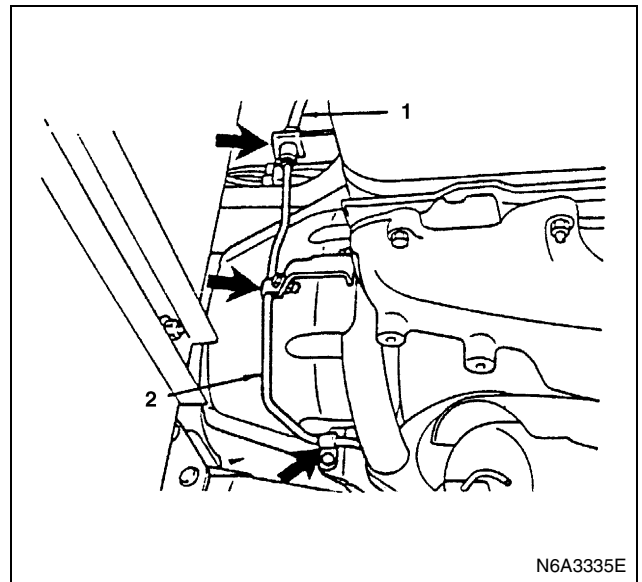


- 3) Wiring Connector
 - Disconnect the wiring connectors from the car speed sensor, the neutral switch and the back-up light switch.
- 4) Shift Cable and Select Cable
 - Disconnect the shift cable and select cable on the transmission side.



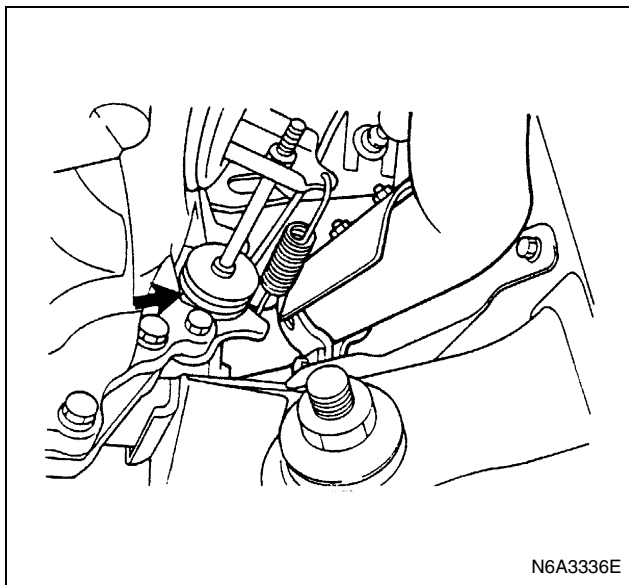
Legend

1. Shift cable
2. Clip
3. Select cable
4. Snap pin
5. Snap pin
- 5) Clutch Slave Cylinder
 - Remove the clutch pipe fixing clips and the clip bracket (Right hand drive models only).

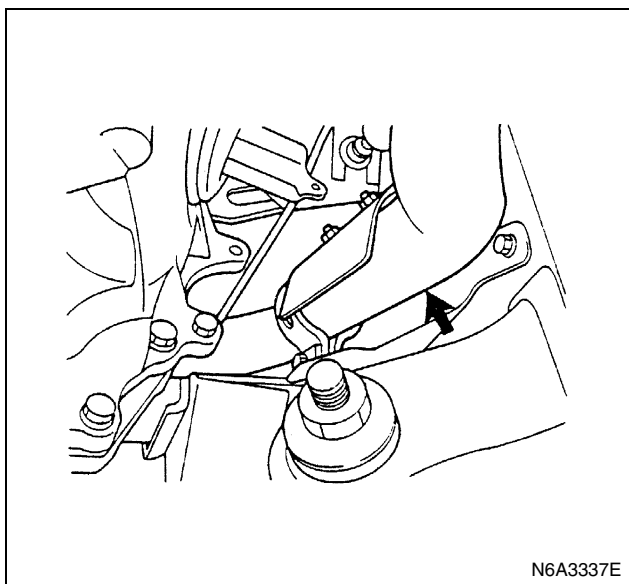


Legend

1. Flexible hose
2. Clutch pipe
- Remove the slave cylinder assembly with the flexible hose attached, and then tie it to the frame so that it does not interface with servicing work.



6) Exhaust Brake Assembly
7) Front Exhaust Pipe



8) Transmission Assembly

Notice:

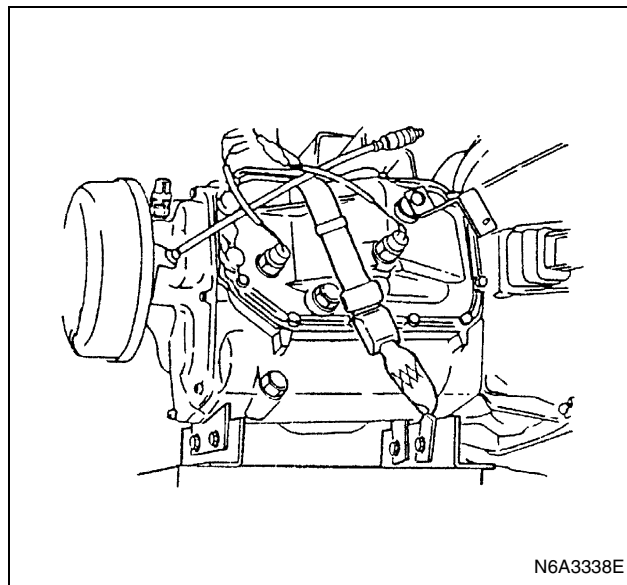
The exhaust pipe bracket, the gear control bracket and the clips are sometimes installed in the wrong position or direction confusedly. To prevent incorrect installation of these parts, put a correct installation mark on them.

- Support the transmission with mission jack.

Caution:

To prevent the falling of the transmission, tie it firmly to the jack with a chain or belt.

Do not allow transmission to hang unsupported from clutch. Damage to the clutch assembly will result.



