ISUZU

2008-2014MY N-SERIES

WORKSHOP MANUAL

ENGINE

(4HG1 model)

Troubleshooting

Hard Starting

1. Starter Inoperative

Checkpoint	Possible cause	Correction
Battery	Loose battery cable terminal Poor connections due to rusting	Clean and/or retighten the battery cable terminal
	Battery discharged or weak	Recharge or replace the battery
	Fan belt loose or broken	Adjust or replace the fan belt
Fusible link	Fusible link shorted	Replace the fusible link
Starter switch	Defective starter switch or starter relay	Replace the starter switch or the starter relay
Starter motor	Defective magnetic switch or starter relay	Repair or replace the magnetic switch
	Defective starter motor	Repair or replace the starter motor

2. Starter Motor Operates But Engine Does Not Turn Over

Checkpoint	Possible cause	Correction
Battery	Loose battery cable terminal Poor connections due to rusting	Clean and/or retighten the battery cable terminal
	Battery discharged or weak	Recharge or replace the battery
	Fan belt loose or broken	Adjust or replace the fan belt
Starter motor	Defective pinion gear	Replace the pinion gear
	Defective magnetic switch	Repair or replace the magnetic switch
	Brush wear, Weak brush spring	Replace the brush and/or the brush spring
Engine	Piston, crank bearing seizure, or other damage	Repair or replace the related parts

3. Engine Turns Over But Does Not Start

Checkpoint	Possible cause	Correction
Engine stop mechanism	Defective fuel cut solenoid valve	Replace the fuel cut solenoid valve

Fuel is Not Being Delivered to The Injection Pump

Fuel	Fuel tank is empty	Fill the fuel tank
Fuel piping	Clogged or damaged fuel lines Loose fuel line connection	Repair or replace the fuel lines Retighten the fuel line connection
Fuel filter	Fuel filter overflow valve does not close	Repair or replace the fuel filter overflow valve
	Clogged fuel filter element	Replace the fuel filter element or the filter cartridge
Fuel system	Air in the fuel system	Bleed the air from the fuel system
Fuel feed pump	Defective feed pump	Repair or replace the feed pump

Fuel is Being Delivered to The Injection Pump

Fuel	Use of the wrong fuel	Use the correct fuel
	Water particles in the fuel	Charge the fuel
Fuel system	Air in the injection pump	Bleed the air from the fuel system

Abnormal Engine Noise

1. Engine Knocking
   Check to see that the engine has been thoroughly warmed up before beginning the troubleshooting procedure.

Check point	Possible cause	Correction
Fuel	Fuel unsuitable	Replace the fuel
Fuel injection timing	Fuel injection timing improperly adjusted	Adjust the fuel injection timing
Injection nozzle	Improper injection nozzle starting pressure and spray condition	Adjust or replace the injection nozzle
Compression pressure	Blown out head gasket	Broken piston ring Replace the head gasket or the piston ring

2. Gas Leakage Noise

Check point	Possible cause	Correction
Exhaust pipes	Loosely connected exhaust pipes Broken exhaust pipes	Tighten the exhaust pipe connections Replace the exhaust pipes
Injection nozzles and/ or glow plugs	Loose injection nozzles and /or glow plugs	Replace the washers Tighten the injection nozzles and/or the glow plugs
Exhaust manifold	Loosely connected exhaust manifold and/ or glow plugs	Tighten the exhaust manifold connections
Cylinder head gasket	Damaged cylinder head gasket	Replace the cylinder head gasket

3. Continuous Noise

Check point	Possible cause	Correction
Fan belt	Loose fan belt	Readjust the fan belt tension
Cooling fan	Loose cooling fan	Retighten the cooling fan
Water pump bearing	Worn or damaged water pump bearing	Replace the water pump bearing
Alternator or vacuum pump	Defective alternator or vacuum pump	Repair or replace the alternator or the vacuum pump
Valve clearance	Clearance improperly adjust	Adjust the valve clearance

4. Slapping Noise

Check point	Possible cause	Correction
Valve clearance	Valve clearance improperly adjusted	Adjust the valve clearance
Rocker arm	Damaged rocker arm	Replace the rocker arm
Flywheel	Loose flywheel bolts	Retighten the flywheel bolts
Crankshaft and thrust bearings	Worn or damaged crankshaft and/or thrust bearings	Replace the crankshaft and/or the thrust bearings
Crankshaft and connecting rod bearings	Worn or damaged crankshaft and/or connecting rod bearings	Replace the crankshaft and/or the connecting rod bearings
Connecting rod bushing and piston pin	Worn or damaged connecting rod bushing and piston pin	Replace the connecting rod bushing and/ or the piston pin
Piston and cylinder liner	Worn or damaged piston and cylinder liner Foreign material in the cylinder	Replace the piston and the cylinder liner

Connecting Rod Bearing Selection
Remarks:
The connecting rod big end inside diameter grade marks (A or B) are stamped on top of the cylinder number align marks of the big end.

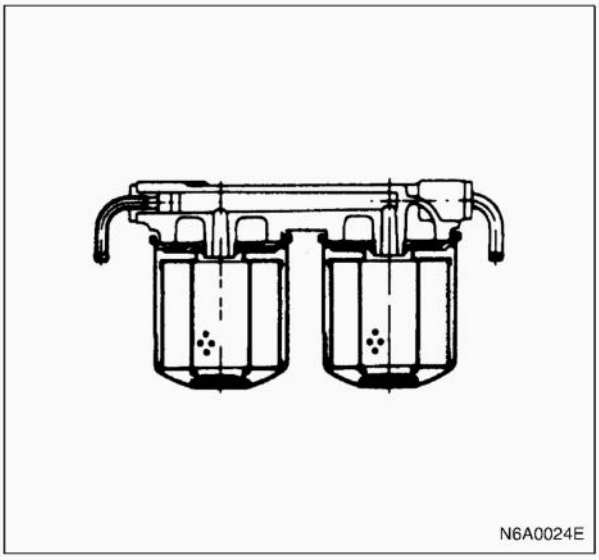
Connecting Rod Big End		Crankpin	Big End Bearing Color Code
Grade Mark	(Reference) Inside Diameter mm (in)	(Reference) Outside Diameter mm (in)	
A	69.985 — 69.992 (2.7553 — 2.7556)	65.902 — 65.922 (2.5946 — 2.5954)	Green
B	69.993 — 70.000 (2.7556 — 2.7559)	65.902 — 65.922 (2.5946 — 2.5954)	Yellow

Flywheel

Item		Standard	Limit
Flywheel Thickness	mm (in)	31.4 — 31.6 (1.236 — 1.244) (Flywheel friction surface — crankshaft setting face)	31.0 (1.22)
Friction Surface Run-Out	mm (in)		0.2 (0.008)
Friction Surface Roughness	mm (in)	0.006 (0.0002) or less	
Ring Gear			The tooth face burr must be chamfered. Replace ones when damaged excessively.

Gear Train

Item		Standard	Limit
Timing Gear Backlash Gear to Gear (In the direction of a normal line)	mm (in)	0.10 — 0.17 (0.0039 — 0.0067) Hold both the gear to be checked and the adjoining gear stationary.	0.30 (0.012)
Crankshaft Gear and Crankshaft Interference	mm (in)	0.03 — 0.093 (0.0012 — 0.0037)	
Camshaft Gear and Camshaft Interference	mm (in)	0.015 — 0.023 (0.0006 — 0.0009)	
Idle Gear Shaft Wear	mm (in)	29.959 — 29.980 (1.1795 — 1.1803)	29.80 (1.1732)
Idle Gear Bushing Wear	mm (in)	30.000 — 30.021 (1.1811 — 1.1819)	30.1 (1.185)
Idle Gear Bushing and Idle Gear Shaft Clearance	mm (in)	0.020 — 0.062 (0.0008 — 0.0024)	0.2 (0.008)
Idle Gear End Play	mm (in)	0.058 — 0.115 (0.0002 — 0.005)	0.2 (0.008)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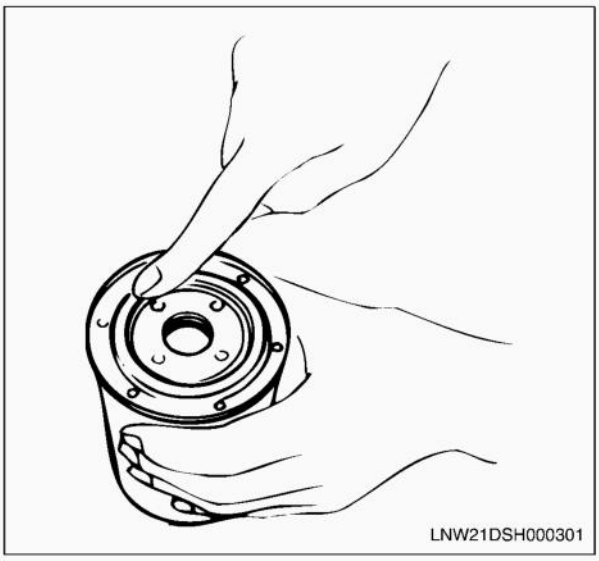
3. Apply a thin coat of engine oil to the O-rings.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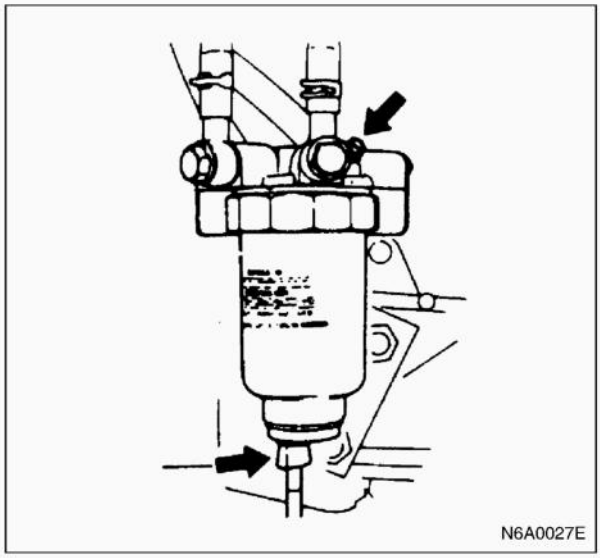
4. Install the filter assemblies.
   Carefully turn each assembly clockwise until the O-ring is fitted against the filter cover sealing face.
5. Use the filter wrench to turn in each filter assembly an additional 1/3 to 2/3 of turn.
6. Operate the priming pump on the fuel filter to bleed the fuel system.
   Refer to "Air Bleeding" for more detailed information.

Pre-fuel Filter Water Draining Procedure

The indicator light will come on when the water level in the water separator exceeds the specified level.
Drain the water and foreign material from the water separator with the following procedure.

1. Place the end of a vinyl hose (beneath the drain plug) in a container.
2. Loosen the air intake plug and drain plug, then drain water.
3. After draining, securely tighten the drain plug and air intake plug.

4HG1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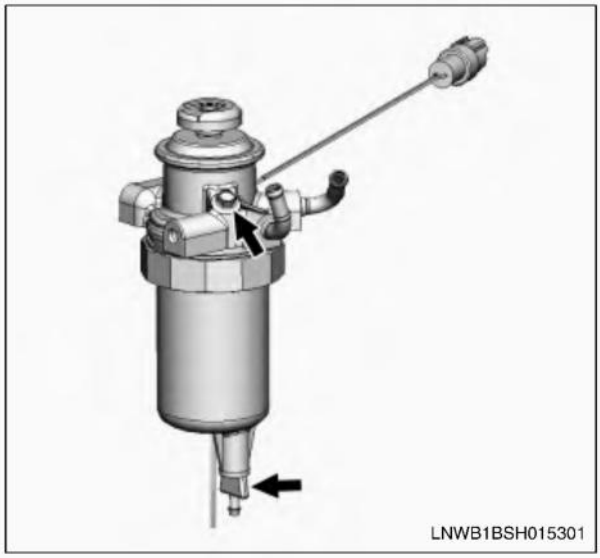
4HG1-T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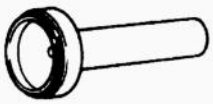
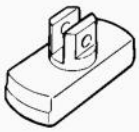
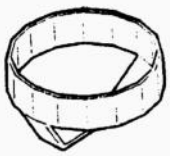
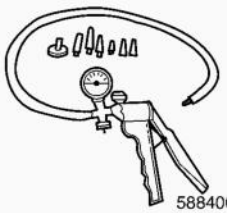
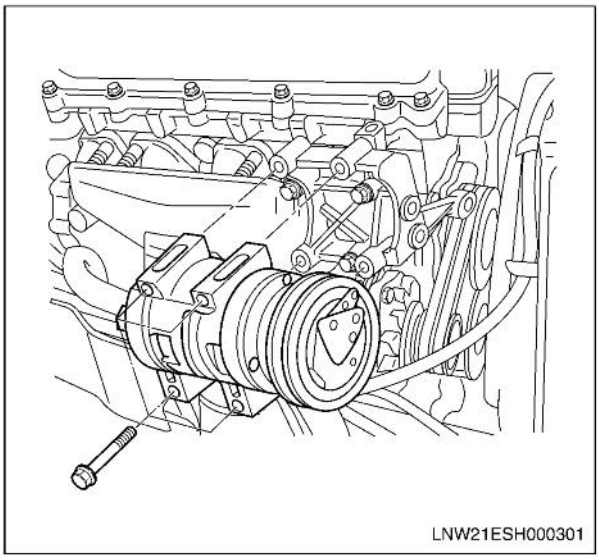
4. Then, operate the priming pump on the injection pump or integrated in the separator to bleed the fuel system.
5. After starting the engine, check to see that no fuel leaks from the drain plug.

Engine Control

Idling Speed Inspection

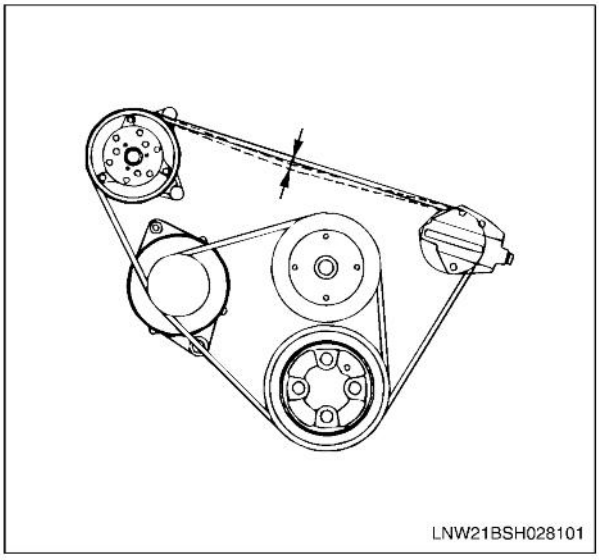
1. Set the vehicle parking brake and chock the drive wheels.
2. Place the transmission in neutral.
3. Start the engine and allow it to warm up.
4. Check that the idling control knob is in the engine idling position.
5. Set a tachometer to the engine.

Illustration	Tool Number / Description / Remarks
 5884022220	5-8840-2222-0 / Sealing cup installer
 9852311690	9-8523-1169-0 / Cylinder liner remover
 5884023970	5-8840-2397-0 / Cylinder liner remover ankle
 8943968180	8-9439-6818-0 / Crankshaft gear remover
 8943968190	8-9439-6819-0 / Crankshaft gear installer
 5884020940	5-8840-2094-0 / Oil filter wrench / 4WD model
 5884002790	5-8840-0279-0 / Vacuum pump



- Install the drive belt adjust belt tension by adjusting bolt and tighten the locking nut to the specified torque.
- Depress the drive belt mid-portion with a 98 N (10 kg/22 lb) force.

Drive Belt Deflection	mm (in)
New belt	16 — 20 (0.63 — 0.79)
Reuse belt	18 — 22 (0.71 — 0.87)



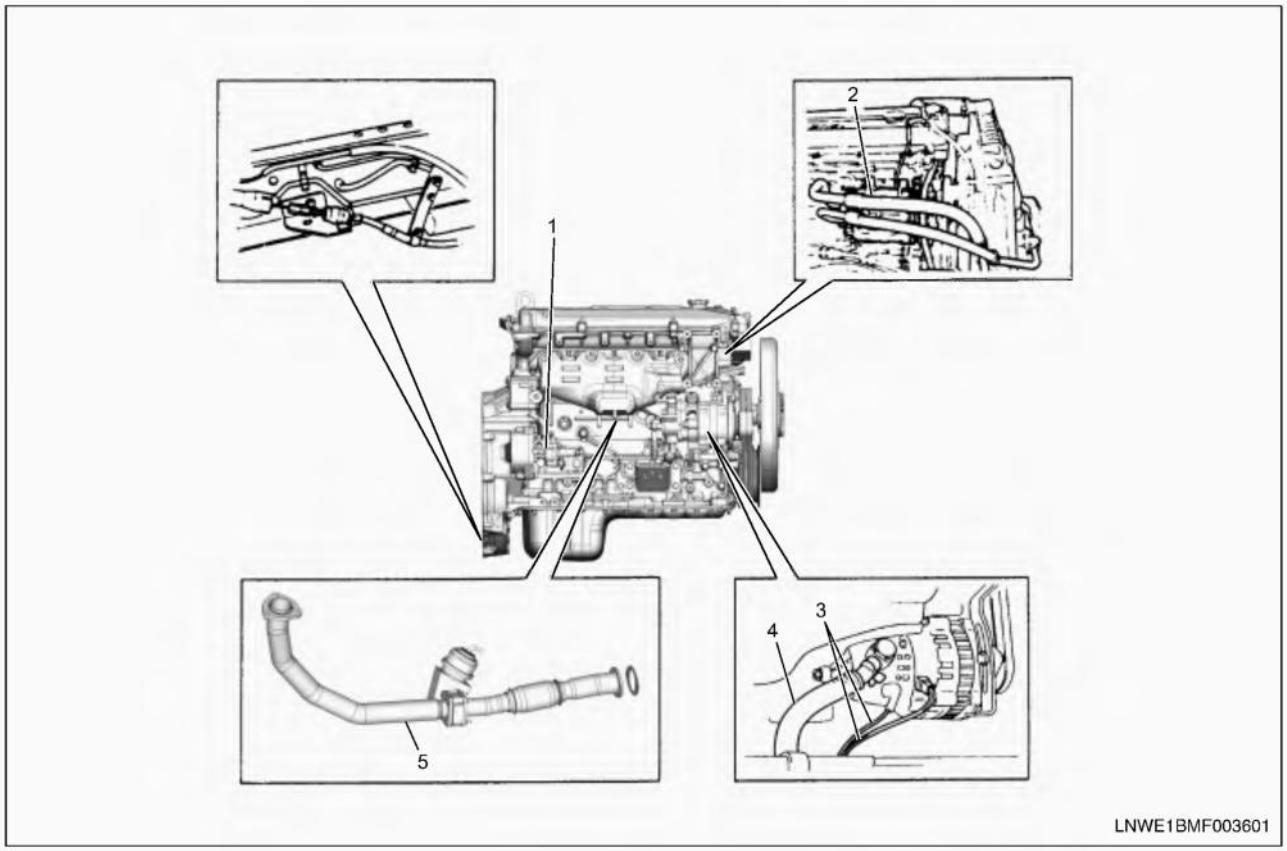
Tighten:
Locking nut to 27 N·m (2.8 kg·m/20 lb·ft)

4. Power Steering Pump

Tighten:
Bolt to

- (1): 48 N·m (4.9 kg·m/35 lb·ft)
- (2): 24 N·m (2.4 kg·m/17 lb·ft)
- (3): 44 N·m (4.5 kg·m/33 lb·ft)