- Remove the nuts of the transmission mounting bracket on the crossmember side.
- Engine and transmission angles may need to be adjusted for removal.
- Hold the rear section of the engine by the jack or hoist.

Caution:

When lifting the engine by the jack, use wood blocks to prevent any possible damage to the oil pan.

- Remove transmission fastening bolts.
- Pull out the transmission assembly rearward.

9) Mounting Bracket

- Raise vehicle and support with suitable safety stands.

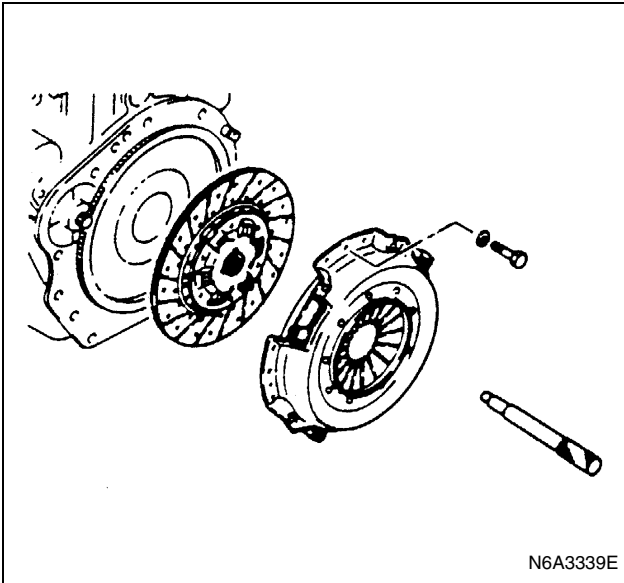
Caution:

Do not let clutch fluid remain on a painted surface, wash it off immediately.

10) Pressure Plate Assembly

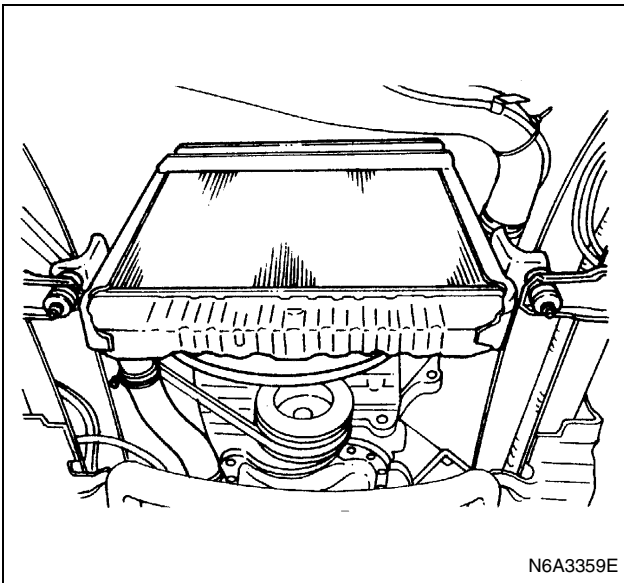
11) Driven Plate Assembly

- Use the pilot aligner to prevent the driven plate assembly from falling free.
Pilot Aligner: 5-5825-3001-0
- Mark the flywheel and pressure plate lug for alignment when installing.
- Loosen the pressure plate assembly fixing bolts.



2. Radiator Assembly

- 1) Remove the radiator hose upper and lower.
- 2) Remove the reservoir tank hose.
- 3) Remove the cushion rubbers on both sides.
- 4) Remove the radiator stay.

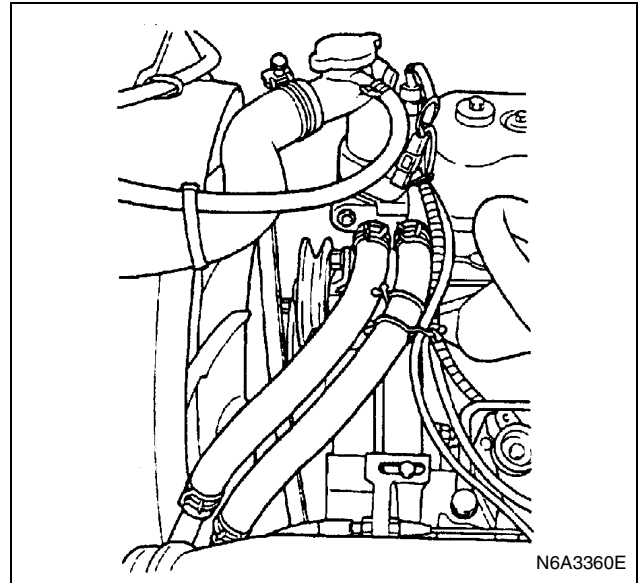


3. Intake Air Duct

4. Heater Hose

5. Engine Control Cable

- Loosen the locking nut at the bracket and disconnect accelerator cable from injection pump control lever.



6. Glow Plug Harness

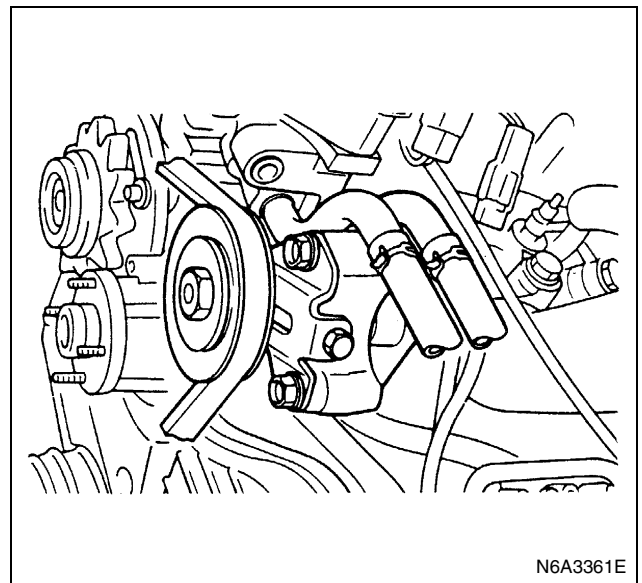
7. Fuel Hose

- Remove the fuel inlet hose and fuel return hose.