Engine Right Side

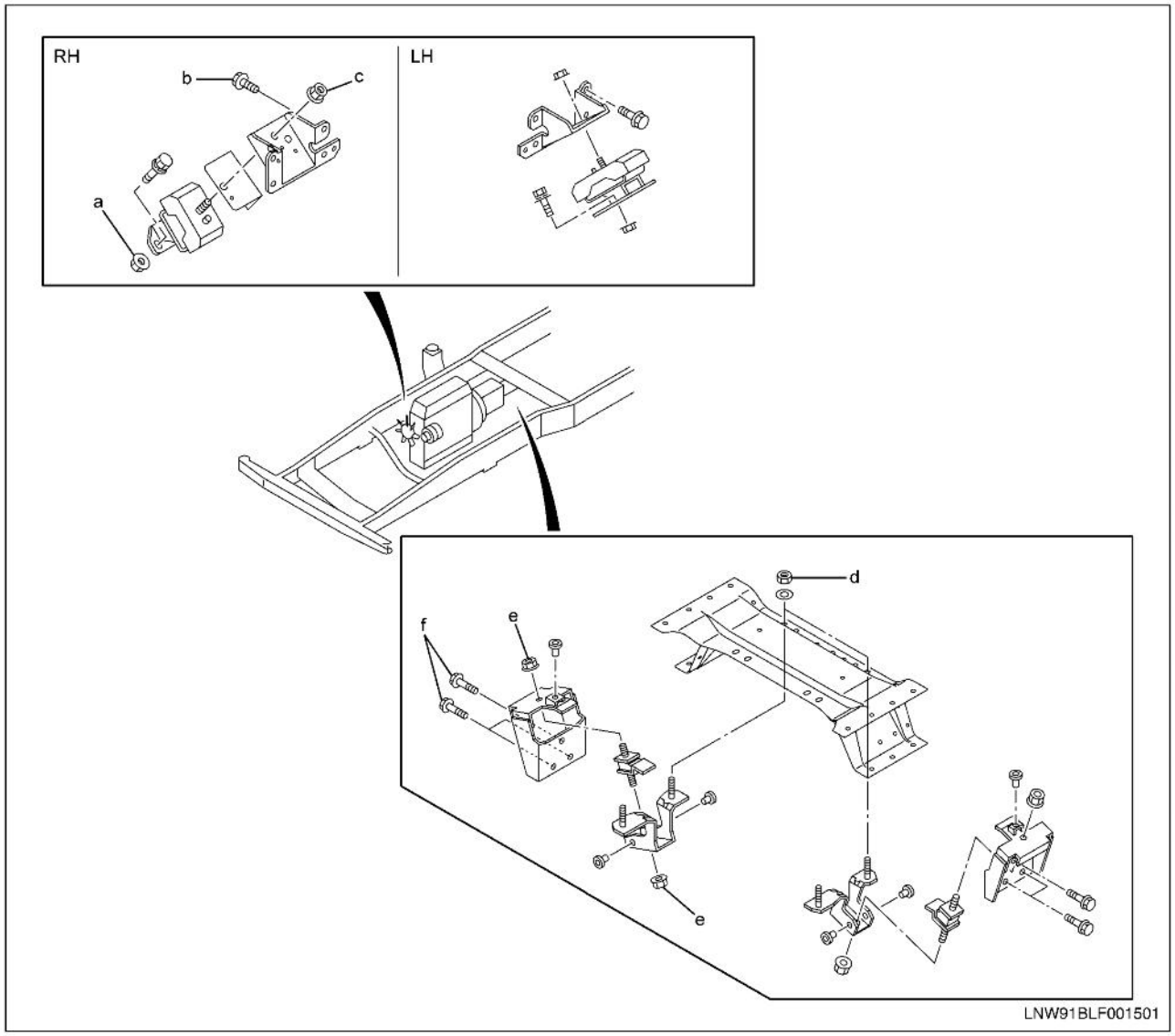


Legend

1. Power steering pump
2. A/C compressor
3. ACG harness
4. ACG vacuum hose
5. Front exhaust pipe

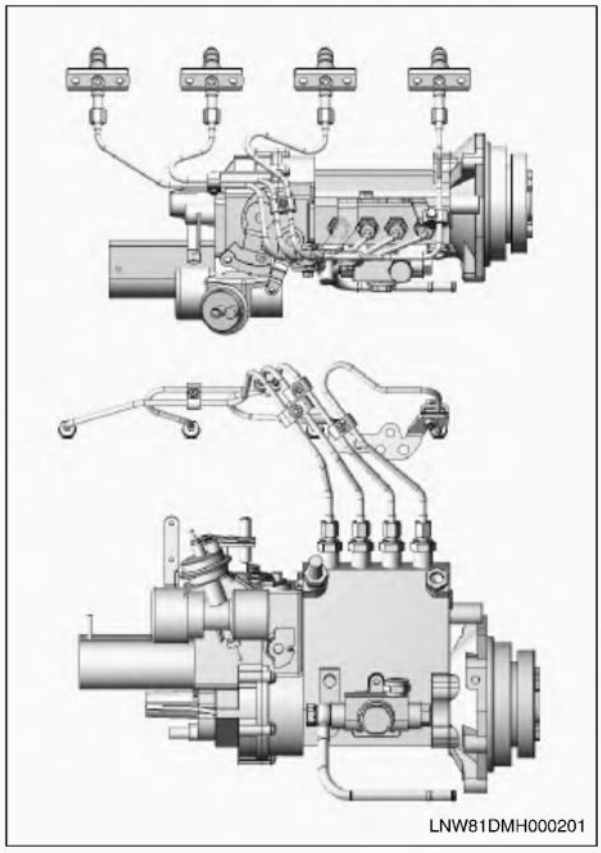
List of Tightening Torques

Engine Mounting



(a) 48 N·m (4.9 kg·m/35 lb·ft)
(b) 51 N·m (5.2 kg·m/38 lb·ft)
(c) 106 N·m (10.8 kg·m/78 lb·ft)
(d) 51 N·m (5.2 kg·m/38 lb·ft)
(e) 45 N·m (4.6 kg·m/33 lb·ft)
(f) 97 N·m (9.9 kg·m/72 lb·ft)

4HG1-T

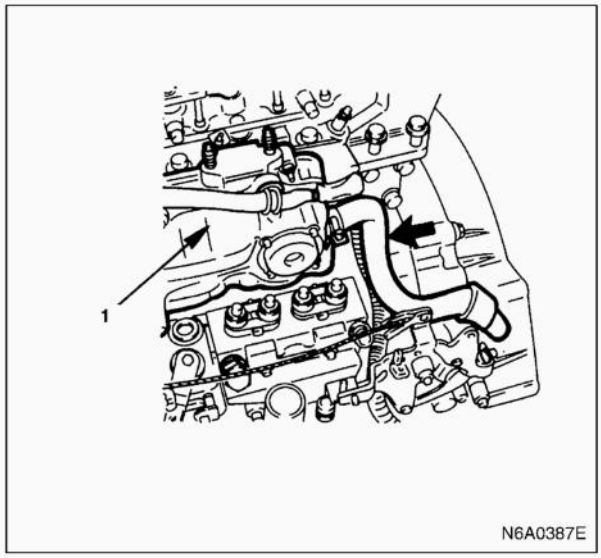


3) Tighten the injection pipe sleeve nuts to the specified torque.

Tighten:
Injection pipe sleeve nut to 29 N·m (3 kg·m/22 lb·ft)

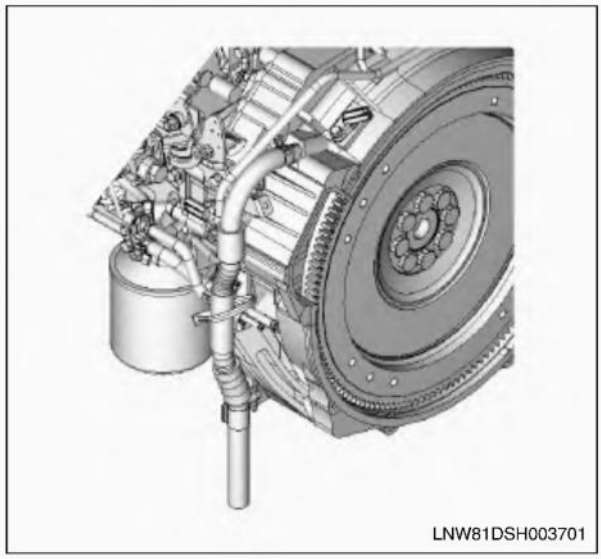
7. Positive Crankcase Ventilation (PCV) Hose

4HG1



Legend
1. Inlet cover

4HG1-T



8. Fuel Pipe
   Do not apply excessive force to the fuel pipe.

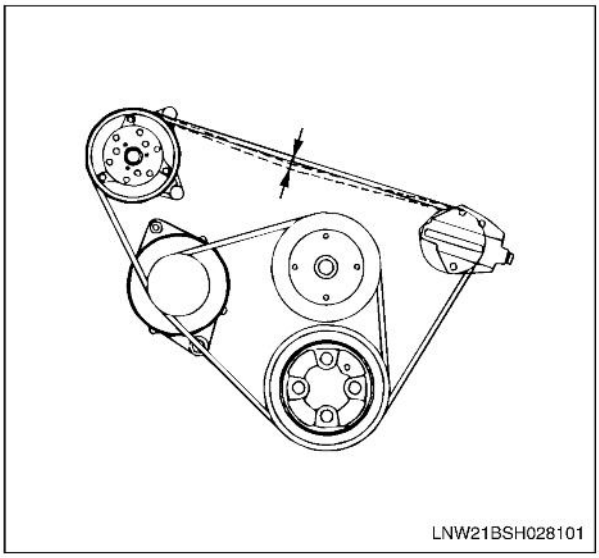
Tighten:
Fuel pipe joint bolt (1) to 41 N·m (4.2 kg·m/30 lb·ft)

Tighten:
Fuel pipe joint bolt (2) to 23 N·m (2.3 kg·m/17 lb·ft)

Tighten:
Clip screw to 4 N·m (0.4 kg·m/35 lb·in)

2) Install drive belt adjust belt tension by adjusting bolt and tighten locking nut to the specified torque.
3) Depress the drive belt mid-portion with a 98 N (10 kg/22 lb) force.

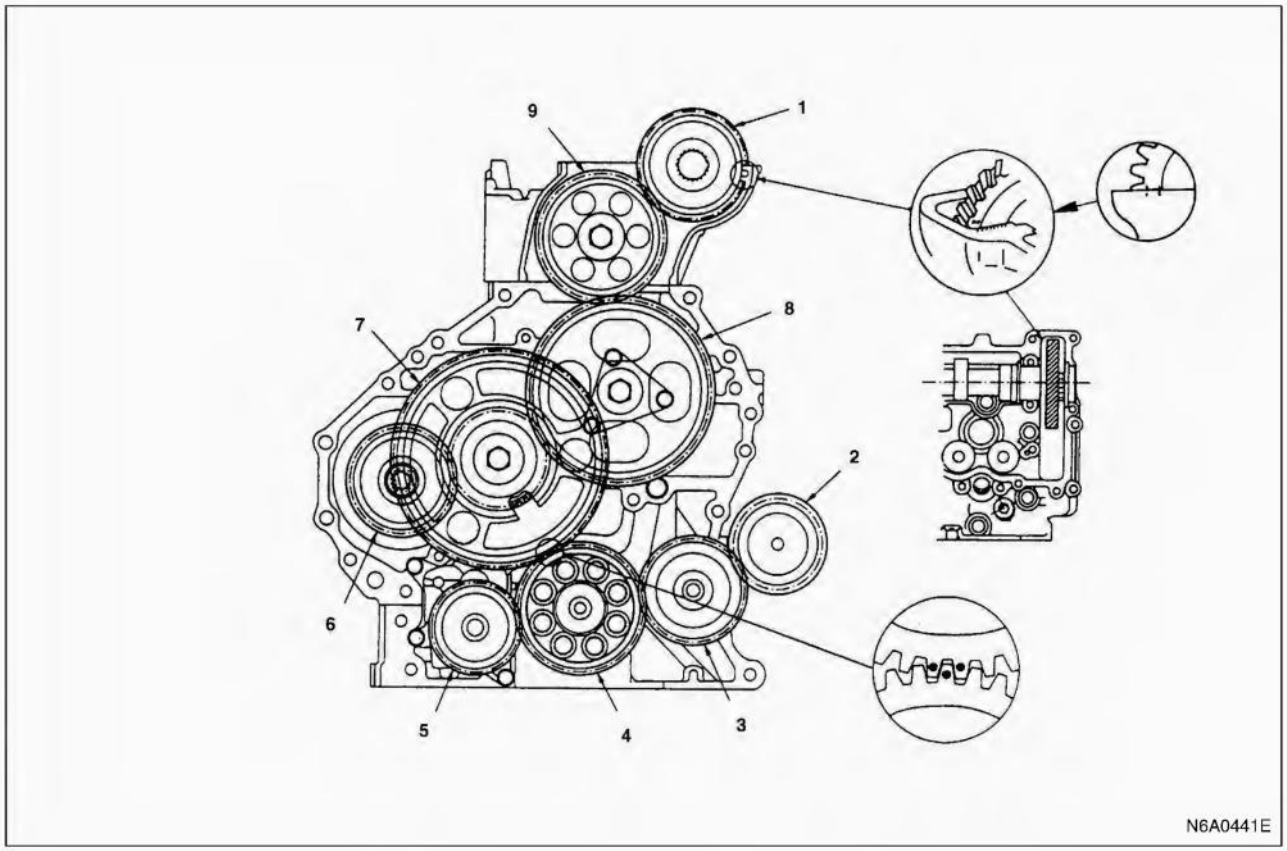
Drive Belt Deflection	mm (in)
New belt	16 — 20 (0.63 — 0.79)
Reuse belt	18 — 22 (0.71 — 0.87)



Tighten:
Locking nut to 27 N·m (2.8 kg·m/20 lb·ft)

- Connect the negative battery cable.
- Lower the cab.
- Start engine and check for gas leakage carefully.

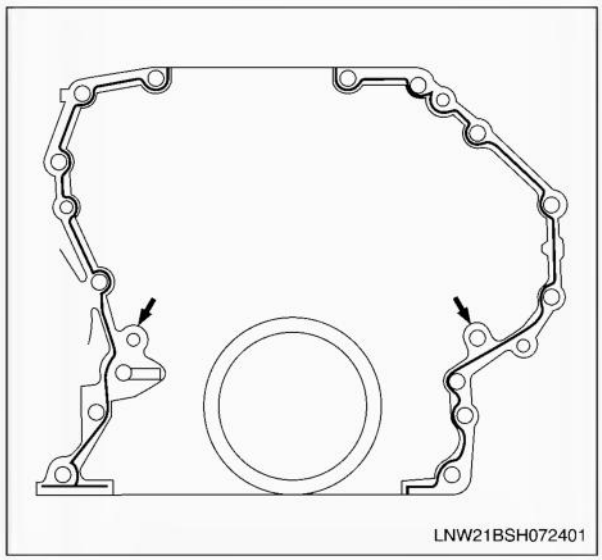
Alignment Mark Position for Each Gear



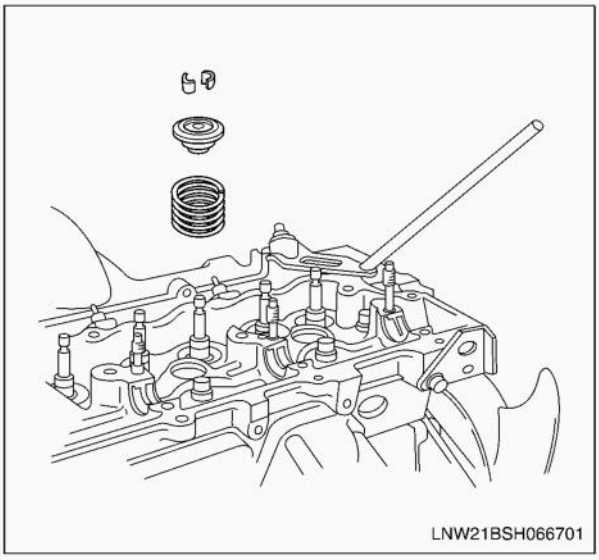
Legend

1. Camshaft gear
2. Power steering pump gear
3. Power steering pump idle gear
4. Crankshaft gear
5. Oil pump drive
6. Injection pump gear
7. Idle gear A
8. Idle gear B
9. Idle gear C

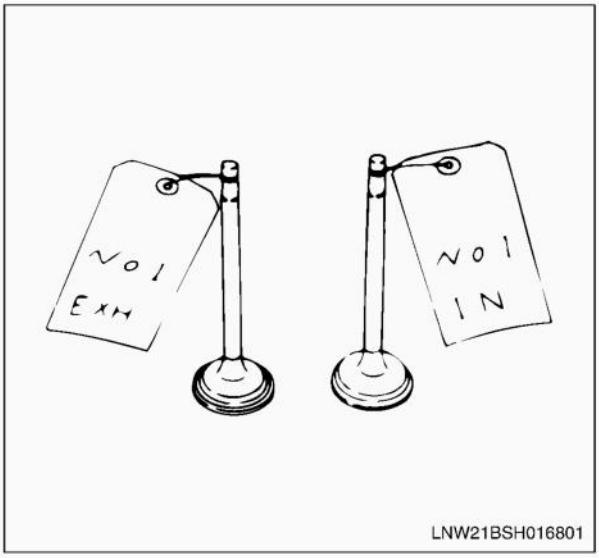
4. Flywheel Housing
   1) Carefully wipe any foreign material from the cylinder block rear face.
   2) As shown in the diagram, uniformly apply liquid gasket (ThreeBond 1207B) to the inside of the bolt hole (excluding the bolt hole at the arrow).



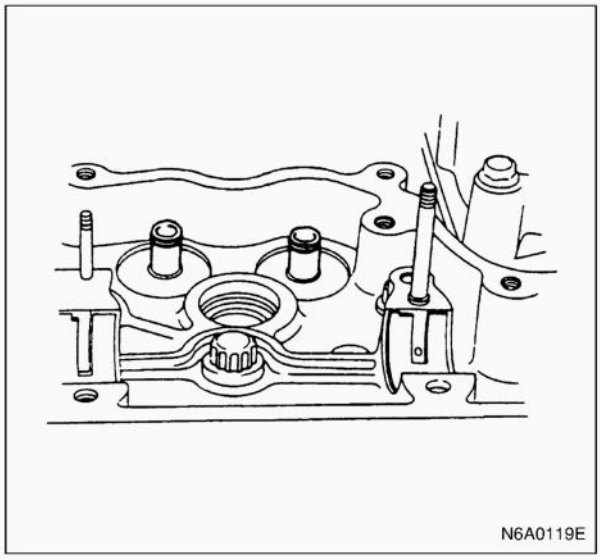
   3) Align the cylinder block knock pins with the flywheel housing knock pin holes.



4. Inlet and Exhaust Valve
   If the inlet and exhaust valves are to be reinstalled, mark their installation positions by tagging each valve with the cylinder number from which it was removed.
   If the inlet and exhaust valves are to be replaced, the valve guides must also be replaced.



5. Valve Guide Seal
6. Spring Lower Seat



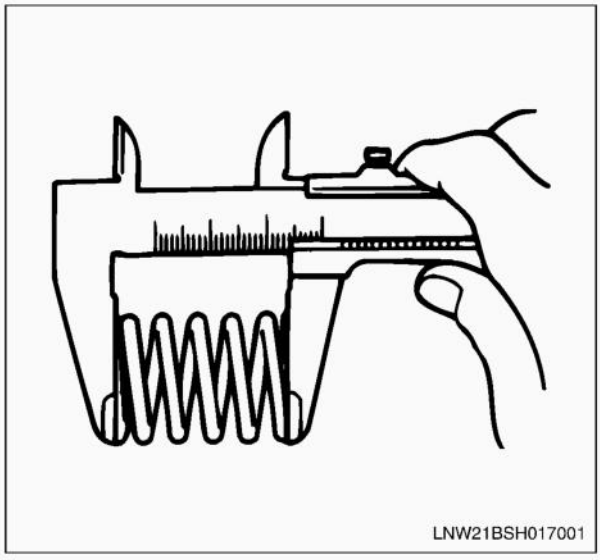
Inspection and Repair

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.

Valve Spring Free Height

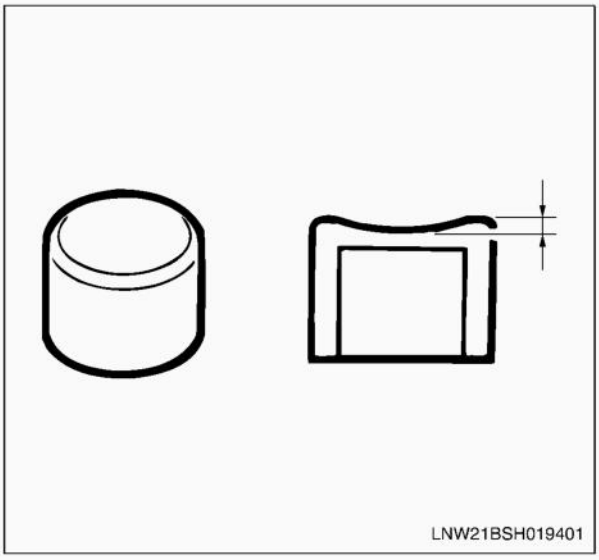
Use a vernier caliper to measure the valve spring free height.
If the measured valve is less than the specified limit, the valve spring must be replaced.