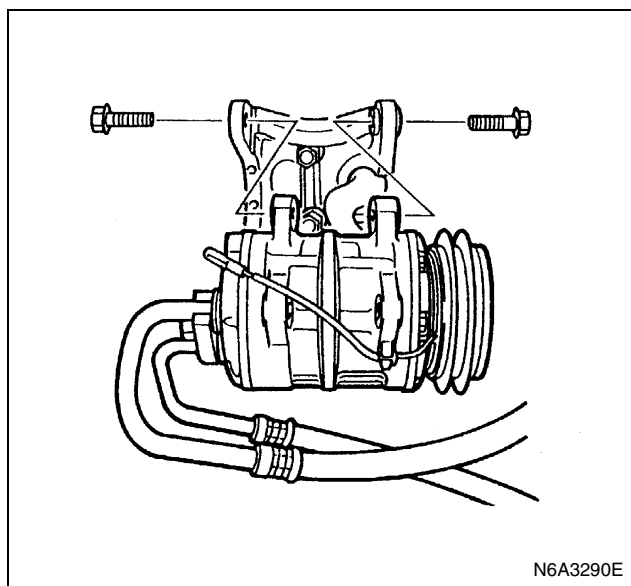
8. Oil Pressure Switch Harness

9. A/C Compressor Assembly

- Loosen the idler pulley lock nut.
- Loosen the adjust bolt then remove the drive belt.

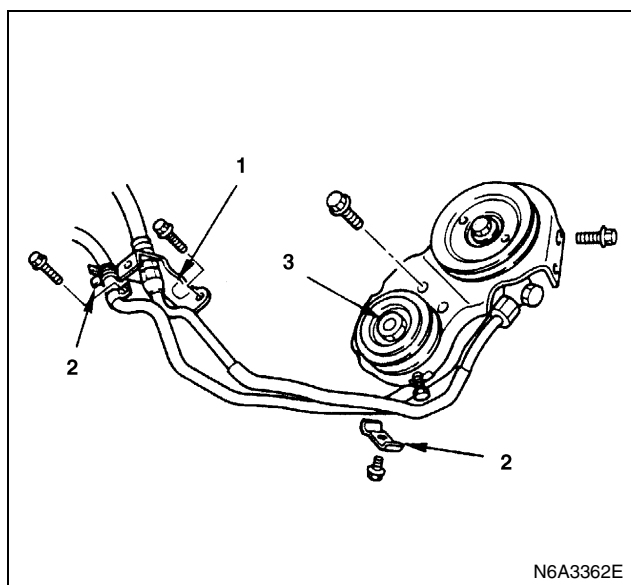


- Disconnect magnetic clutch harness connector.
- Remove the A/C compressor fixing bolts and temporarily tighten the A/C compressor to chassis frame side use the wire.



10. Power Steering Pump & Bracket Assembly (Power Steering Model)

- 1) Loosen the idler pulley lock nut.
- 2) Loosen the adjust bolt then remove the drive belt.
- 3) Remove the pipe bracket fixing bolt and clip.
- 4) Remove the power steering pump fixing bolts pump to chassis frame side use the wire.

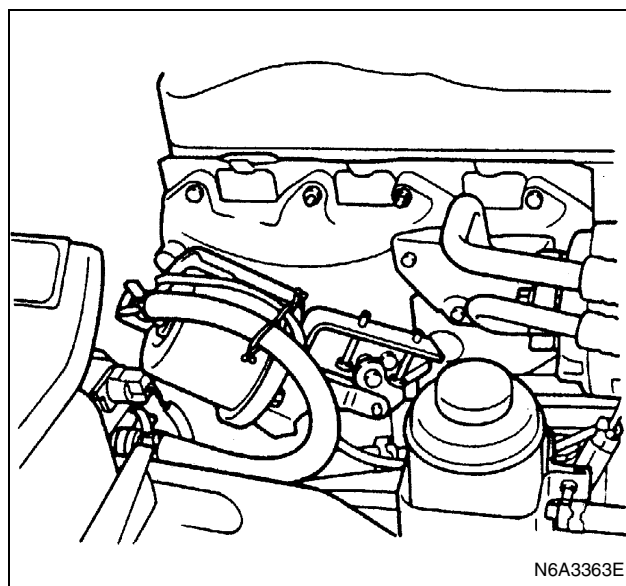


Legend

1. Bracket
2. Clip
3. Lock nut

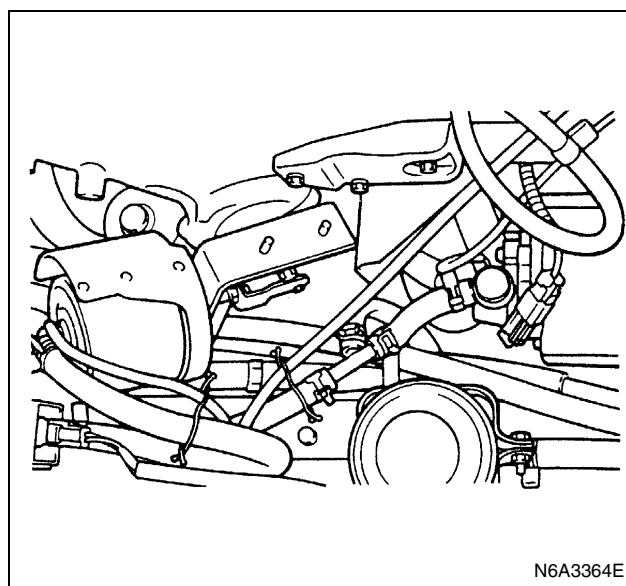
11. Actuator Vacuum Hose (Exhaust Brake Model)

- Disconnect the vacuum hose from actuator side.



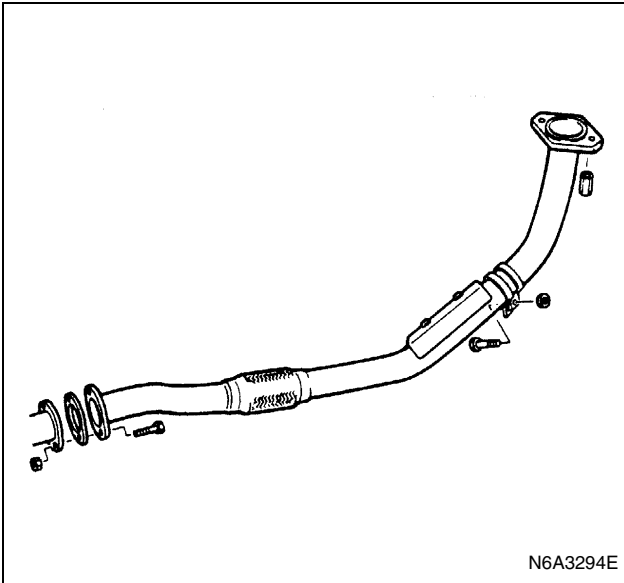
12. Vacuum Pump Hose (Exhaust Brake Model)

- Disconnect the vacuum hose from vacuum tank side and magnetic valve side.



13. Front Exhaust Pipe

- Remove the exhaust pipe fixing bolts from exhaust manifold.
- Remove the exhaust pipe stay bolt.
- Remove the fixing nuts from front pipe.



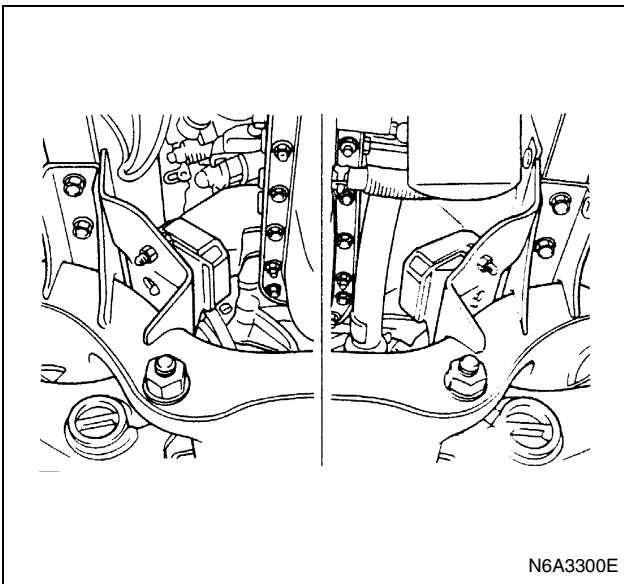
14. Support Rubber

1) Right Hand

- Remove two fixing nuts at the cross member side.

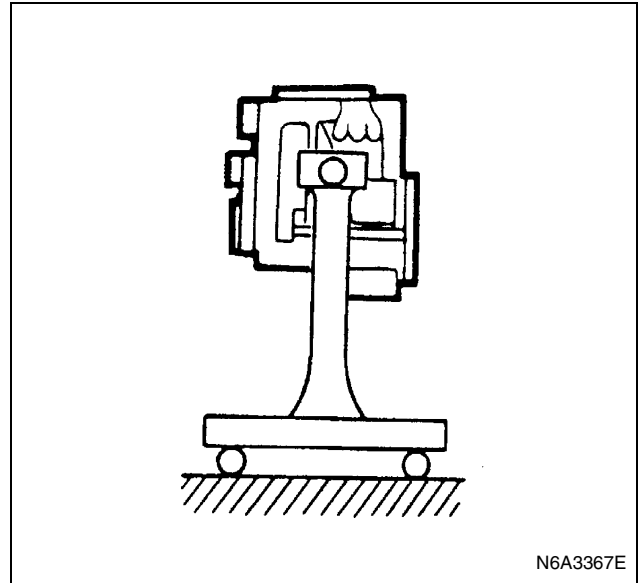
2) Left Hand

- Remove two fixing nuts at the cross member side.



15. Engine Assembly

- 1) Lift engine carefully by using hoist.



- 2) Lift front part of engine higher than rear part of it.

- 3) Take out engine assembly taking care not to damage full pipes, brake pipes and so on.

Installation

1. Engine Assembly

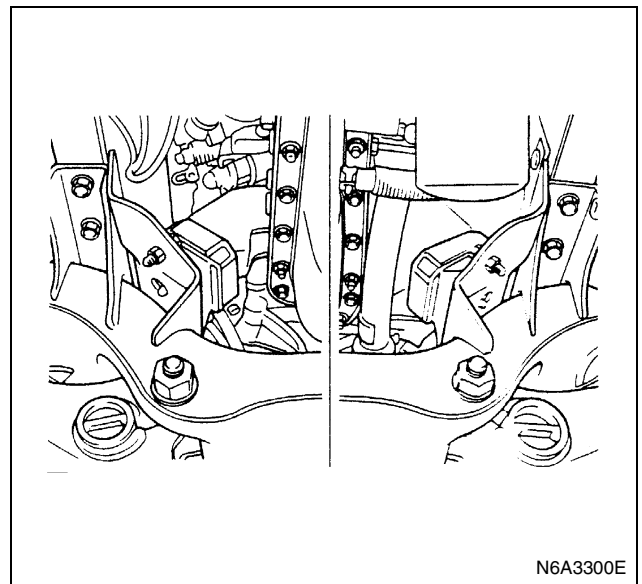
- Position engine mountings by using hoist.

2. Support Rubber

- After all fixing bolts (left: two bolts, right: two bolts) were inserted to every holes, and engine asm and tighten fixing bolts to the specified torque.

Tighten:

- 40 N·m (4.1 kg·m / 30 lb·ft)



3. Front Exhaust Pipe

- Connect the exhaust pipe and tighten nut to the specified torque.