Valve Spring Free Height	mm (in)
Nominal Size	Limit
62.5 (2.46)	59.4 (2.34)

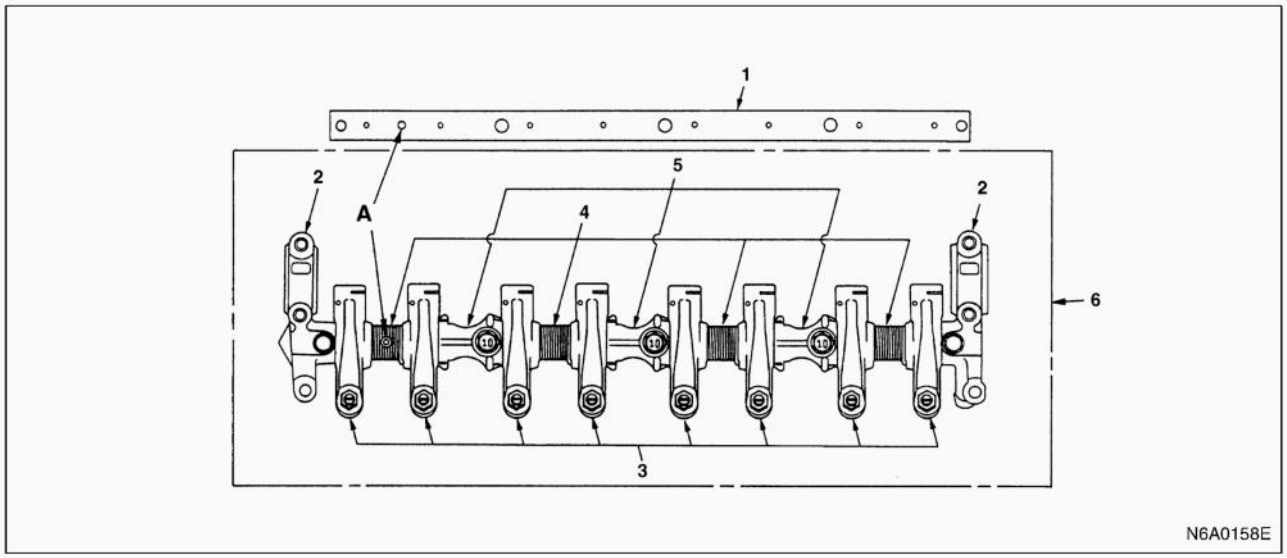


Valve Spring Squareness

Use a surface plate and a square to measure the valve spring squareness.
If the measured value exceeds the specified limit, the valve spring must be replaced.



Reassembly

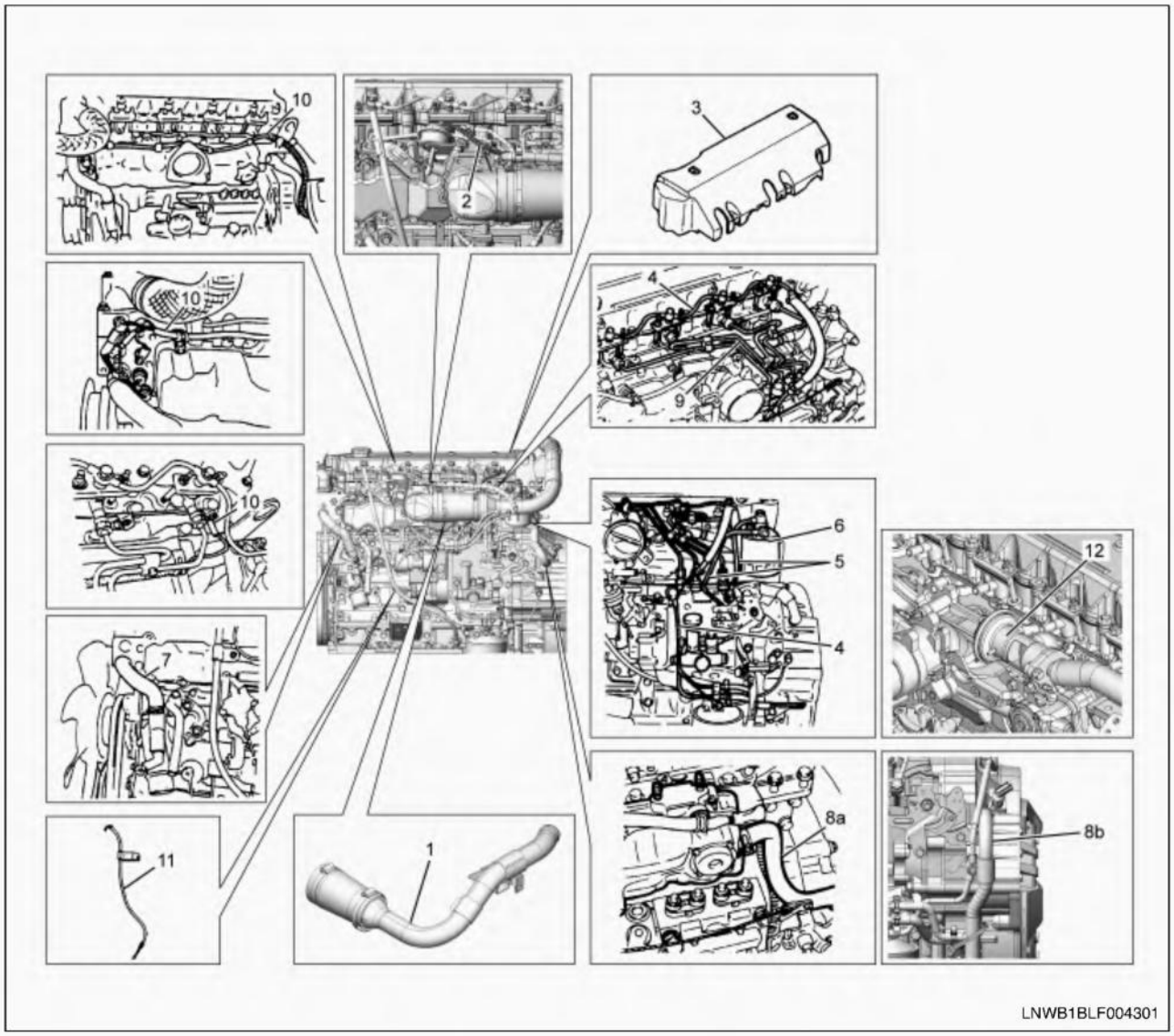


Legend

A. Front mark
1. Rocker arm shaft
2. Camshaft bracket
3. Rocker arm
4. Spring
5. Rocker arm bracket
6. Rocker arm shaft assembly

1. Rocker Arm Shaft
   1) Use compressed air to thoroughly clean the rocker arm shaft oil holes.
   2) Apply a coat of engine oil to the rocker arm shaft.
   3) Install the rocker arm shaft with the “Front” mark facing up and toward the front of the engine.
2. Camshaft Bracket
   Install the camshaft bracket to the rocker arm shaft and temporarily tighten the camshaft bracket fixing bolt as shown in the illustration.

Engine Left Side



Legend

1. Intake air duct
2. Vacuum hose
3. Nozzle cover
4. Leak off pipe
5. Fuel pipe
6. Fuel filter and bracket
7. Water bypass hose

8a. PCV hose (4HG1)
8b. PCV hose (4HG1-T)
9. Injection pipe
10. Engine harness
11. Oil level gauge guide tube
12. EGR valve

Note:
Note that there are three types of a cylinder head gasket available as below, according to the piston projection.

- For each cylinder, calculate the average value (Ti) of the piston projection.
- Find the maximum value (Ti max) of the average of each cylinder.
- Based on the Timax obtained, select a gasket of the appropriate grade.

Gasket Grade	Identification	Protrusion amount of the piston (Timax) mm(in)
A	No hole	0.579 - 0.659 (0.0228 - 0.0259)
B	1 hole	0.659 - 0.739 (0.0259 - 0.0291)
C	2 hole	0.739 - 0.819 (0.0291 - 0.0322)

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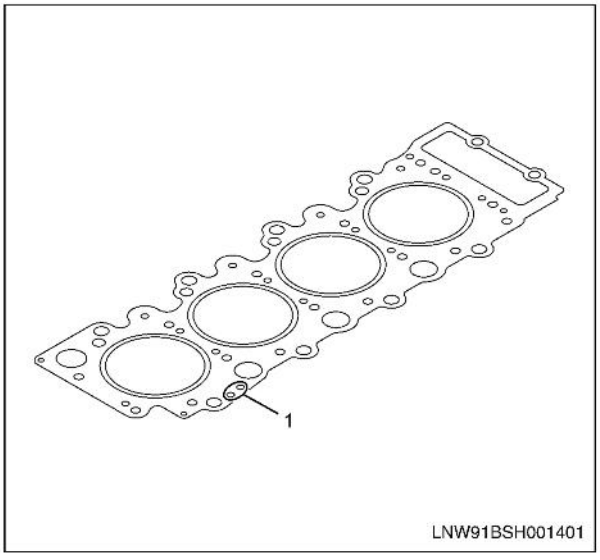

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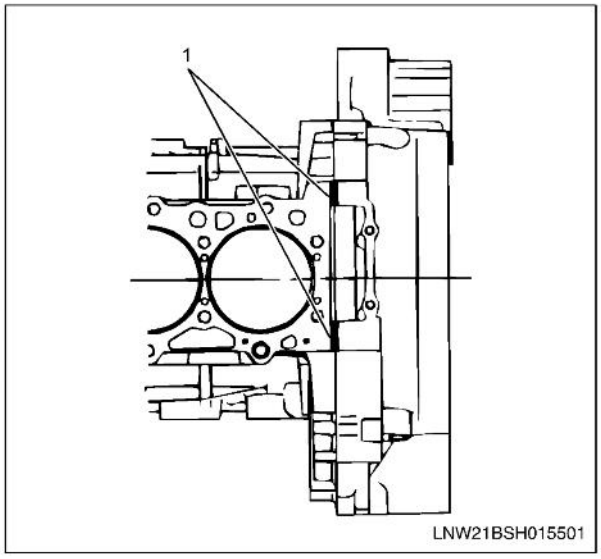
Legend
1. Grade identification hole

5) Apply a 3 mm (0.12 in) bead or recommended liquid gasket (ThreeBond 1207C) or its equivalent to the shaded areas shown in the illustration.



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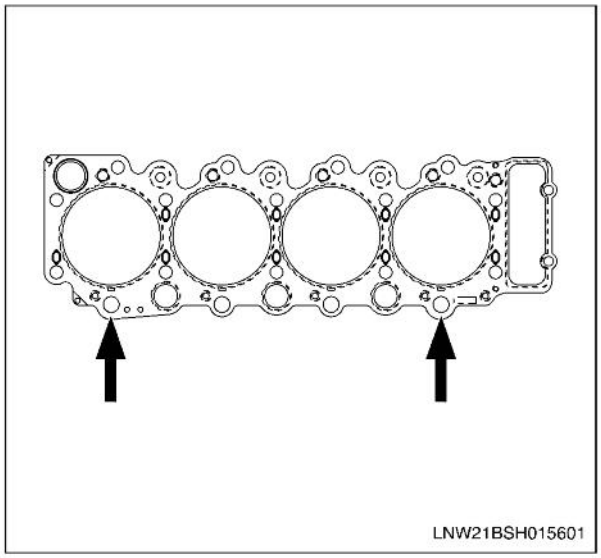
Legend
1. Liquid gasket application position

6) Install the cylinder head gasket with its "Part Number" mark facing up and toward the left of the engine.

Caution:
Do not reuse the cylinder head gasket.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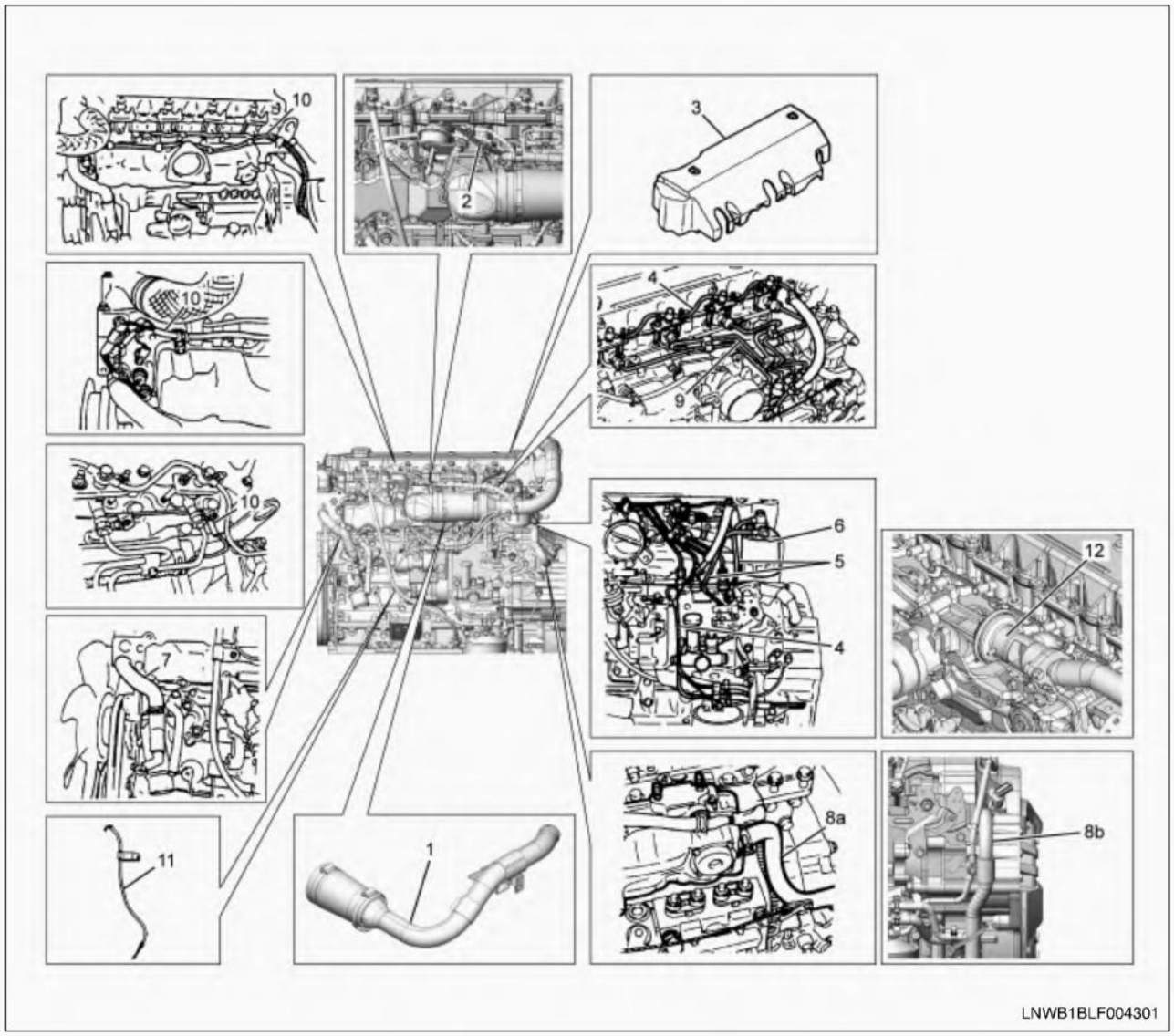
2. Cylinder Head Assembly
   1) Align the cylinder block dowels and the cylinder head dowel holes.
   2) Carefully place the cylinder head on the cylinder head gasket.

Engine Left Side



Legend

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2. Vacuum hose
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8a. PCV hose (4HG1)
8b. PCV hose (4HG1-T)
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10. Engine harness
11. Oil level gauge guide tube
12. EGR valve

Gasket Grade	Identification	Protrusion amount of the piston (Timax) mm(in)
A	No hole	0.579 - 0.659 (0.0228 - 0.0259)
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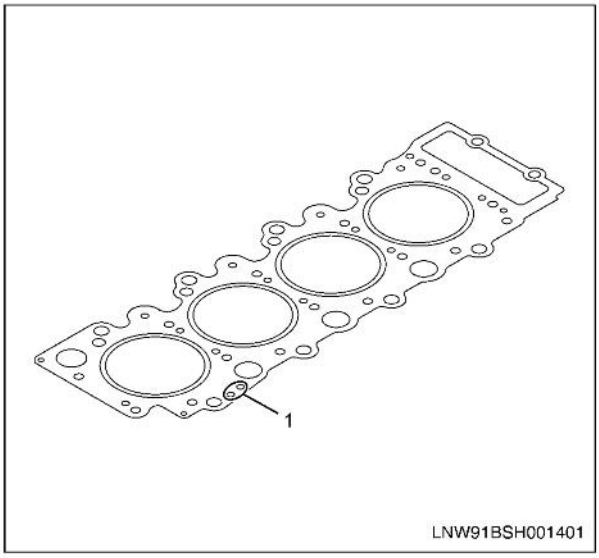
C	2 hole	0.739 - 0.819 (0.0291 - 0.0322)

LNW91BSH002601

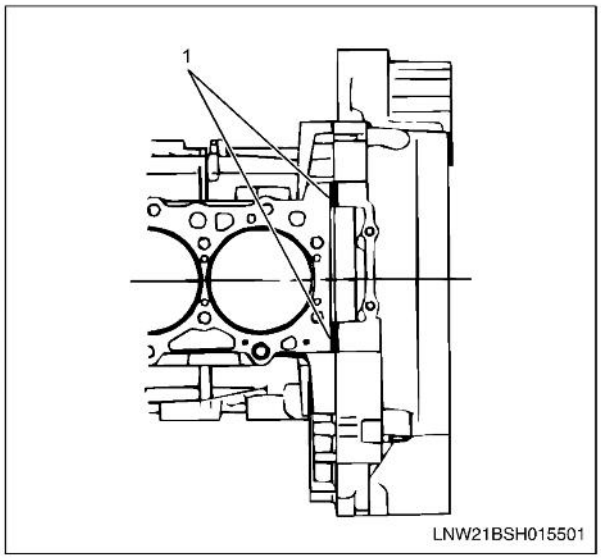


LNW91BSH001401

Legend

1. Grade identification hole

5) Apply a 3 mm (0.12 in) bead or recommended liquid gasket (ThreeBond 1207C) or its equivalent to the shaded areas shown in the illustration.



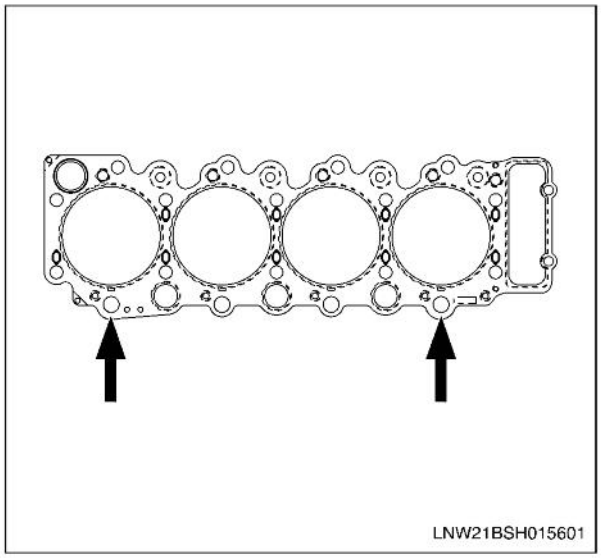
LNW21BSH015501

Legend

1. Liquid gasket application position

6) Install the cylinder head gasket with its "Part Number" mark facing up and toward the left of the engine.

Caution:
Do not reuse the cylinder head gasket.

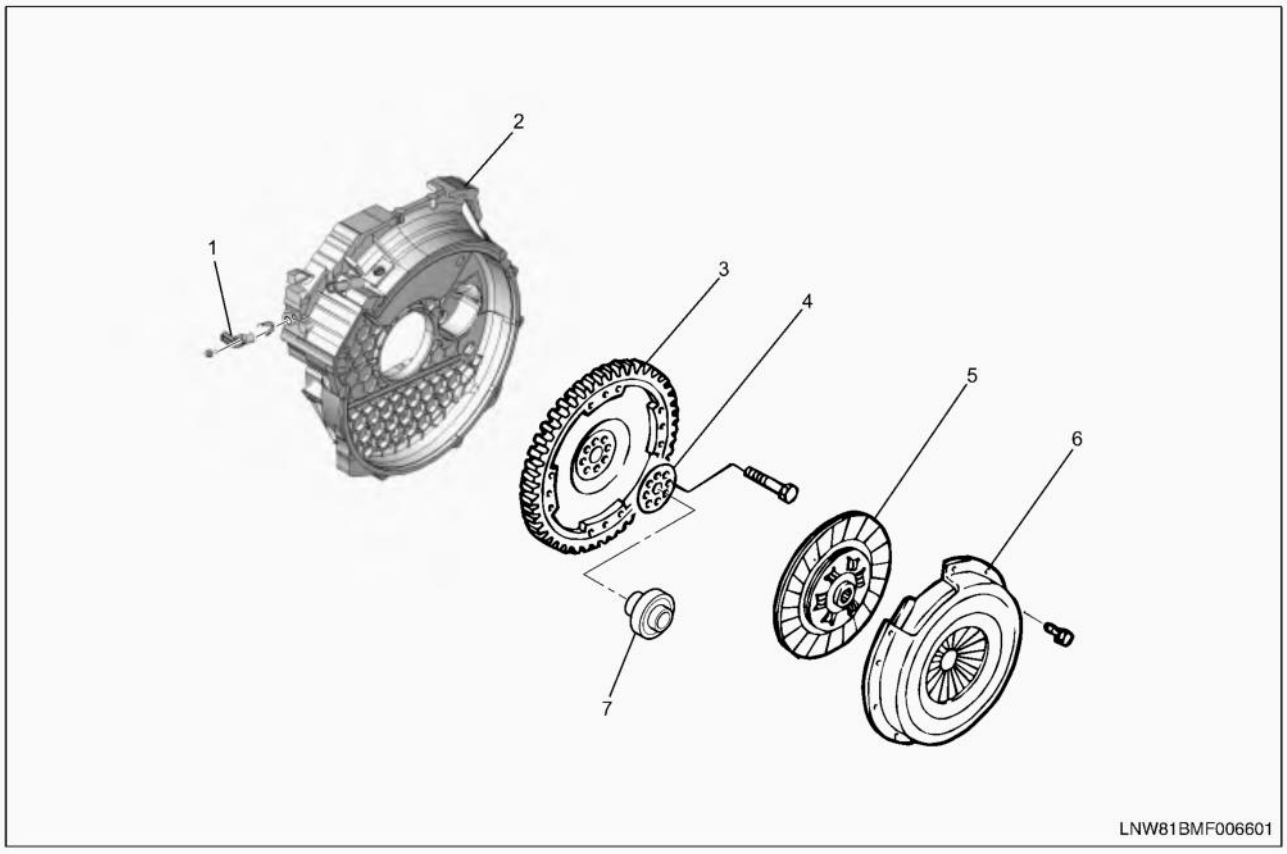


LNW21BSH015601

2. Cylinder Head Assembly
   1) Align the cylinder block dowels and the cylinder head dowel holes.
   2) Carefully place the cylinder head on the cylinder head gasket.

Flywheel and Pilot Bearing

Component



Legend

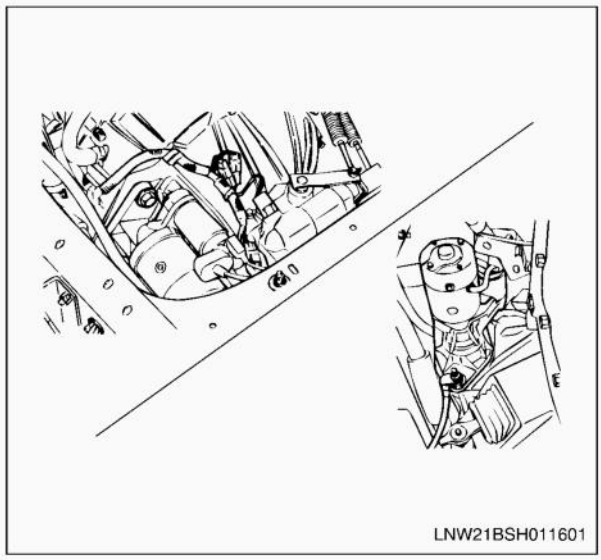
1. Engine speed sensor
2. Flywheel housing
3. Flywheel assembly
4. Washer
5. Clutch disc
6. Clutch pressure plate assembly
7. Pilot bearing

Removal

Preparation

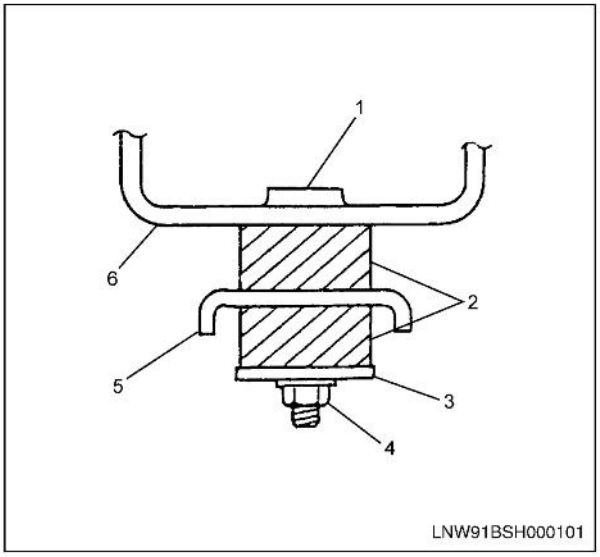
- Disconnect battery ground cable.

1. Tachometer sensor
2. Starter
   1) Disconnect the battery cable at the starter motor.
   2) Remove the starter assembly from flywheel housing.



3. Transmission Assembly

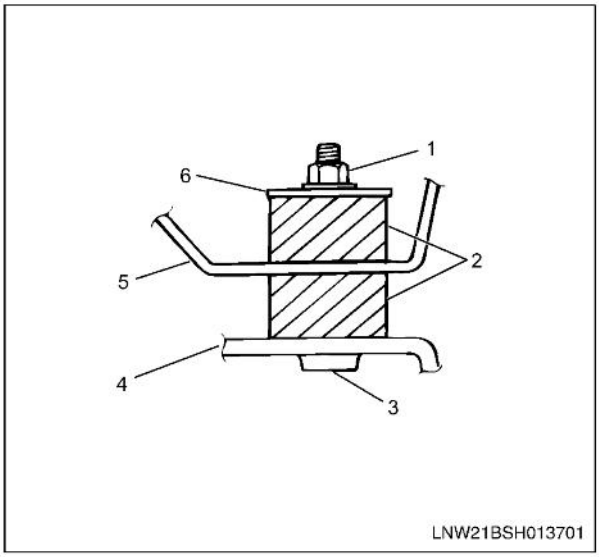
Vehicle Type NPR, NQR, NPS



Legend

1. Stud bolt
2. Rubber
3. Washer
4. Flange nut
5. Flame side bracket
6. Radiator side bracket

Vehicle Type NMR

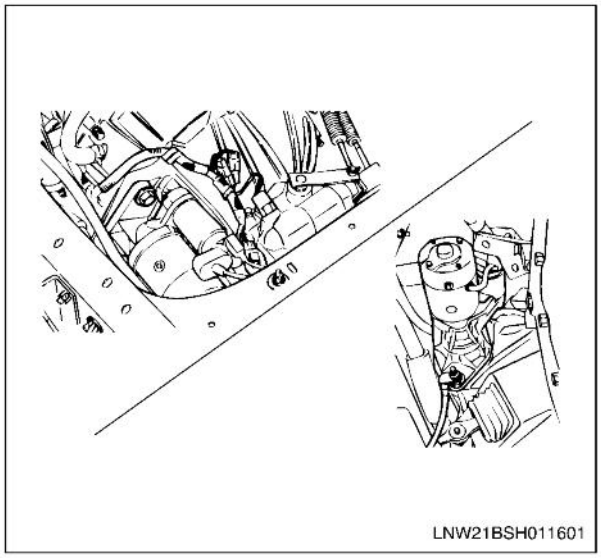


Legend

1. Nut
2. Rubber
3. Stud bolt
4. Flame side bracket
5. Radiator side bracket
6. Washer

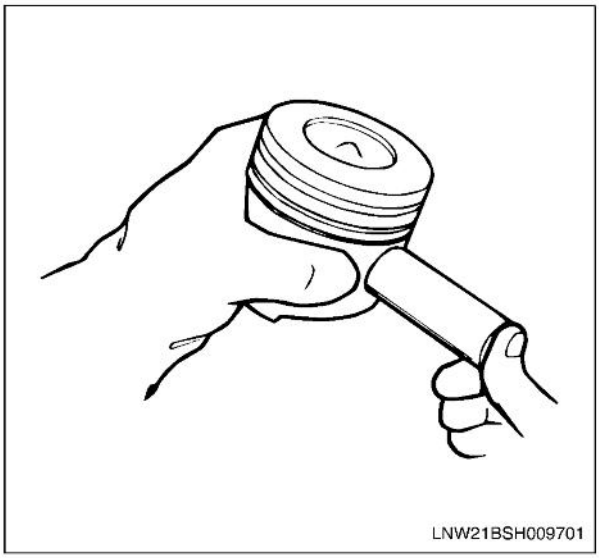
7. Radiator Lower Hose
8. Coolant Reserve Tank Hose
9. Radiator Upper Hose
10. Starter

Tighten:
Starter bolt to 76 N·m (7.7 kg·m/56 lb·ft)



11. Connect battery ground cable.
    - Pour engine coolant into engine.

- Inspect for a certain degree of resistance when the piston pin is lightly pushed in, when the piston is at room temperature.
- Replace the piston or the piston pin if they feel loose at room temperature.

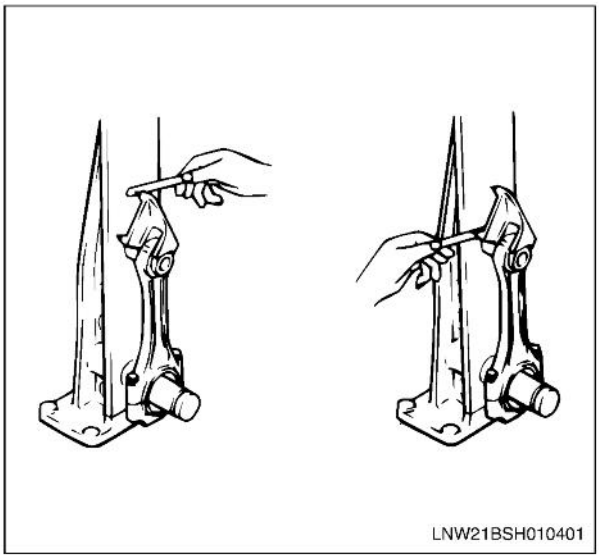


Connecting Rod

Connecting Rod Alignment

Use a connecting rod aligner to measure the distortion and the parallelism between the connecting rod big end hole and the connecting rod small end hole.
If either the measured distortion or parallelism exceeds the specified limit, the connecting rod must be replaced.

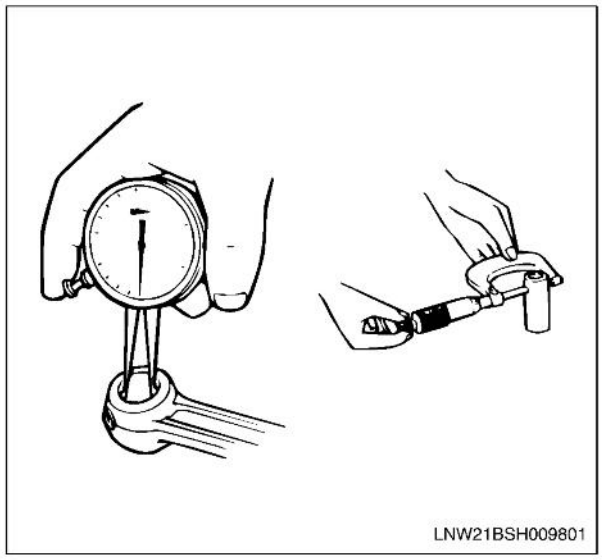
Connecting Rod Alignment		mm (in)
Per Length of 100 (3.94)		
	Standard	Limit
Distortion	0.05 (0.002) or less	0.20 (0.008)
Parallelism		



Piston Pin and Connecting rod Small End Bushing Clearance

Use a caliper calibrator and a dial indicator to measure the clearance between the piston pin and connecting rod small end bushing.
If the clearance between the piston pin and the connecting rod small end bushing exceeds the specified limit, replace the piston pin and/or the connecting rod bushing.

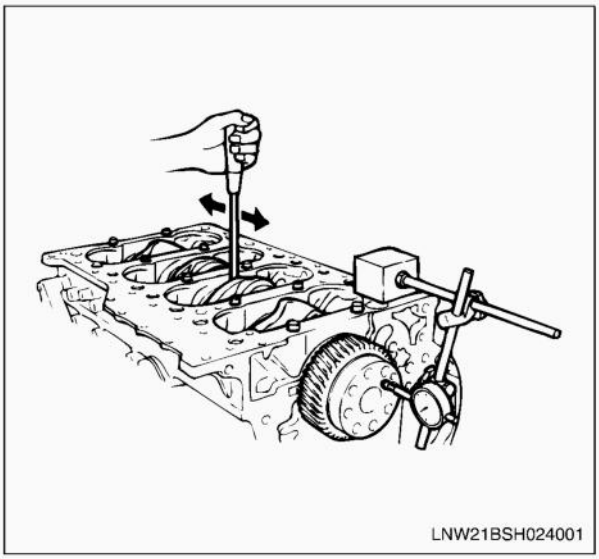
Piston Pin and Connecting Rod Small End Bushing Clearance	mm (in)
Standard	Limit
0.012 — 0.027 (0.0005 — 0.0011)	0.05 (0.002)



Reassembly

1. Piston
2. Piston Pin Snap Ring
   Use a pair of snap ring pliers to install the piston pin snap ring to the piston.

Crankshaft End Play	mm (in)
Standard	Limit
0.040 — 0.205 (0.0016 — 0.0081)	—


LNW21BSH024001

Crankshaft and Bearing

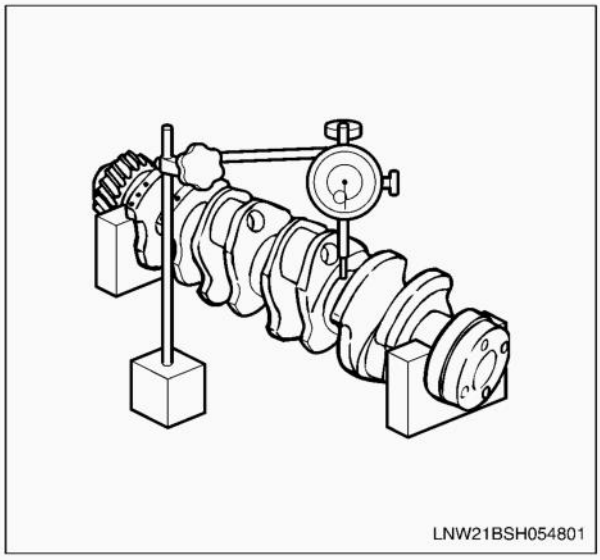
Inspect the surface of the crankshaft journals and crankpins for excessive wear and damage.
Inspect the oil seal fitting surfaces for excessive wear and damage.
Inspect the oil ports for obstructions.

Crankshaft Run-Out

1. Set a dial indicator to the center of the crankshaft journal.
2. Gently turn the crankshaft in the normal direction of rotation.

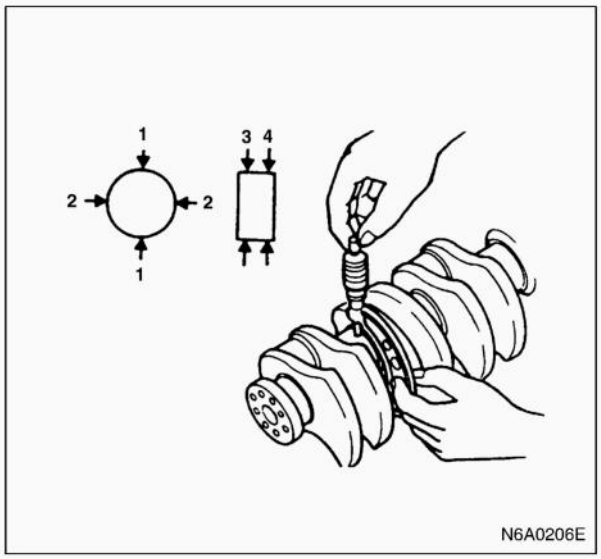
Read the dial indicator as you turn the crankshaft.
If the measured value exceeds the specified limit, the crankshaft must be replaced.

Crankshaft Run-Out	mm (in)
Standard	Limit
0.05 (0.002) or less	0.30 (0.012)


LNW21BSH054801

Crankshaft Journal and Crankpin Diameter

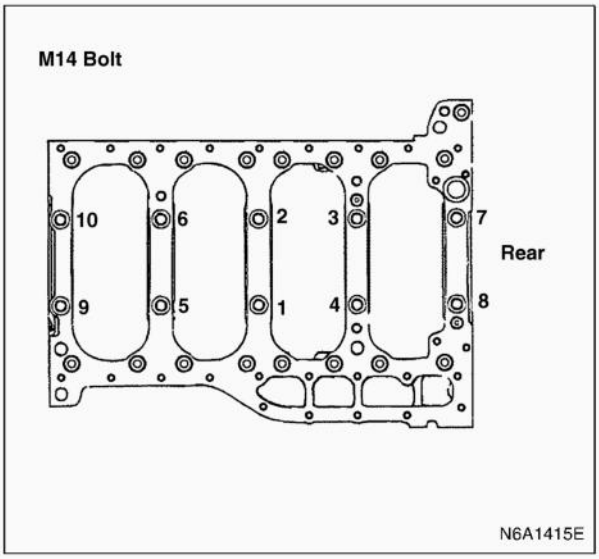
1. Use a micrometer to measure the crankshaft journal diameter across points (1) — (1) and (2) — (2).
2. Use the micrometer to measure the crankshaft journal diameter at the two points (3) and (4).

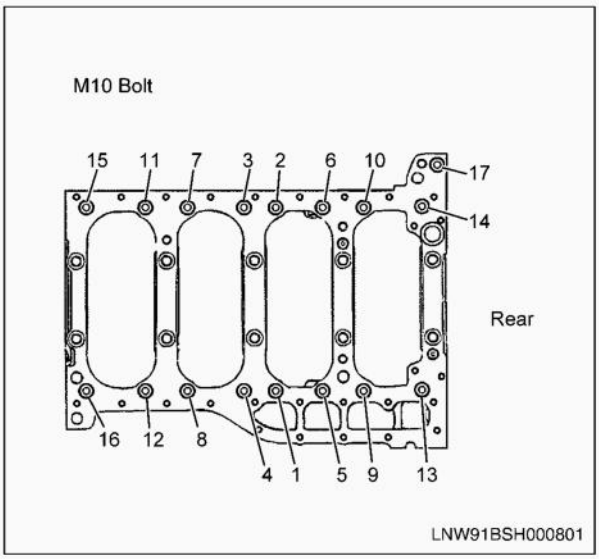


N6A0206E

3. Repeat Steps 1 and 2 to measure the crankpin diameter.
   If the measured values are less than the limit, the crankshaft must be reground or replaced.