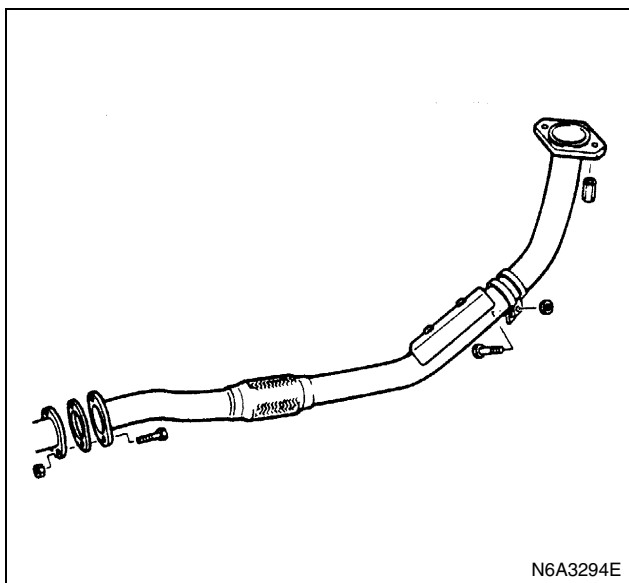
Tighten:

- Exhaust pipe nut to 69 N·m (7.0 kg·m / 51 lb·ft)

- Install the exhaust pipe stay and tighten bolt nut to the specified torque.

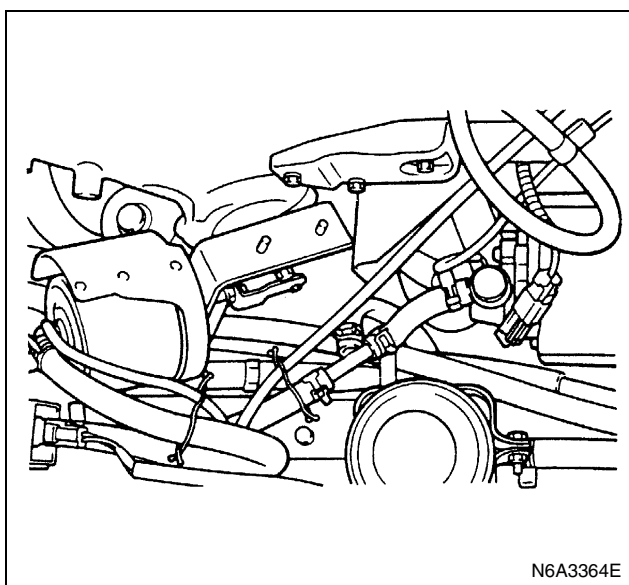
Tighten:

- Stay bolt nut to 40 N·m (4.1 kg·m / 30 lb·ft)



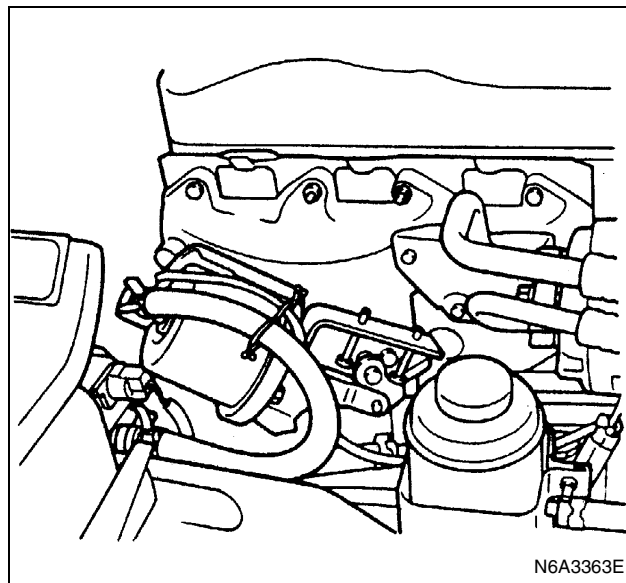
4. Vacuum Pump Hose (Exhaust Brake Model)

- Connect the vacuum hose to vacuum tank side and magnetic valve side.



5. Actuator Vacuum Hose (Exhaust Brake Model)

- Connect the vacuum hose to actuator.

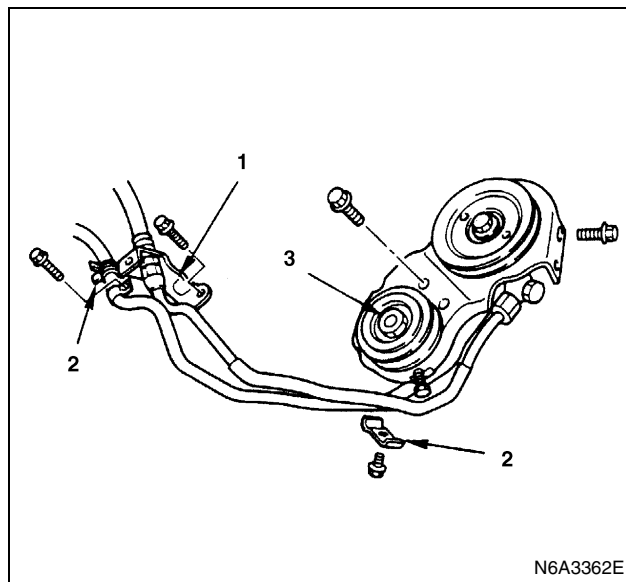


6. Power Steering Pump & Bracket Assembly (Power Steering Model)

- Install the power steering pump and pipe bracket then tighten bolts to the specified torque.