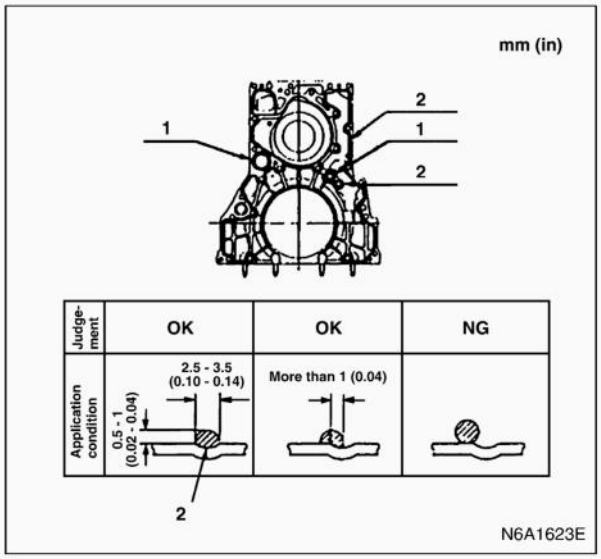
Crankshaft Journal and Crankpin Diameter		mm (in)
	Standard	Limit
No.1,2,4 and 5 Journal	81.905 — 81.925 (3.2246 — 3.2254)	81.85 (3.2224)
No.3 Journal	81.891 — 81.911 (3.2241 — 3.2248)	81.85 (3.2224)



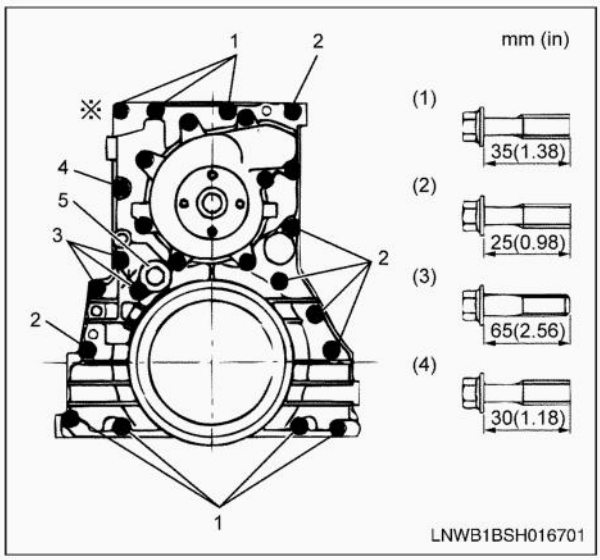


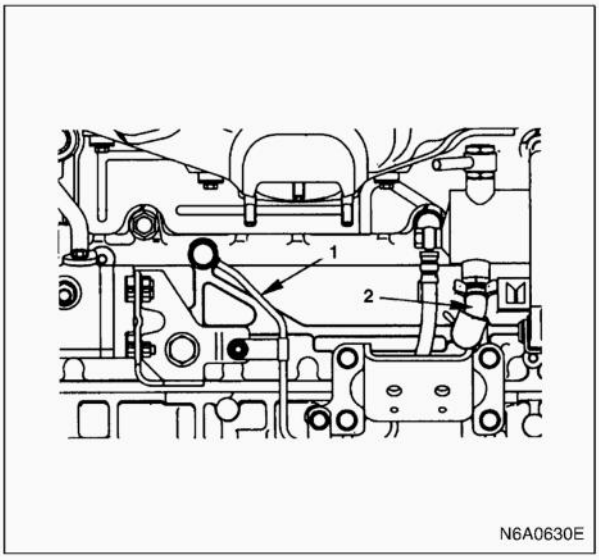
7. Piston and Connecting Rod Assembly
8. Connecting Rod Lower Bearing
9. Connecting Rod Cap Assembly
   Above works refer to "Piston and Connecting Rod" section in this manual.
10. Oil Pump Assembly
11. Idle Gear A
    Above works refer to "Oil Pump Assembly" section in this manual.
12. Flywheel Housing
13. Power Steering Pump Idle Gear
14. Power Steering Pump Idle Gear Cover
15. Oil Thermo Valve
    Above works refer to "Timing Gear Replacement" section in this manual.
16. Front Cover
    1) Carefully wipe any foreign material from the cylinder block front face.
    2) Apply 2.5 — 3.5 mm (0.10 — 0.14 in) bead of the recommended liquid gasket (ThreeBond 1207C) or its equivalent on the groove of the front cover fitting surface shown in the illustration.
    3) Install the O-rings (2 pieces) to the front cover.
    - Install the front cover within 7 minutes after application of liquid gasket.
    - For the dislocation of liquid gasket, refer to the illustration.
    4) Align the cylinder block knock pins with the front cover knock pin holes.

Tighten:
Front cover bolt to 24 N·m (2.4 kg·m/17 lb·ft)



Legend
1. O-ring
2. Liquid gasket

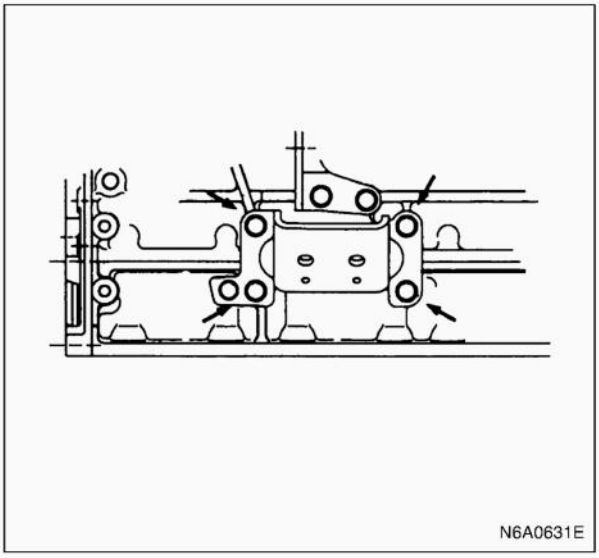




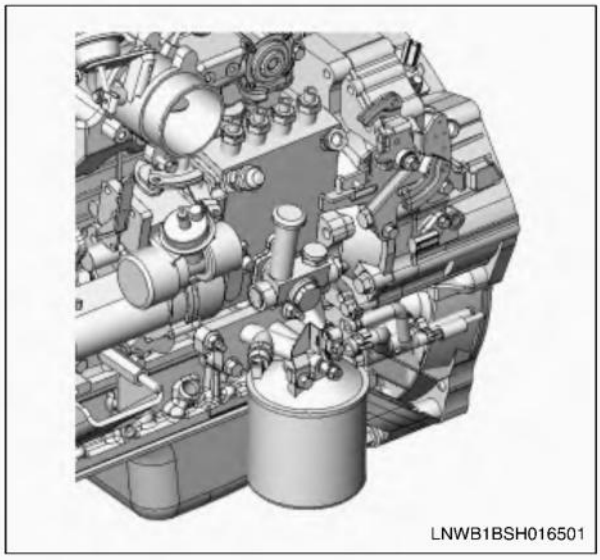
Legend

1. Vacuum pump oil pipe
2. Vacuum pump rubber hose

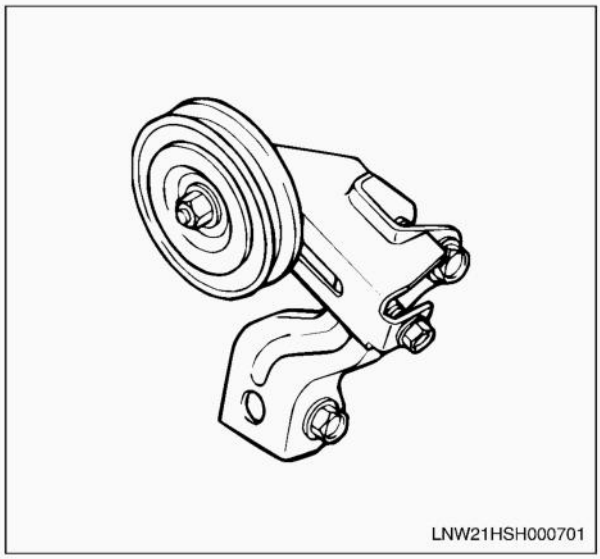
22. Fan Belt
23. Generator
24. Engine Foot

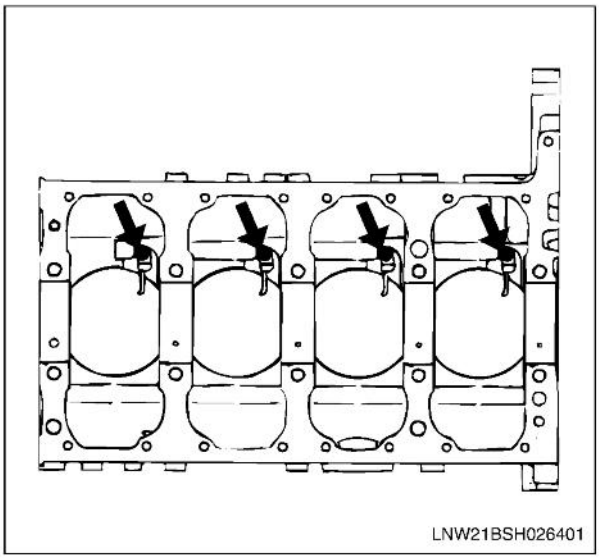


25. Injection Pump Assembly
    1) Remove the injection pump bracket bolts and the injection pump rear bracket bolts.
    2) Then remove the injection pump assembly.

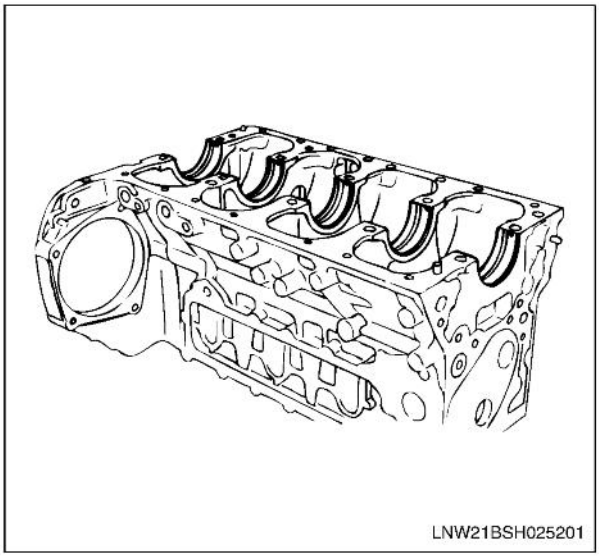


26. Injection Pump Rubber Spacer
27. Idle Pulley Bracket (If equipped with A/C)




LNW21BSH026401

3. Crankshaft Bearing Upper
   When replacing the crankshaft or the crankshaft bearing with a new one, select the crankshaft bearing according to the respective grades stamped on the crankshaft and the cylinder block.
   Refer to the "Crankshaft" in section.
   All upper bearings have oil grooves.

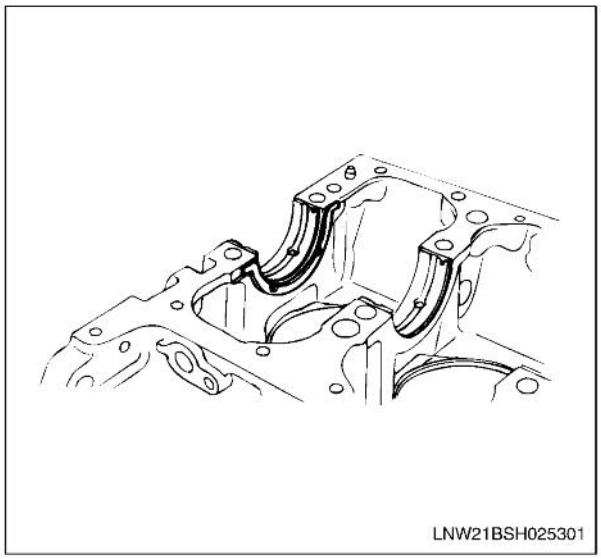

LNW21BSH025201

   1) Carefully wipe any foreign material from the upper bearing.

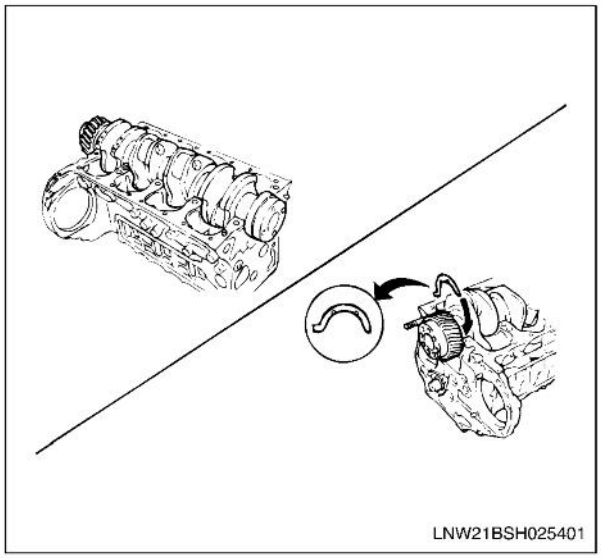
Caution:
Do not apply engine oil to the bearing back faces and the cylinder block bearing fitting surface.

   2) Locate the position mark applied at disassembly if the removed upper bearings are to be reused.
4. Thrust Bearing Upper
   Install the thrust bearing upper to the front side of the cylinder block No.5 journal. At this time, the thrust bearing upper may be pasted to the cylinder block with grease.
   However, be sure to wipe off nay excessive grease.

Caution:
The thrust bearing oil grooves must be facing the crankshaft.


LNW21BSH025301

5. Crankshaft Assembly
   Apply an ample coat of engine oil to the crankshaft journals and the crankshaft bearing surfaces before installing the crankshaft with timing gear.

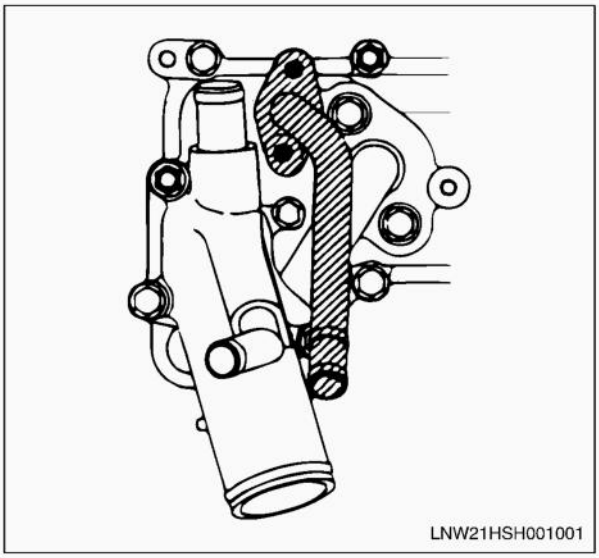

LNW21BSH025401

6. Crankshaft Bearing Lower
   All lower bearings does not have oil grooves.
   1) Carefully wipe any foreign material from the lower bearing.

Caution:
Do not apply engine oil to the bearing back faces and the crankcase bearing fitting surfaces.

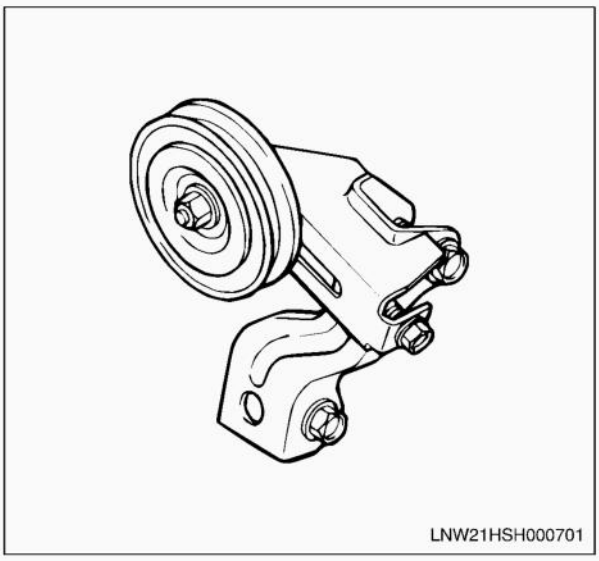
   2) Locate the position mark applied at disassembly if the removed lower bearings are to be reused.

Tighten:
Heater pipe bolt to 24 N·m (2.4 kg·m/17 lb·ft)



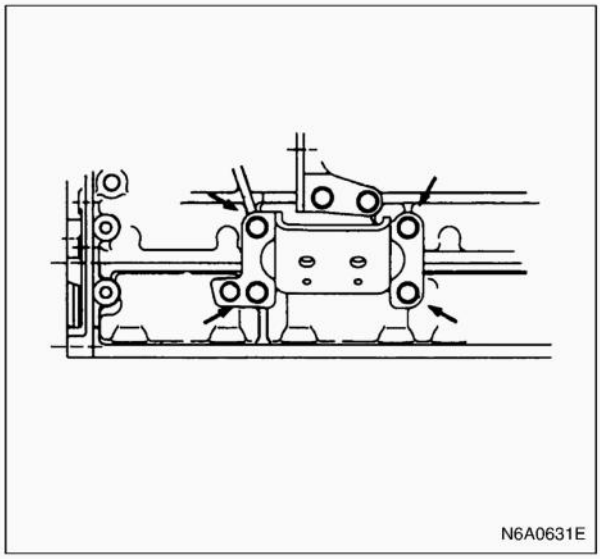
38. Idle Pulley Bracket (If equipped with A/C)

Tighten:
Idle pulley bracket bolt to 24 N·m (2.4 kg·m/17 lb·ft)



39. Injection Pump Rubber Spacer
40. Injection Pump Assembly
    Above works refer to "Injection Pump Assembly" section in this manual.
41. Engine Foot

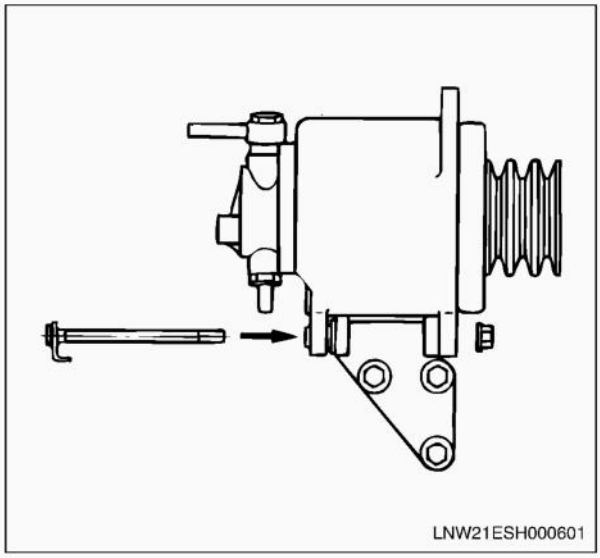
Tighten:
Engine foot bolt to 51 N·m (5.2 kg·m/38 lb·ft)



42. Generator

Note:
When tightening the generator, tighten in advance the fan belt temporarily after its adjustment.

- Insert through the lower fixing bolt from the rear side as shown in the illustration, and tighten it with a nut on the front side.

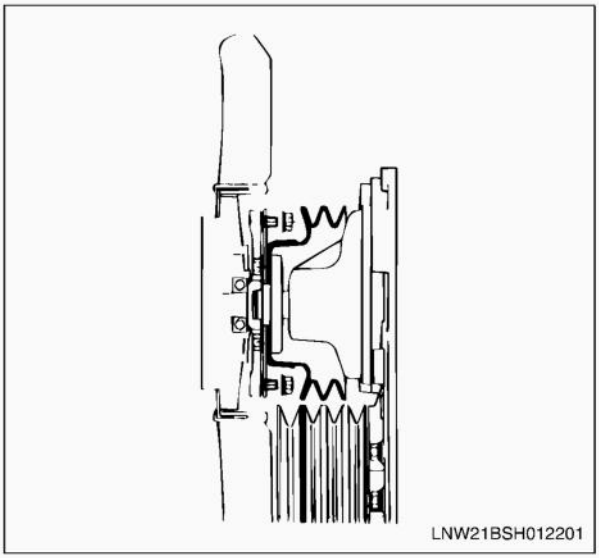


43. Fan Belt
    Check the drive belt tension.
    Depress the drive belt mid-portion with a 98 N (10 kg/22 lb) force or measure the drive belt vibration frequency.

Drive Belt Deflection	mm (in) / Hz
New belt	8 — 12 (0.31 — 0.47) / 140 — 170
Reuse belt	10 — 14 (0.39 — 0.55) / 121 — 139

Check the drive belt for cranking and other damage.

2. Fan Guide
3. Fan



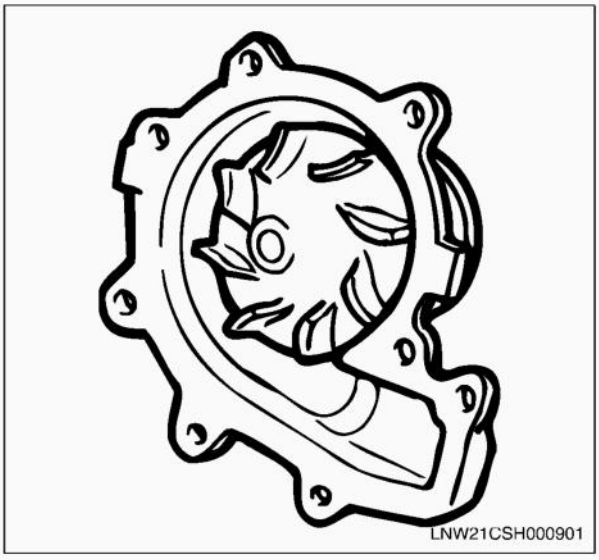
4. Fan Belt
5. Water Pump Pulley
6. Water Pump Assembly

Inspection

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.

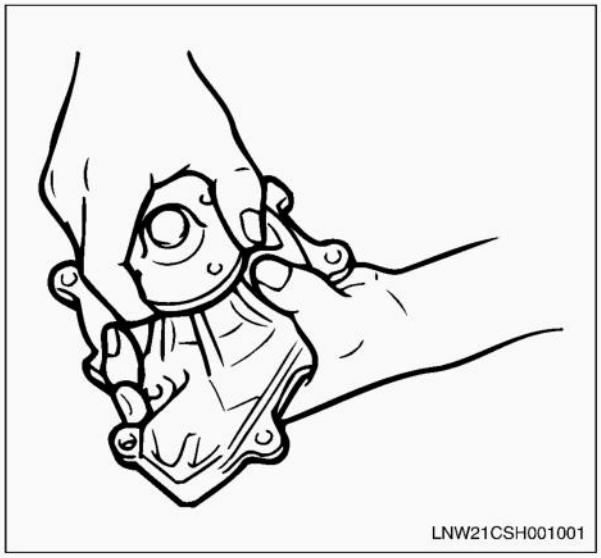
Water Pump Assembly

1. Check the pump body for crack and damage.
2. Check the impeller for crack and corrosion.
3. Check the seal unit leakage.
4. If there is any abnormal condition, replace the water pump as an assembly.