Tighten:

- Pump bolts to 19 N·m (1.9 kg·m / 14 lb·ft)
- Pipe bracket bolts to 19 N·m (1.9 kg·m / 14 lb·ft)
- Clip bolt to 10 N·m (1.0 kg·m / 87 lb·in)



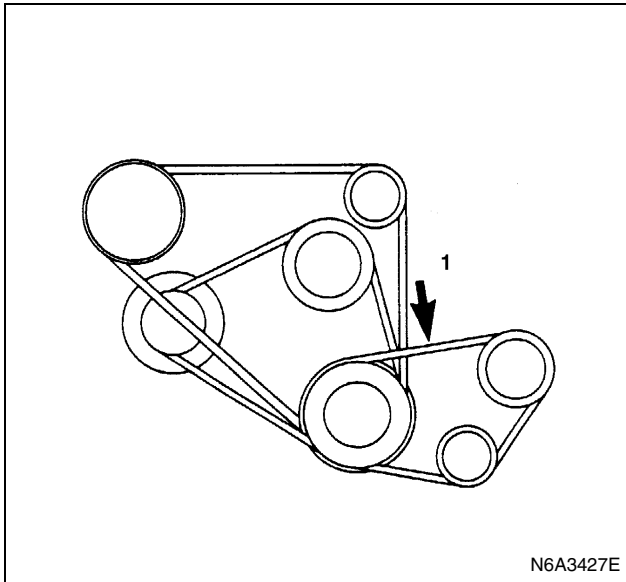
Legend

1. Bracket
2. Clip
3. Lock nut

- Install Power Steering pump drive belt (1) and adjust belt tension.
Check drive belts for wear or damage, and replace with new ones as necessary.
Check belts for tension, and adjust as necessary.

- Push the middle of belts with a force of 10 kg and check each bolt for deflection.
- Standard deflection

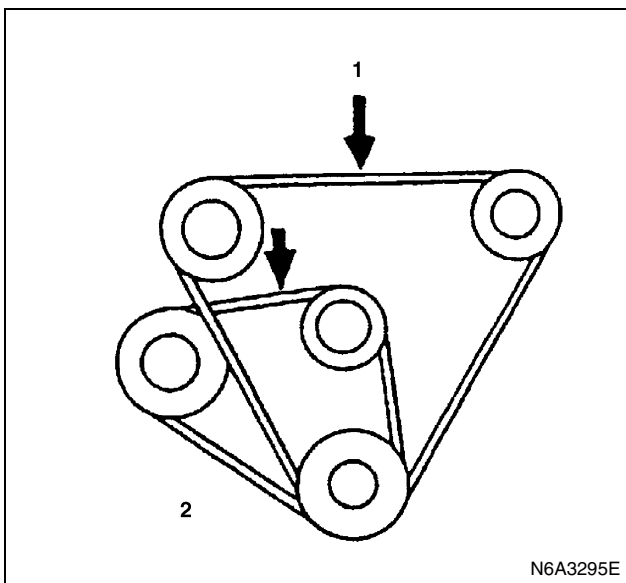
mm (in)	
	Initial tension
P/S pump drive belt	8 — 12 (0.31 — 0.47)

4JG2

- P/S pump lock bolt loose, adjust belt tension with adjust belt.

Tighten:

- Idler lock nut to 27 N·m (2.8 kg·m / 20 lb·ft)

4JB1**Legend**

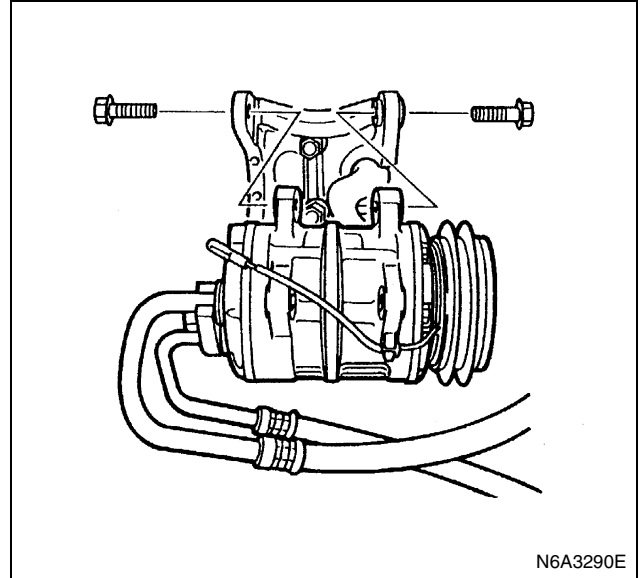
1. A/C compressor drive belt & P/S pump drive belt
2. AC generator & fan pulley drive belt

7. A/C Compressor Assembly (A/C Model)

- Install the A/C compressor fixing bolts and tighten bolts to the specified torque.

Tighten:

- Compressor fixing bolts to 37 N·m (3.8 kg·m / 27 lb·ft)

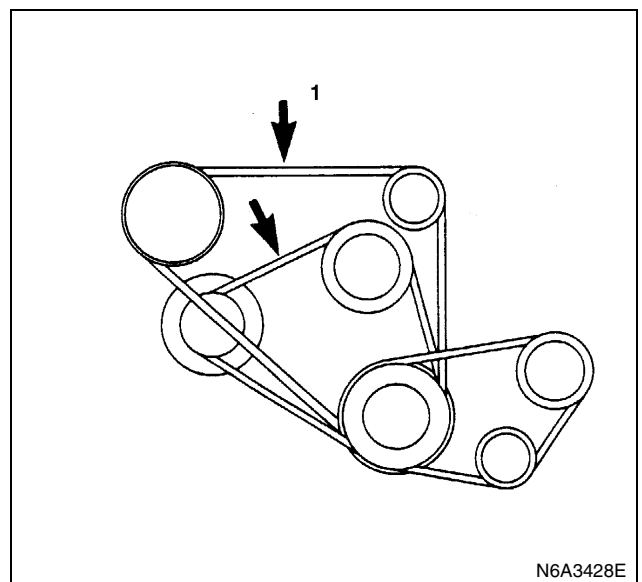


- Connect the magnetic clutch harness connector.
- Install A/C compressor drive belt (1) and adjust belt tension.

Check drive belts for wear or damage, and replace with new ones as necessary. Check belts for tension, and adjust as necessary.

- Push the middle of belts with a force of 10kg and check each bolt for deflection.
- Standard deflection

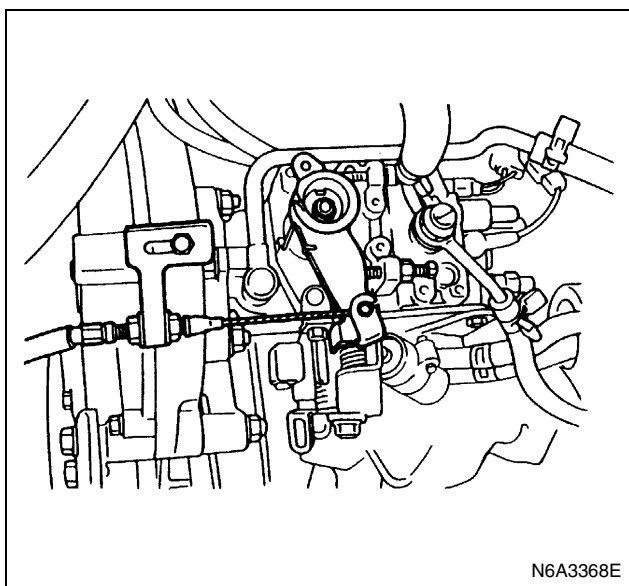
mm (in)	
	Initial tension
A/C compressor drive belt	8 — 12 (0.31 — 0.47)

4JG2

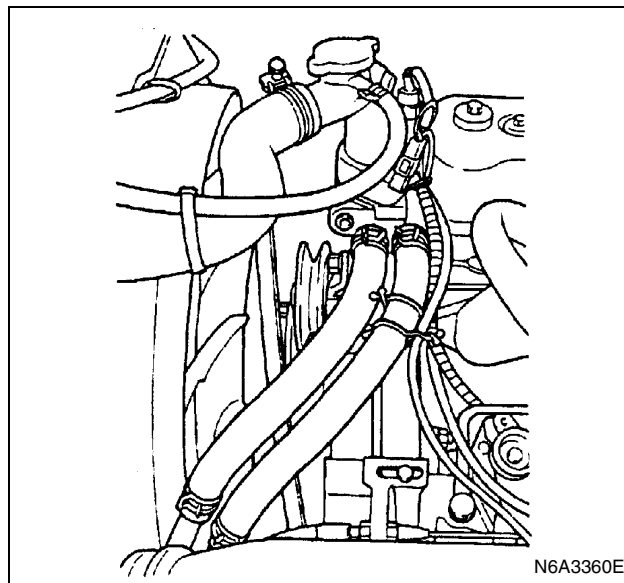
- A/C compressor pulley lock bolt loose, adjust belt tension with adjuster's adjust bolt.

Tighten:

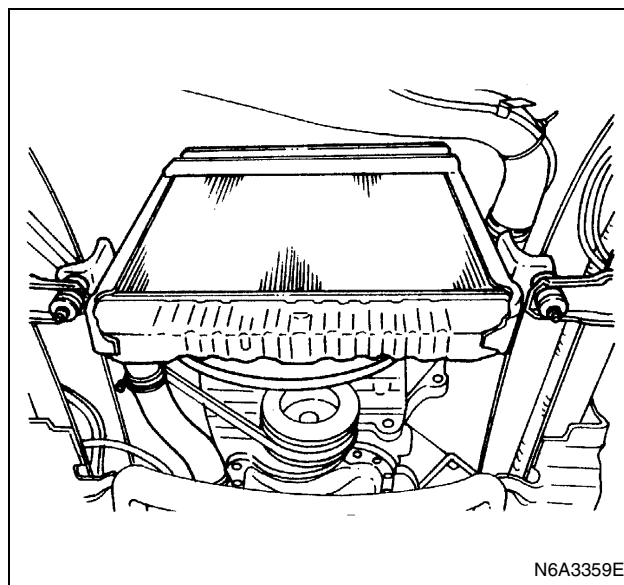
- Idler lock nut to 27 N·m (2.8 kg·m / 20 lb·ft)
- Oil Pressure Switch Harness
 - Connect the oil pressure switch harness connector.
 - Fuel Hose
 - Connect the fuel feed hose and return hose then tighten clip securely.
 - Glow Plug Harness
 - Install the harness connector then tighten bolt securely.
 - Engine Control Cable
 - 1) Install the control wire to the engine control lever.
 - 2) Hold accelerator lever in the fully closed position and stretch the control cable in the direction indicated by the arrow to remove any slack.
 - 3) Tighten the accelerator cable bracket bolt.



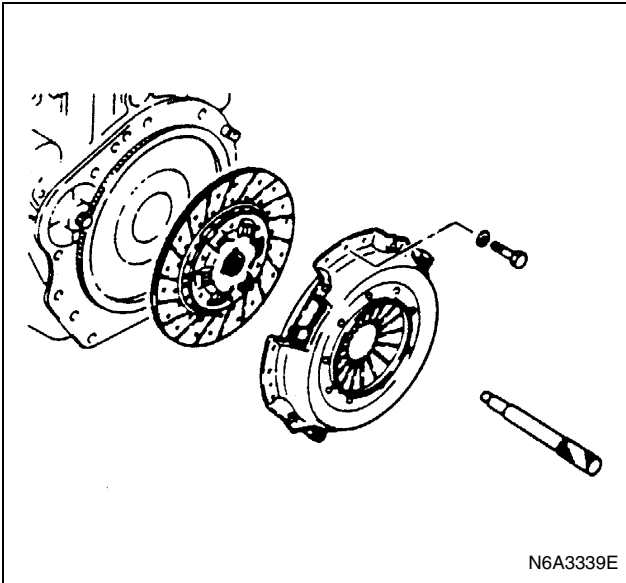
- Heater Hose
 - Connect the heater hose then tighten clip securely.
- Intake Air Duct
 - Connect the air duct then tighten clip securely.



- Radiator Assembly
 - 1) Install the cushion rubber on both sides.
 - 2) Install the radiator stay
 - 3) Connect the radiator hose upper and lower.
 - 4) Connect the reservoir tank hose.