Bearing Unit

1. Rotate the fan center while pushing it toward the radius, and check to see if there is any excessive play or noise.
2. When there is any excessive play or noise found, replace it as a water pump assembly.

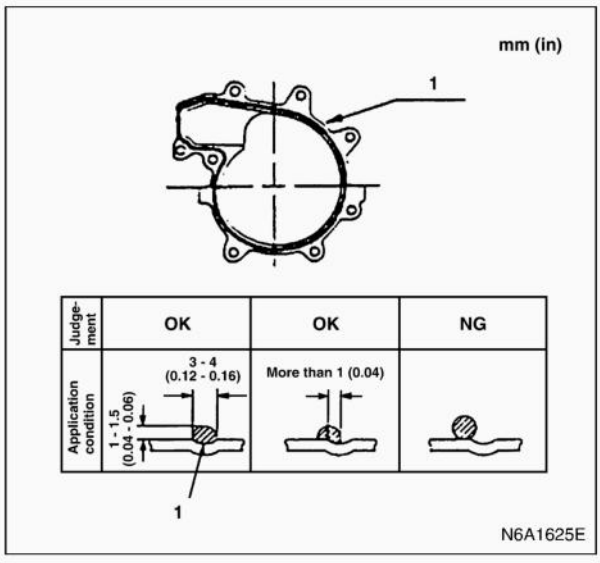


Installation

1. Water Pump Assembly
   1) Apply 3 — 4 mm (0.12 — 0.16 in) bead of the recommended liquid gasket (ThreeBond 1207C) or its equivalent on the water pump fitting surface.
   2) Install the water pump to the front cover.

Tighten:
Water pump bolt to 24 N·m (2.4 kg·m / 17 lb·ft)

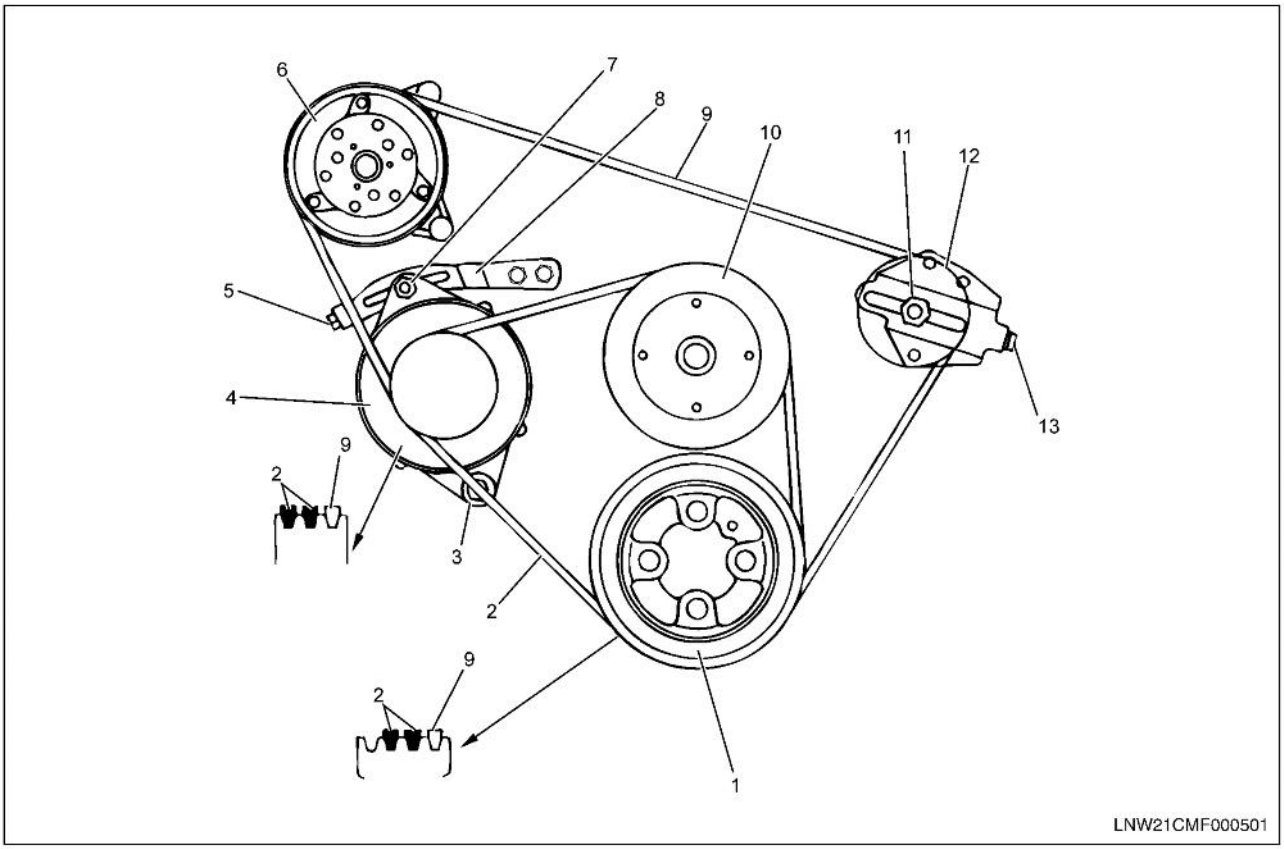
- Install the water pump within 7 minutes after application of liquid gasket.
- For the dislocation of liquid gasket, refer to the illustration.



Legend
1. Liquid gasket

Drive Belt Adjustment

Component



Legend

1. Crank pulley
2. Generator drive belt
3. Generator fixing bolt
4. Generator
5. Adjusting bolt
6. A/C compressor
7. Adjust plate lock nut
8. Adjust plate
9. A/C compressor drive belt
10. Water pump pulley
11. Tension pulley lock nut
12. Tension pulley
13. Adjusting bolt

Inspection

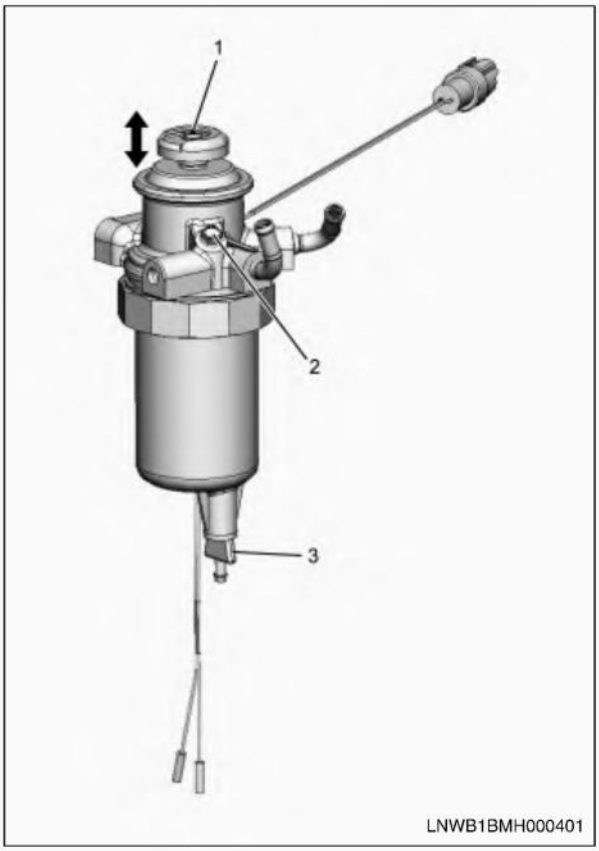
Check drive belts for wear or damage, and replace with new ones as necessary. Check belts for tension, and adjust as necessary.

1. Check drive belts tension
2. Push the middle of belts with a force of 98 N (10 kg / 22 lb) and check each belt for deflection or vibration frequency.

Drive Belt Deflection	mm (in) / Hz
New belt	8 — 12 (0.31 — 0.47) / 140 — 170
Reuse belt	10 — 14 (0.39 — 0.55) / 121 — 139

A/C Drive Belt Deflection	mm (in)
New belt	16 — 20 (0.63 — 0.79)
Reuse belt	18 — 22 (0.71 — 0.87)

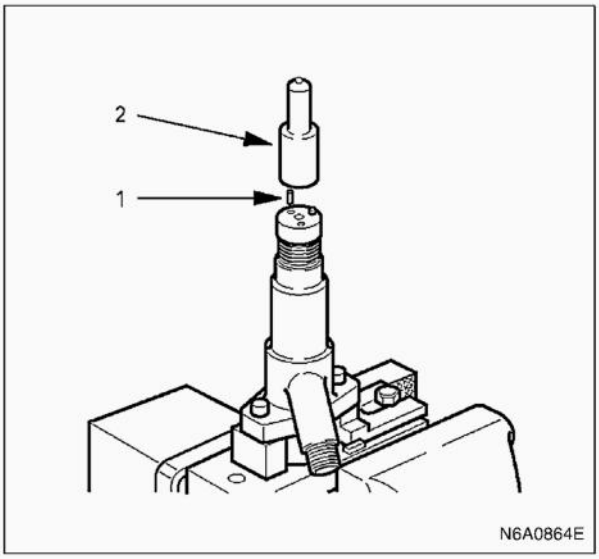
4HG1-T



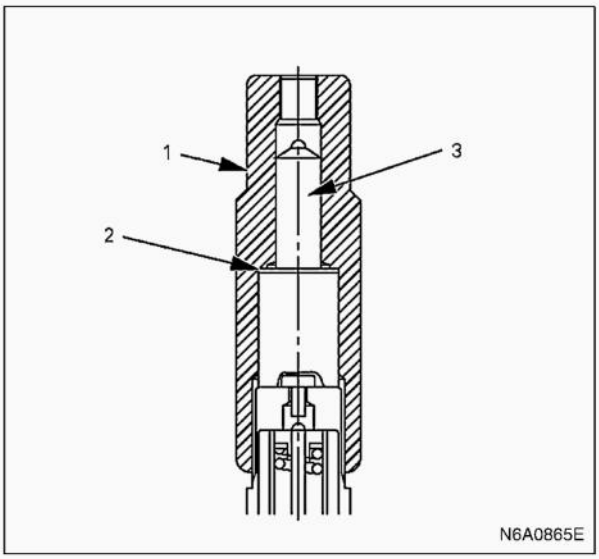
Legend

1. Priming pump
2. Air bleeding plug
3. Drain plug

6. Start the engine and check to be sure no fuel is leaking from the drain plug.



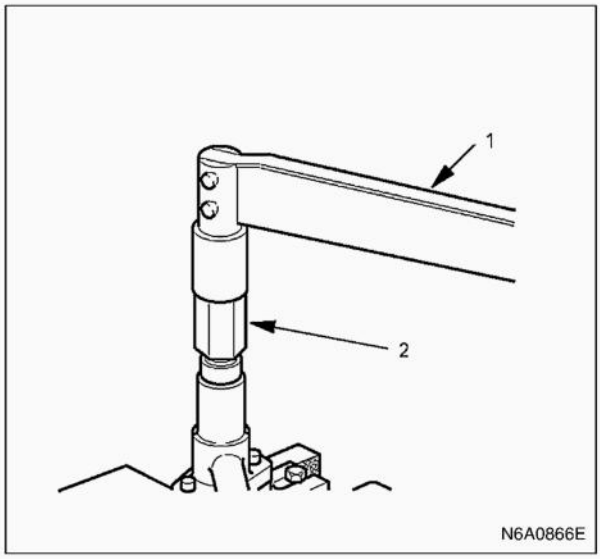
7. Hand-tighten the adjustment retaining nut together with the gasket to the nozzle holder.
   Retaining nut: 157892-3200 (* Bosch AS)
   Gasket: 157892-5100 (* Bosch AS)
   (* Bosch Automotive System Corporation)



Legend

1. Retaining nut (special tool)
2. Gasket
3. Nozzle

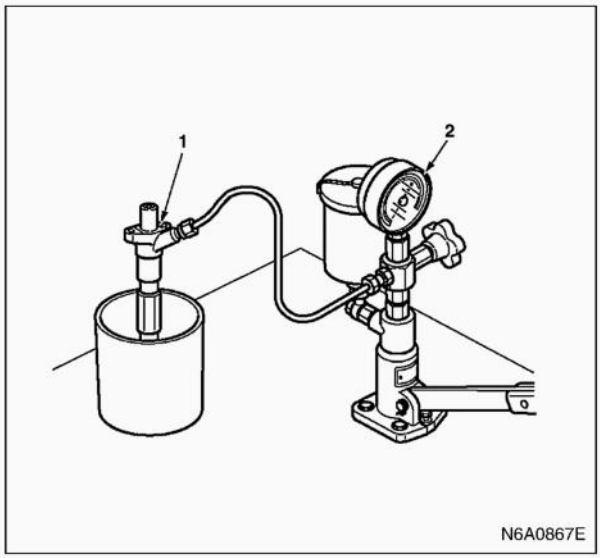
8. Tighten the adjustment retaining nut to the specified torque.
   Torque: 29 — 39 N·m (3.0 — 4.0 kg·m/257 — 345 lb·in)



Legend

1. Torque wrench
2. Retaining nut (special tool)

9. Set the nozzle holder (1) to the nozzle tester (2).

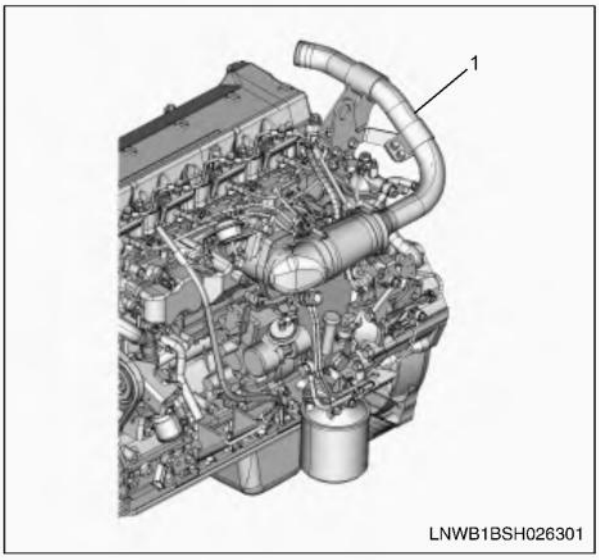


10. Operate the nozzle tester and measure the first nozzle opening pressure.
11. If the first nozzle opening pressure is not as specified, disassemble the nozzle holder and replace the shim until the pressure is as specified.

Caution:

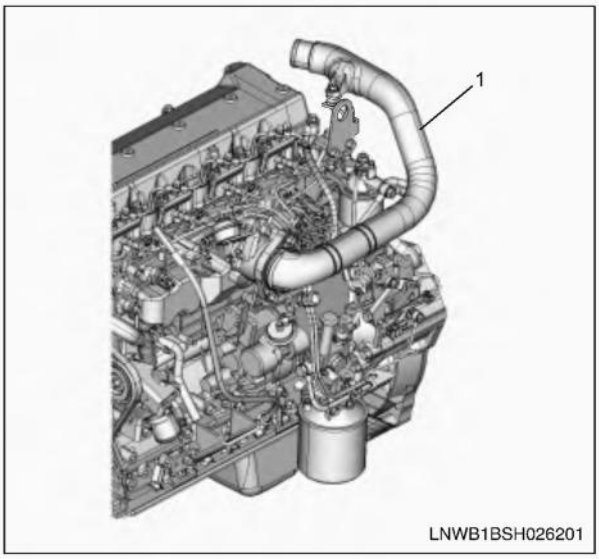
- Use a micrometer to measure shim thickness.
- Use some combination of 3 adjusting shims to adjust the pressure.

Metal Type



Legend
1. Intake air duct

Resin Type



Legend
1. Intake air duct

2. Vacuum Hose
3. Oil Level Guide Tube
   - Remove the guide tube fixing bolt and pull out the guide tube.

Injection Volume and Governor Performance Diagram

Identification Numbers	: 101401-7430/101401-7440	
[4HG1]		
Pre-stroke	: No. 1 plunger 4.1±0.05 mm (0.1614±0.0020 in)	
Injection order	: 1 — 3 — 4 — 2 (interval 90°±30') Plungers are numbered from the Governor side	
Tappet clearance	: Bolt adjustment type	: More than 0.3 mm (0.0118 in) for all cylinders.
	: Shim adjustment type	: Manually rotate the camshaft 2 — 3 times and confirm that it rotates smoothly.

Injection Volume

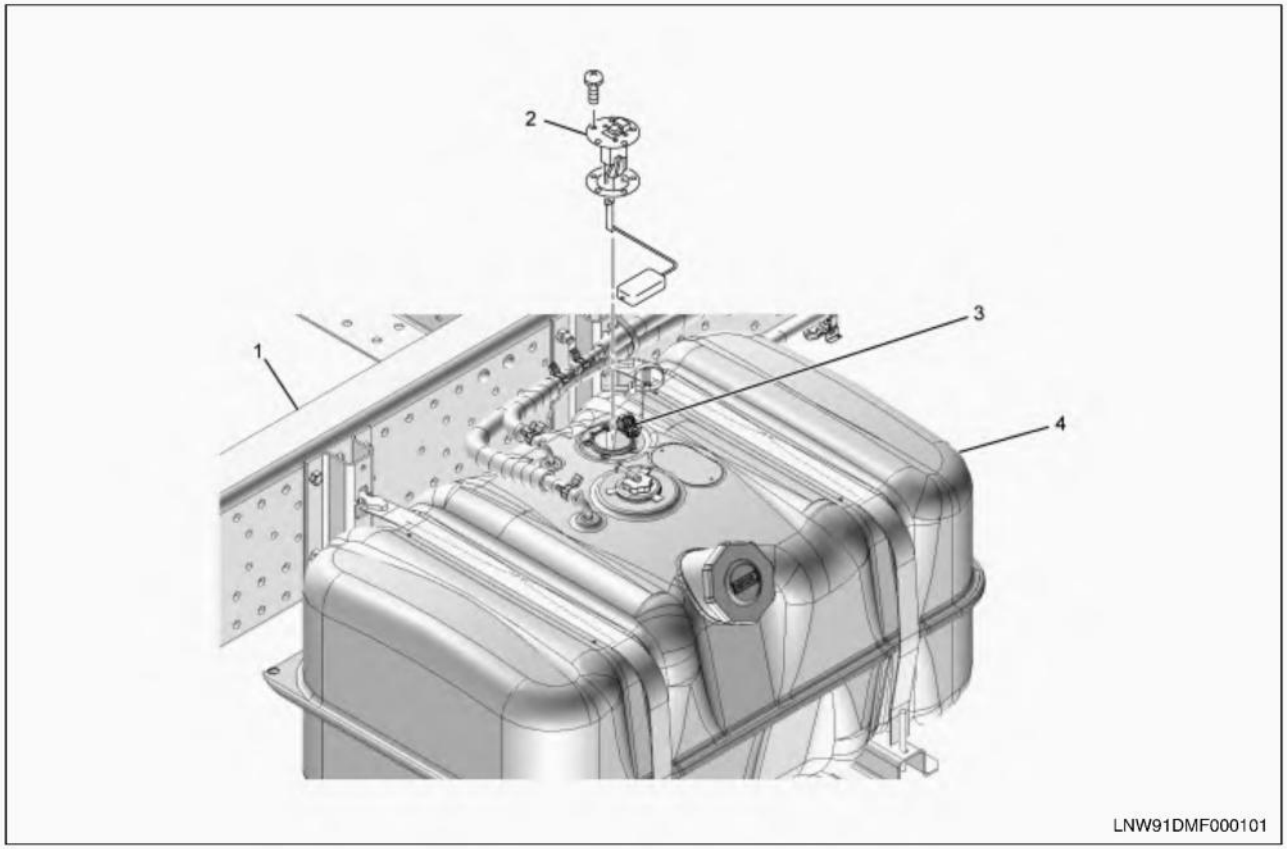
Adjusting point	Pump speed (r/min)	Injection volume (cc/ 1000 strokes)	Variance (%)	Remarks
	1,310	70.5±1.6	±4	Basic
H	315	10±1.3	±10.0	
A	1,310	70.5±1	—	Basic
B	1,600	(75.5)±2	—	
C	520	(64)±2	—	
D	960	$(70.5)^{+2}_{-0}$	—	
I	150	$(95)^{+16}_{-0}$	—	

Timing Advance Specification

Pump Speed (r/min)	1,050 or less	1,000	1,600 or more
Degree for Angle of Lead (deg.)	Start	0.5 or less	Finish 5±0.5

Fuel Tank Unit

Component



Legend

1. Frame
2. Fuel tank unit
3. Fuel tank unit connector
4. Fuel tank

Removal

Preparation

Disconnect the Battery ground cable.