- Transmission and Clutch Assembly
 - 1) Driven Plate Assembly
 - Apply multi-purpose with MOS2 type grease to the driven plate hub spline.
 - Use the pilot aligner to install the driven plate assembly.
- Pilot Aligner: 5-5825-3001-0

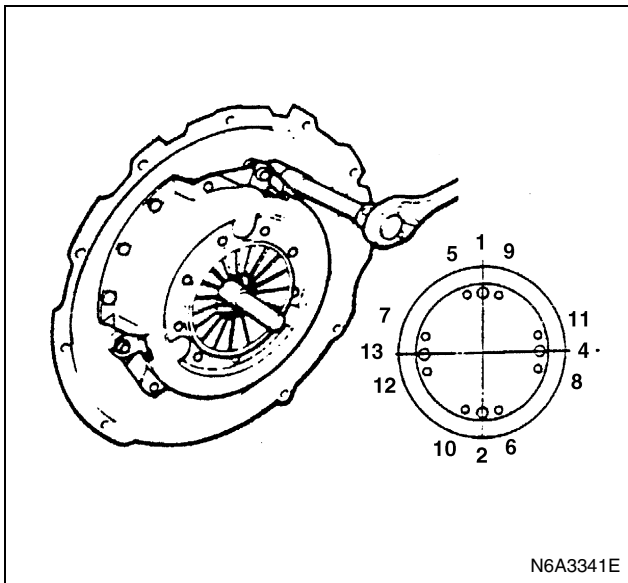


2) Pressure Plate Assembly

- Tighten pressure plate assembly fixing bolts in numerical order.

Tighten:

- Pressure plate fixing bolt to 18 N·m (1.8 kg·m / 13 lb·ft)



- Remove the pilot aligner.

Notice:

In case a new pressure plate assembly is mounted, after tightening a pressure plate at the specified torque, be sure to remove the wiring for protection of a diaphragm spring.

3) Mounting Bracket

Tighten:

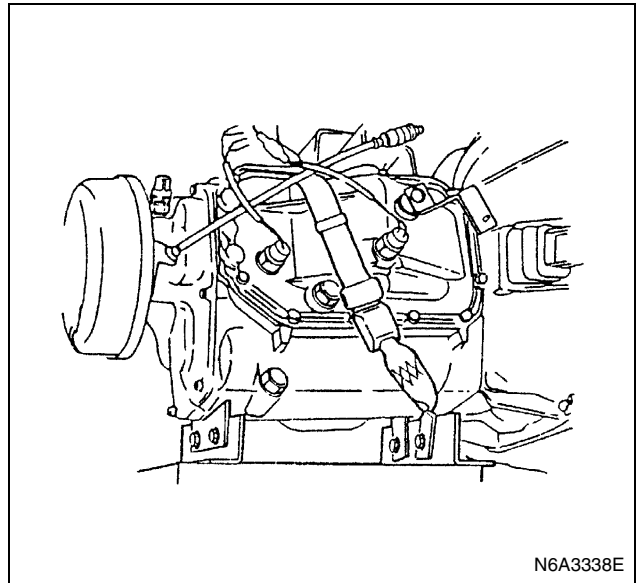
- Mounting bracket nuts to 69 N·m (7.0 kg·m / 51 lb·ft)

4) Transmission Assembly

- Support the transmission with mission jack.

Caution:

To prevent the falling of the transmission, tie it securely to the jack with a chain or belt.



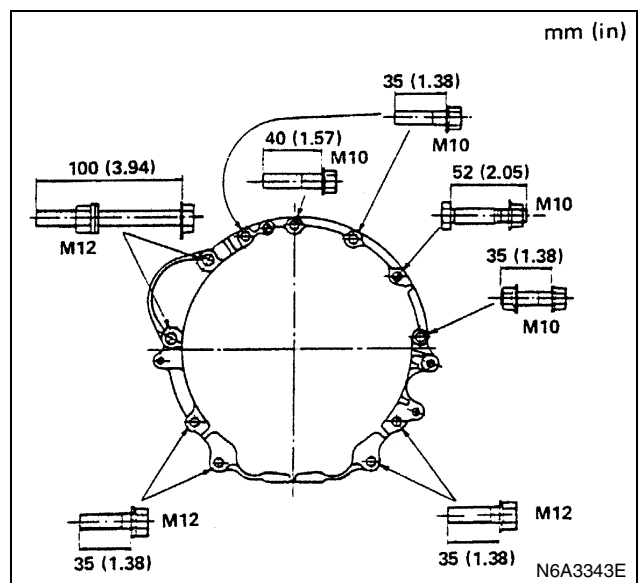
- Shift transmission into high gear.
- Align transmission with engine slope.
- Turn output parking brake drum to aid clutch spring engagement.

Tighten:

- Clutch housing to flywheel housing bolts to
M10: 46 N·m (4.7 kg·m / 34 lb·ft)
M12: 91 N·m (9.3 kg·m / 67 lb·ft)
- Raise engine and transmission up into rear transmission mount.

Tighten:

- Engine rear mounting nuts to
M10: 40 N·m (4.1 kg·m / 30 lb·ft)
M12: 69 N·m (7.0 kg·m / 51 lb·ft)



5) Front Exhaust Pipe

Tighten:

- Front exhaust pipe bolts to 37 N·m (3.8 kg·m / 27 lb·ft)
6) Exhaust Brake Assembly

Tighten:

- Exhaust brake bolts to 17 N·m (1.8 kg·m / 12 lb·ft)
7) Clutch Slave Cylinder

Tighten:

- Slave cylinder bolts to 19 N·m (1.9 kg·m / 14 lb·ft)
 - Perform slave cylinder adjustment before installation of the return spring.
 - a. Loosen the lock nut of the push rod.
 - b. Turn the adjust nut until it reaches the shift fork.
 - c. Back off the adjust nut 1.5 turns. (shift fork free play Approximately 2 mm / 0.1 in).
 - d. Tighten the lock nut.

Tighten:

- Push rod lock nut to 16 N·m (1.6 kg·m / 12 lb·ft)
 - 8) Shift Cable and Select Cable
 - 9) Wiring Connector
 - Color of Connector
 - Back-up Light Switch: Brown
 - Neutral Switch: Gray
 - 10) Parking Brake Cable
 - 11) Propeller Shaft
 - Line up reference mark.

Tighten:

- Propeller shaft nuts to 66 N·m (6.7 kg·m / 48 lb·ft)
 - Connect battery ground cable
 - Pour coolant
 - Start the engine and check coolant leakage