1. Fuel Tank Unit Connector
   - Disconnect the fuel tank unit connector from the fuel tank unit.
2. Fuel Tank Unit
   - Remove the fuel tank unit fixing screw and fuel tank unit.

Note:

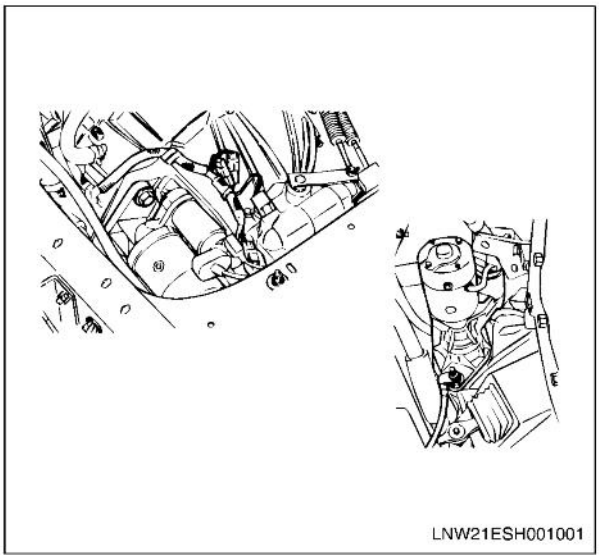
After removing fuel tank unit, cover fuel tank with waste to prevent any dust entering

Installation

1. Fuel Tank Unit
2. Fuel Tank Unit Connector
   - Connect the wiring connector to the fuel tank unit.

- Disconnect the front frame harness connector somewhere near the control box of the transmission, remove each clip that fastens the harness.

2. Starter Assembly

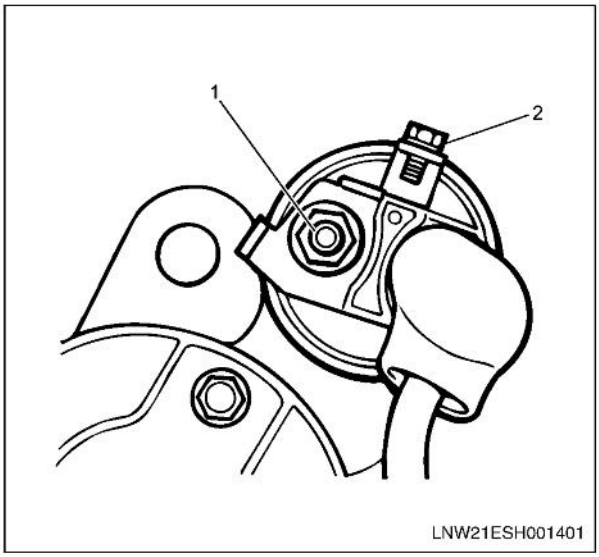


- Remove the starter assembly from flywheel housing.

3. Starter Wiring Connector

Installation

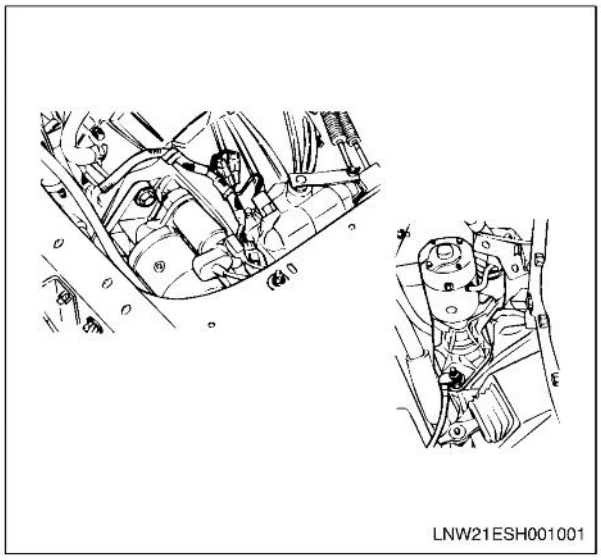
1. Starter Wiring Connector



Legend

1. Terminal B
2. Terminal S

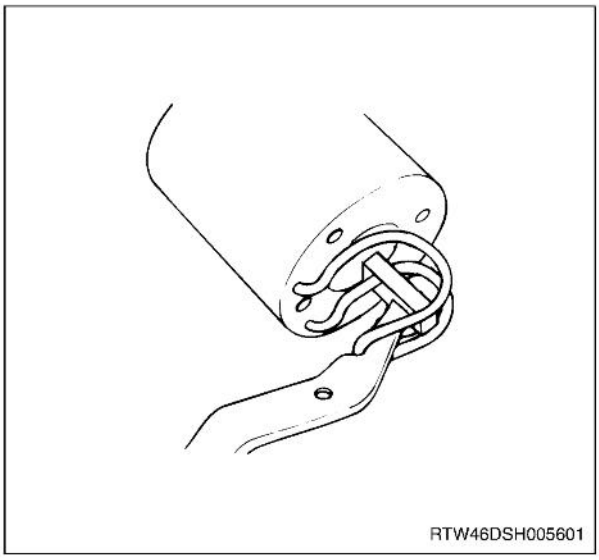
2. Starter Assembly



- Install the starter to the flywheel housing.

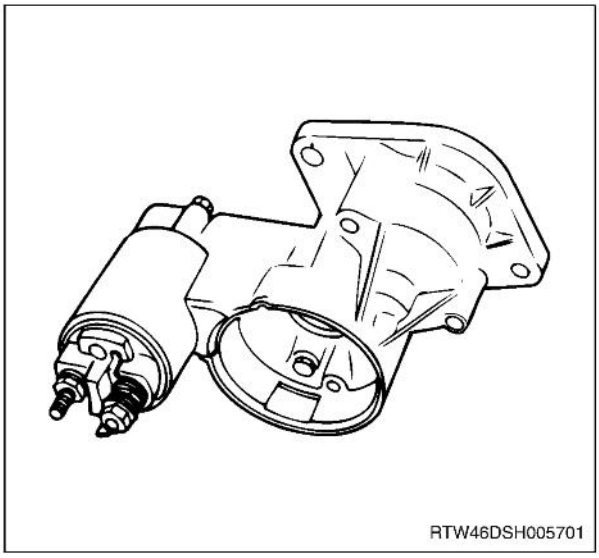
Tighten:
Starter bolt to 76 N·m (7.7 kg·m / 56 lb·ft)

3. Starter Earth Cable
   - Connect the earth cable to the starter motor.
   - Connect the battery ground cable.


RTW46DSH005601

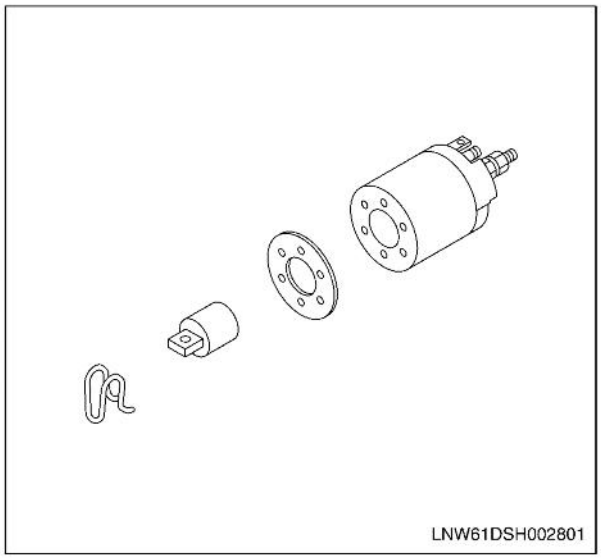
2) Insert the shift lever into the plunger hole of the magnetic switch.

5. Dust Cover
   Install the dust cover.
6. Bolt
   Install the magnetic switch assembly in the gear case and tighten the bolt to the specified torque.

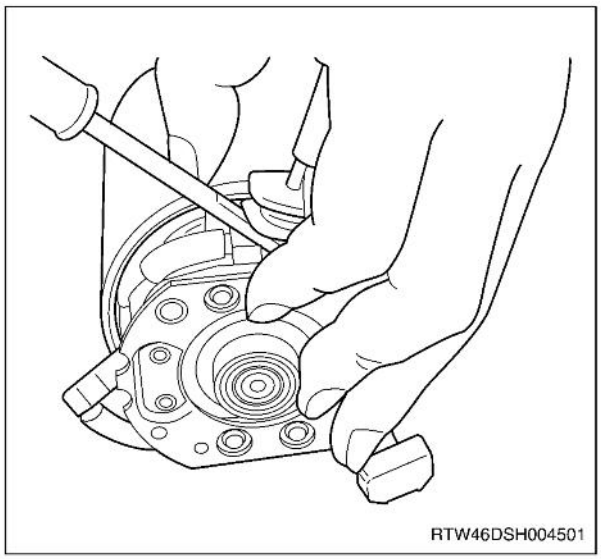

RTW46DSH005701

Tighten:
Gear case bolt to 8 N·m (0.8 kg·m / 69 lb·in)

7. Pinion Clutch
8. Pinion Shaft
   Apply a coat of grease to the pinion clutch gear and install the pinion assembly to the armature shaft.


LNW61DSH002801

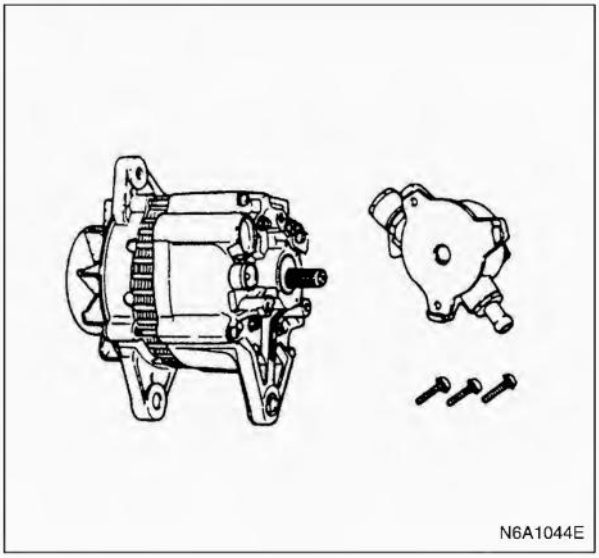
9. Return Spring
10. Pinion Stopper
11. Pinion Stopper Clip
12. Ball Bearing
13. Bearing Holder
14. Clutch Assembly
15. Bearing Retainer
16. Armature
17. Yoke
18. Brush Holder


RTW46DSH004501

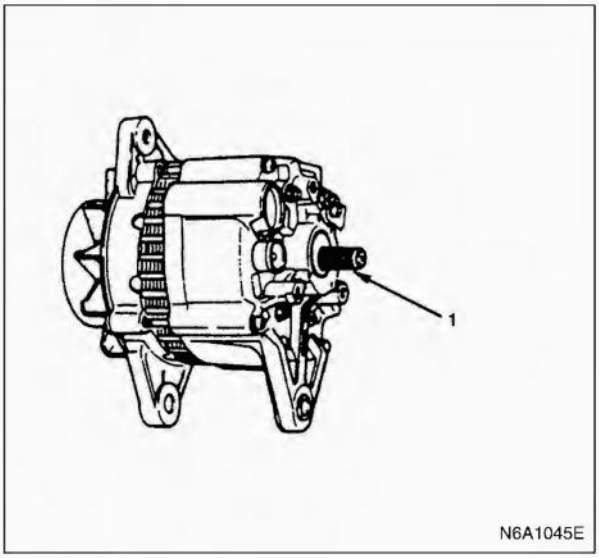
1) Twist the holder spring and hold it.
2) Install the brush to the brush holder.
3) Repeat step 1 and 2 for the reaming holders.
4) Install the brush holder assembly to the yoke.

Disassembly

1. Vacuum Pump Assembly



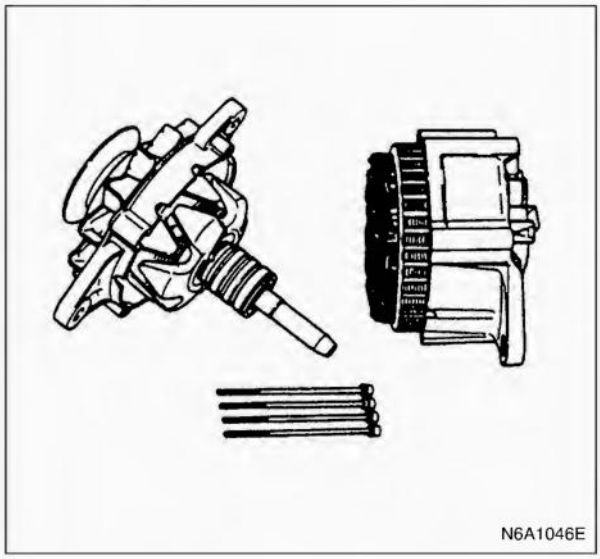
   1) Loosen the vacuum pump fixing bolts.
   2) Support the vacuum pump center plate.
   3) Carefully remove the vacuum pump.
2. Through Bolt
3. Rotor and Front Cover Assembly
4. Stator and Rear Cover Assembly
   1) Loosen the through bolts.
   2) Remove the rotor and front cover assembly from the stator and rear cover assembly.
      Do not allow the stator to separate from the rear cover.
      Take care not to damage the oil seal.
      Tape the rotor splines to protect them from damage.



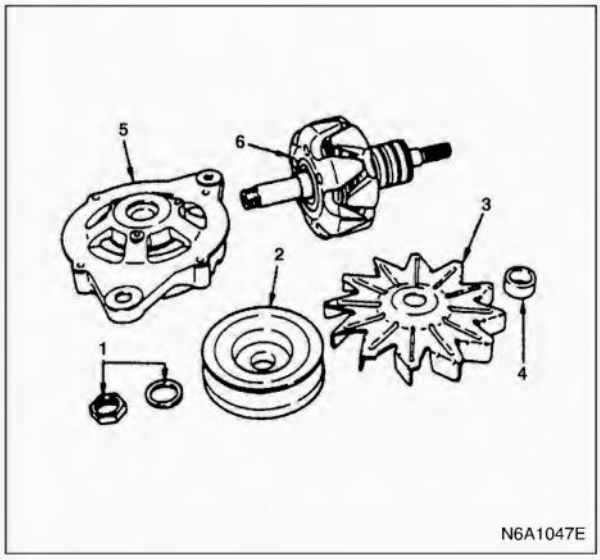
Legend

1. Taping

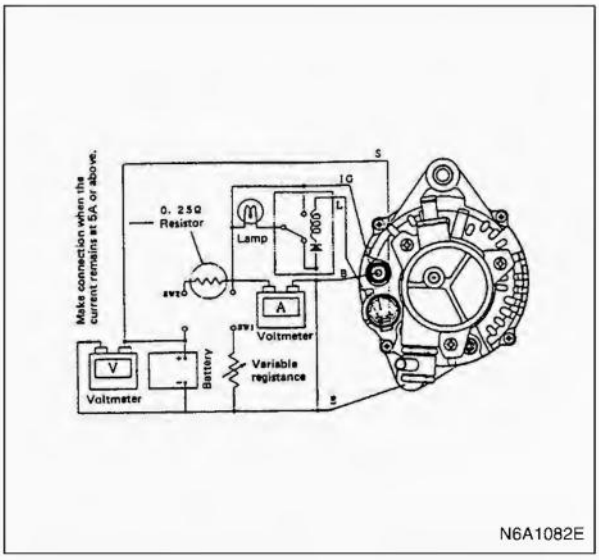
5. Pulley Nut
6. Pulley
7. Fan
8. Spacer
9. Rotor



   1) Carefully clamp the rotor assembly in a vice.



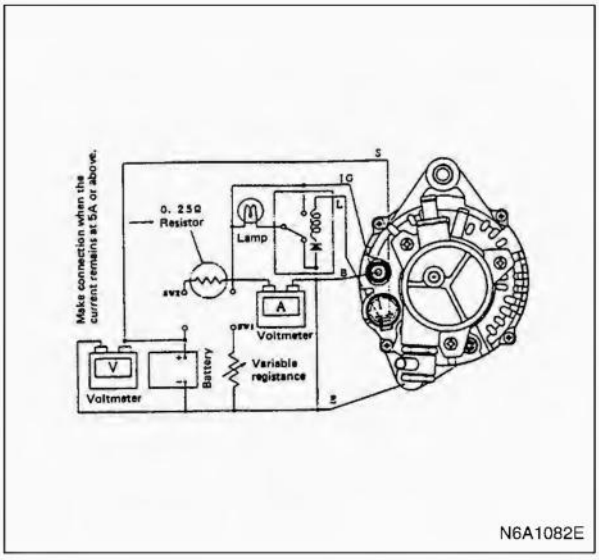
   2) Loosen the pulley nut (1).
   3) Remove the pulley (2), the fan (3), the spacer (4), the front cover (5) and the rotor (6).
10. Front Cover
11. Bearing Retainer
12. Front Ball Bearing
13. Rear Ball Bearing
14. Terminal Nut and Bolt
15. Stator



- Use a fully charged battery to conduct the measurement with the current outputted from the battery terminals at 5A or less.

Note:
When conducting the performance test:
For the connection between the generator B terminal and the battery (+) terminal and between the E terminal and the battery (–) terminal, use a lead wire with a cross section of 8 mm^2 and the length of 2.5 m or less.

2. Adjusting voltage measurement

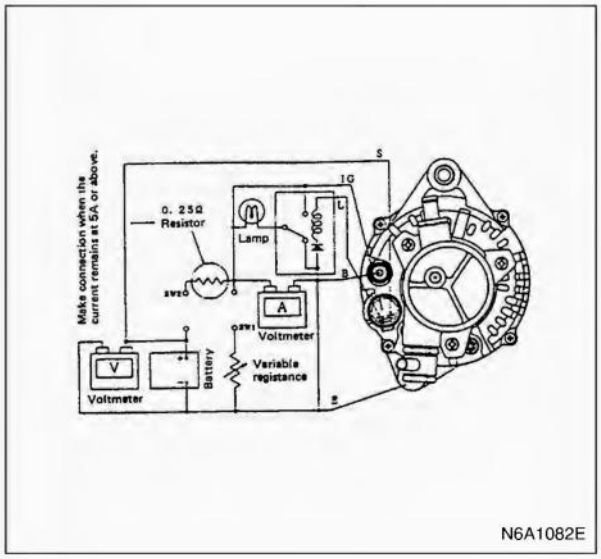


- Open SW1 and close SW2.
- With the number of the generator rotations raised up to its rated rotations of 5,000 r/min, measure the adjusting voltage.

Adjusting voltage = 28 - 29V

- Check to see if the fluctuation in the adjusting voltage is not caused by the increased number of rotations.

3. Measurement of the number of rotations at 27V
   - Open SW1 and close SW2.
   - Increase the number of the generator rotations gradually until the reading of the voltmeter indicates 27V. Measure the number of rotations at this time.
4. Output current measurement

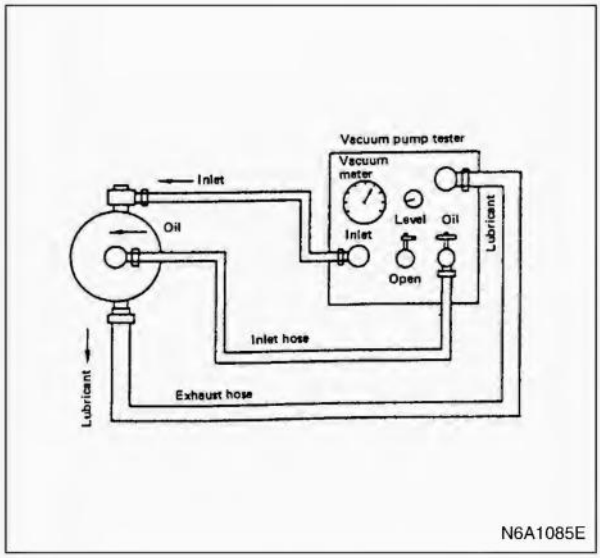


- Set the resistance of the variable resistor at the minimum, and rotate the generator with SW1 and SW2 closed.
- While keeping the voltage steady at 27V after adjusting the variable resistor, read the indicated value of the ammeter at the generator rotation of 5,000 r/min.

Current at 27V with 5,000 r/min = 42A or more (for 50A specification)

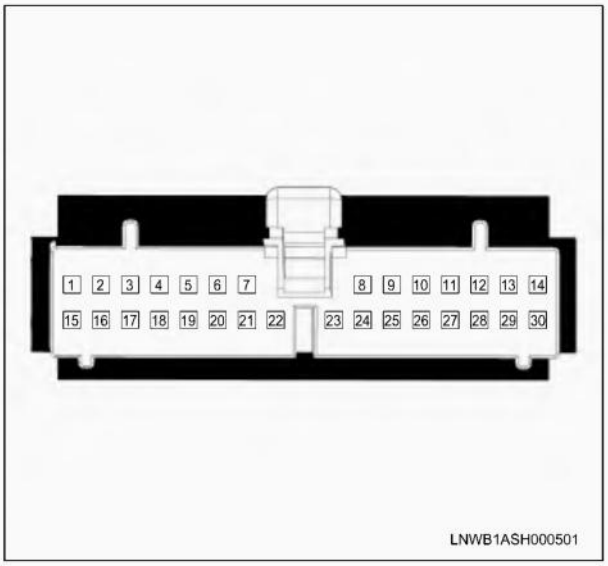
Current at 27V with 5,000 r/min = 75A or more (for 80A specification)

5. Unit test of vacuum pump
   - With a pipe arrangement as shown in the illustration, use the vacuum pump tester to conduct the measurement.



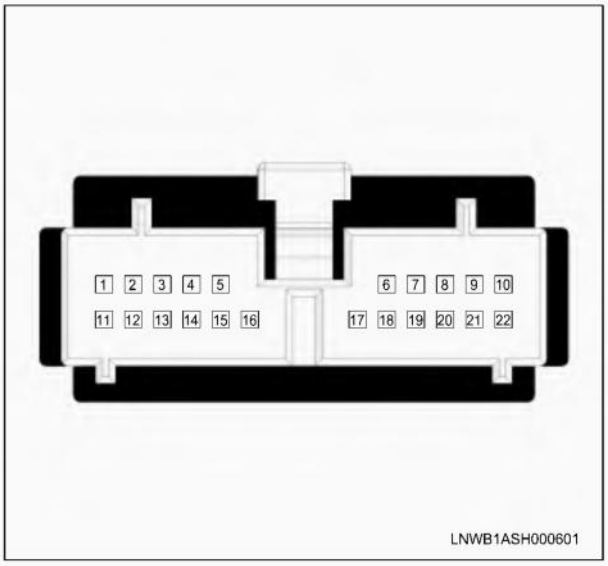
EGR Control Unit Connector End Views

EGR control unit



Connector No.		B420
Connector color		Green
Test adapter No.		J-35616-64B
Pin No.	Wire color	Pin function
1	–	Not used
2	–	Not used
3	–	Not used
4	–	Not used
5	–	Not used
6	RED/ BLK	Ignition voltage
7	BLK/ YEL	Battery voltage
8	WHT	Rack position sensor signal
9	RED	Rack position sensor 5 volts reference
10	–	Not used
11	–	Not used
12	BLK	Glow system detection switch ground
13	–	Not used
14	BLU/ WHT	Keyword serial data
15	–	Not used
16	–	Not used
17	–	Not used
18	–	Not used
19	–	Not used

Connector No.		B420
Connector color		Green
Test adapter No.		J-35616-64B
Pin No.	Wire color	Pin function
20	–	Not used
21	–	Not used
22	–	Not used
23	BLK	Ground
24	BLK	Rack position sensor low reference
25	–	Not used
26	–	Not used
27	–	Not used
28	–	Not used
29	BLU	Diagnostic request switch
30	BLK	Ground



Connector No.		B421
Connector color		Green
Test adapter No.		J-35616-64B
Pin No.	Wire color	Pin function
1	LT GRN	Engine speed sensor signal
2	VIO	Engine speed sensor low reference
3	GRY	ECT sensor signal
4	GRY/ BLK	ECT sensor low reference
5	–	Not used

Lost Communication with The EGR Control Unit

Circuit Description

The EGR control unit communicates with the scan tool over the Keyword serial data link.

Connector End View Reference: Emission Controls Connector End Views or EGR Control Unit Connector End Views

Circuit/ System Testing Lost Communication with The EGR Control Unit

Step	Action	Value(s)	Yes	No
1	Did you perform the Diagnostic System Check - Emission Controls?	—	Go to Step 2	Go to Diagnostic System Check - Emission Controls
2	Attempt to establish communication with the EGR control unit. Does the scan tool communicate with the EGR control unit?	—	Go to Intermittent Conditions	Go to Step 3
3	1. Inspect for an intermittent, for a poor connection and corrosion at the data link connector (DLC) (pin 7 of B31). 2. Repair the connection(s) as necessary. Did you find and correct the condition?	—	Go to Step 9	Go to Step 4
4	1. Check the EGR (10A) fuse and Ignition 1 (15A) fuse in the cabin fuse block. Replace and retest if open. If any fuse continues to open, repair the short to ground on each circuit fed by that fuse. 2. Turn OFF the ignition. 3. Disconnect the EGR control unit B420 harness connector. 4. Turn ON the ignition, with the engine OFF. 5. Connect a test lamp to ground and check the ignition voltage feed circuit at the EGR control unit (pin 6 of B420). 6. Connect a test lamp to ground and check the battery voltage feed circuit at the EGR control unit (pin 7 of B420). Does the test lamp illuminate?	—	Go to Step 6	Go to Step 5
5	Repair the open in the ignition voltage or battery voltage feed circuit to the EGR control unit. Did you complete the repair?	—	Go to Step 9	—
6	1. Turn OFF the ignition. 2. Inspect for an intermittent, for a poor connection and corrosion at the harness connector of the EGR control unit (pin 14 of B420). 3. Test the Keyword serial data circuits between the EGR control unit (pin 14 of B420) and the DLC (pin 7 of B31) for an open circuit or high resistance. 4. Repair the connection(s) or circuit(s) as necessary. Did you find and correct the condition?	—	Go to Step 9	Go to Step 7
7	Check EGR control unit ground terminal for corrosion and tightness. Clean or tighten grounds as necessary. Did you find and correct the condition?	—	Go to Step 9	Go to Step 8

DTC 31 or 32

Circuit Description

The EGR control unit controls the EGR gas flow based on the engine speed, engine coolant temperature and rack position. The EGR control unit controls the EGR valve opening by controlling the EGR solenoid valve which supplies vacuum pressure to the EGR valve. If the EGR control unit detects an open or short circuit on the EGR solenoid valve control circuit, DTC 31 or 32 will set.

Condition for Running the DTC

- The ignition switch is ON.

Condition for Setting the DTC

- The EGR control unit detects a low voltage condition on the EGR solenoid valve control circuit when the solenoid valve is commanded OFF. (DTC 31)
- The EGR control unit detects a high voltage condition on the EGR solenoid valve control circuit when the solenoid valve is commanded ON. (DTC 32)

Action Taken When the DTC Sets

- The EGR control unit blinks the glow plug indicator lamp when the diagnostic runs and fails.
- The EGR control unit inhibits EGR control.

Diagnostic Aids

- If an intermittent condition is suspected, refer to Intermittent Conditions in this section.

Connector End View Reference: Emission Controls Connector End Views or EGR Control Unit Connector End Views

Circuit/ System Testing DTC 31

Step	Action	Value(s)	Yes	No
1	Did you perform the Diagnostic System Check - Emission Controls?	—	Go to Step 2	Go to Diagnostic System Check - Emission Controls
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Monitor the DTC Information with a scan tool. Does the DTC fail this ignition?	—	Go to Step 3	Go to Diagnostic Aids
3	1. Turn OFF the ignition. 2. Disconnect the EGR solenoid valve harness connector. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp between the ignition voltage feed circuit (pin 2 of J234) and a known good ground. Does the test lamp illuminate?	—	Go to Step 5	Go to Step 4
4	Repair the open circuit or high resistance between the Meter (10A) fuse and the EGR solenoid valve (pin 2 of J234). Check the Meter (10A) fuse first. Did you complete the repair?	—	Go to Step 11	—
5	Connect a test lamp across the EGR solenoid valve harness connector (pins 1 and 2 of J234). Does the DTC fail?	—	Go to Step 6	Go to Step 7
6	1. Test the control circuit between the EGR control unit (pin 10 of B421) and the EGR solenoid valve (pin 1 of J234) for the following conditions: • An open circuit • A short to ground • High resistance 2. Repair the circuit(s) as necessary. Did you find and correct the condition?	—	Go to Step 11	Go to Step 8

Step	Action	Value(s)	Yes	No
5	1. Turn OFF the ignition. 2. Disconnect the ECT sensor harness connector E85. 3. Turn ON the ignition, with the engine OFF. 4. Observe the glow plug indicator lamp. Is the glow plug indicator lamp blinked?	—	System OK	Go to Step 6
6	Did the glow plug indicator lamp illuminate in Step 5?	—	Go to Glow Plug Indicator Lamp Always On	Go to Glow Plug Indicator Lamp Inoperative
7	Connect a test lamp between the metal bus bar (glow plug power supply E14 terminal) and a known good ground. Does the test lamp turn ON?	—	Go to Step 8	Go to Step 9
8	1. Turn OFF the ignition. 2. Remove the metal bus bar from the glow plugs. 3. Measure resistance of each glow plug between the glow plug terminals and a known good ground. Are the resistances within the specified value each other?	1 Ω	System OK	Go to Step 19
9	1. Turn OFF the ignition. 2. Replace the glow relay with the starter relay or replace with a known good relay. 3. Connect a test lamp between the metal bus bar (glow plug power supply E14 terminal) and a known good ground. 4. Turn ON the ignition, with the engine OFF. Does the test lamp turn ON?	—	Go to Step 17	Go to Step 10
10	Inspect the Glow (60A) slow blow fuse in the chassis side fuse & relay box. Is the Glow (60A) slow blow fuse open?	—	Go to Step 11	Go to Step 12
11	Replace the Glow (60A) slow blow fuse. If the slow blow fuse continues to open, repair the short to ground on a circuit fed by the slow blow fuse or check for a shorted attached component. Did you complete the repair?	—	Go to Step 20	—
12	1. Turn OFF the ignition. 2. Remove the glow relay. 3. Probe the battery voltage feed circuit of the relay (pin 1 of X19) with a test lamp that is connected to a known good ground. Does the test lamp illuminate?	—	Go to Step 13	Go to Step 14
13	1. Probe the voltage supply circuit of glow plugs (pin 2 of X19) with a test lamp that is connected to a known good ground. 2. Turn ON the ignition, with the engine OFF. Does the test lamp illuminate?	—	Go to Step 16	Go to Step 15

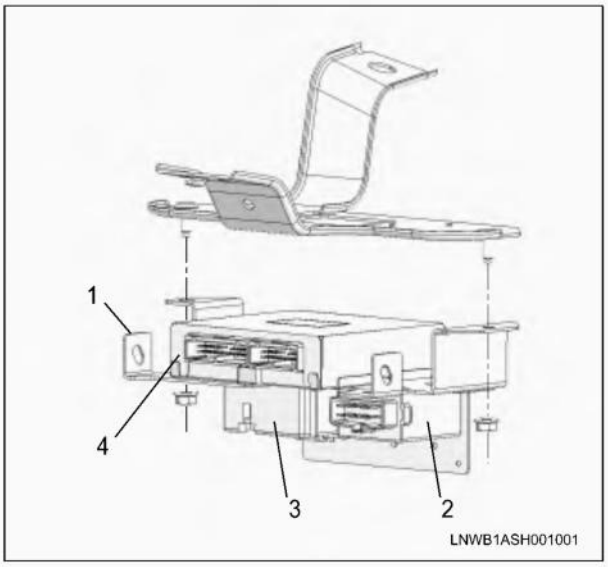
Step	Action	Value(s)	Yes	No
21	Replace the exhaust brake solenoid valve. Refer to Exhaust Brake Solenoid Valve in Section 1G Engine Exhaust. Did you complete the replacement?	—	Go to Step 24	—
22	Replace the intake throttle solenoid valve. Refer to Intake Throttle Solenoid Valve in Section 1J Induction. Did you complete the replacement?	—	Go to Step 24	—
23	Replace the exhaust brake control relay. Did you complete the replacement?	—	Go to Step 24	—
24	Reconnect all previously disconnected components, fuse or harness connector(s). Did you complete the action?	—	Go to Step 3	—

Checks	Action
Electrical System Checks	Inspect the engine electrical for the following conditions. • Glow plug control system operation. Refer to Glow Control System Check in this section. • Starting system operation. Refer to section 1E Engine Electrical. • Weakened batteries.

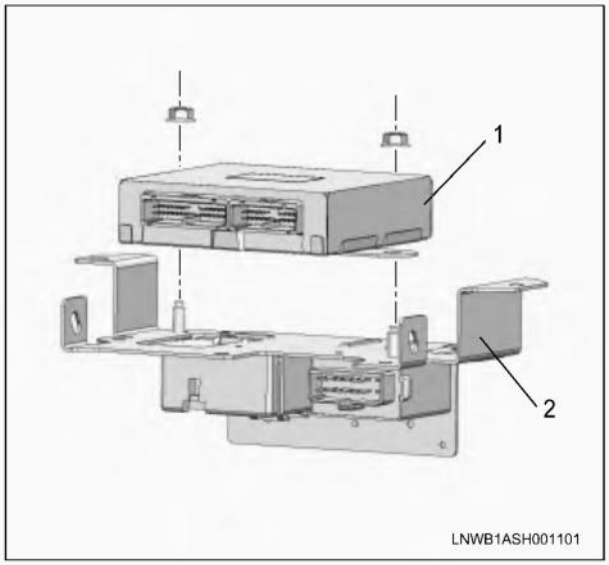
EGR Control Unit

Removal

1. Disconnect the battery negative cable.
2. Remove the knee bolster panel.
   - Refer to Instrument Panel in section 9K Interior & Exterior Trims.
3. Remove the side trim panel.
   - Refer to Instrument Panel in section 9K Interior & Exterior Trims.
4. Remove the windshield washer tank.
   - Refer to Windshield Washer Motor in section 9B Windshield Wiper & Washer.
5. Disconnect the harness connectors from the EGR control unit, intermittent relay and the door lock controller.
6. Loosen the nuts and remove the bracket (1) with the EGR control unit (4), intermittent relay (2) and the door lock controller (3).



7. Loosen the nuts and remove the EGR control unit (1) from the bracket (2).



Installation

Perform installation the reverse order the removal.

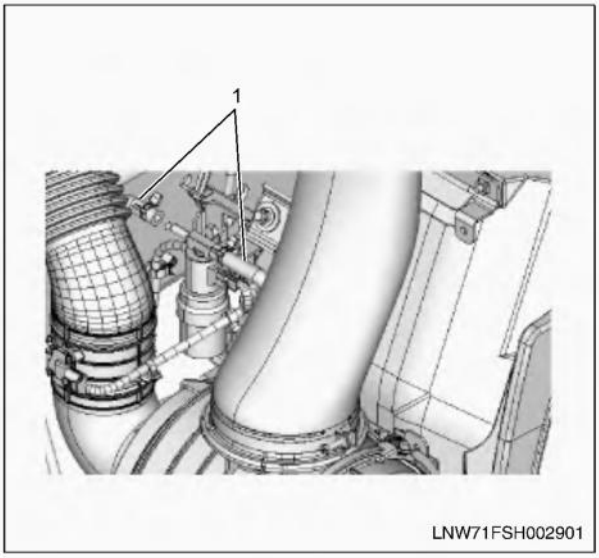
Functional Inspection:

- When inspecting or repairing the exhaust system, check that there is an adequate gap between the floor and body.
- Damage caused by heat from the body panel or vibrations can cause exhaust gas to enter the cabin. Be careful.
- Inspect for loose or damaged connections and exhaust gas leaks.
- Inspect the clamp and rubber for degradation, cracks or damage.
- If the pipes or silencer are damaged or dented, repair or replace them.
- Inspect for dents or damage, or holes and fractures caused by corrosion, and abnormal noise when driving the vehicle.

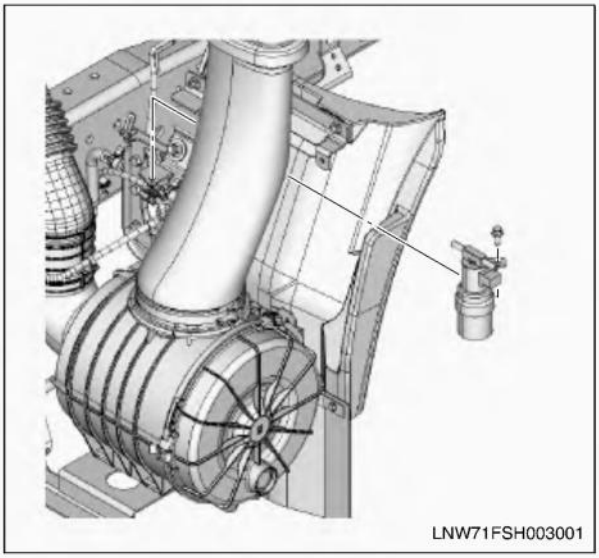
Exhaust Brake Solenoid Valve

Removal

1. Remove the rubber hoses (1).

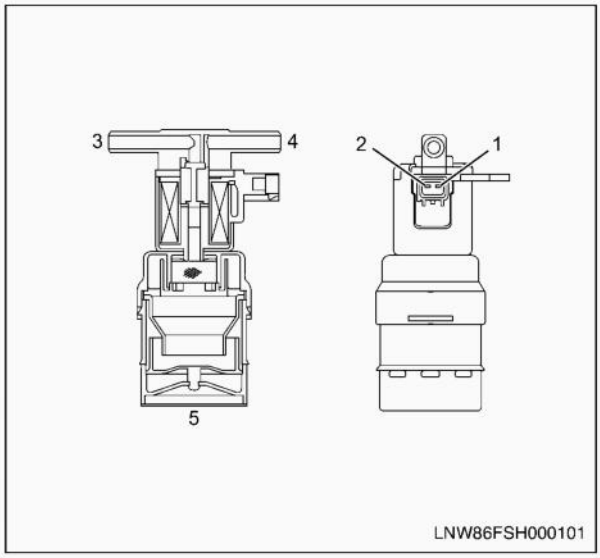


2. Remove the exhaust brake solenoid valve.



Inspection

1. Perform a continuity test between terminals (1) and (2), and confirm that continuity exists.

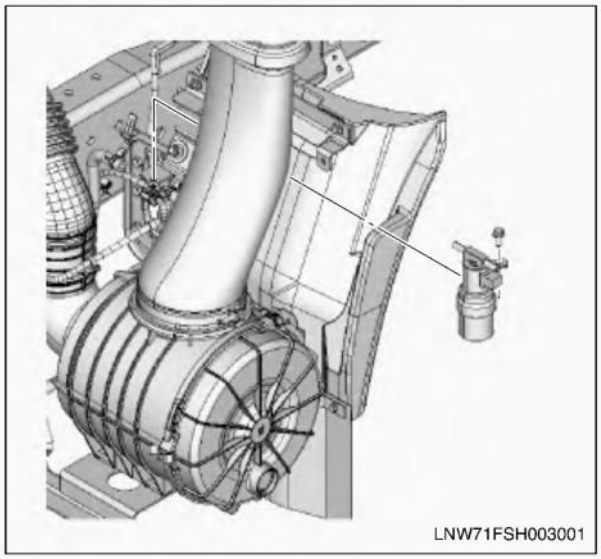


2. Confirm that air exits from (5) when blowing your breath from (4). At this time, confirm that air does not exit from (3).
3. Confirm that an operation sound is made when providing power supply voltage to the connector.
4. While providing power supply voltage to the connector, confirm that air exits from (3) when blowing your breath from (4).
   At this time, confirm that air does not exit from (5).

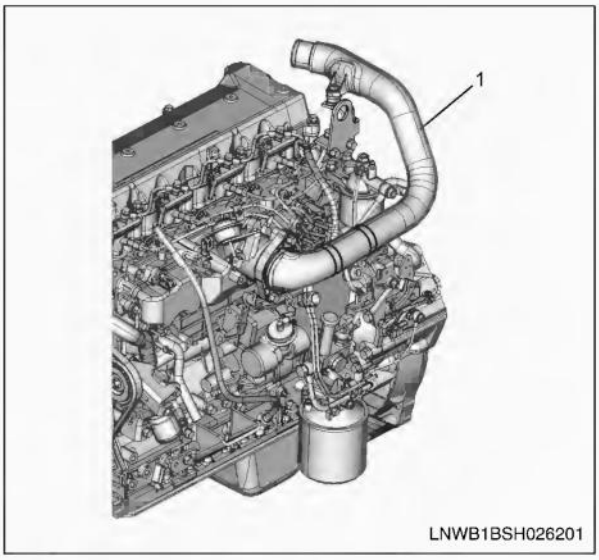
Installation

1. Install the exhaust brake solenoid valve.

Tighten:
20 N·m (2.0 kg·m / 14 lb·ft)



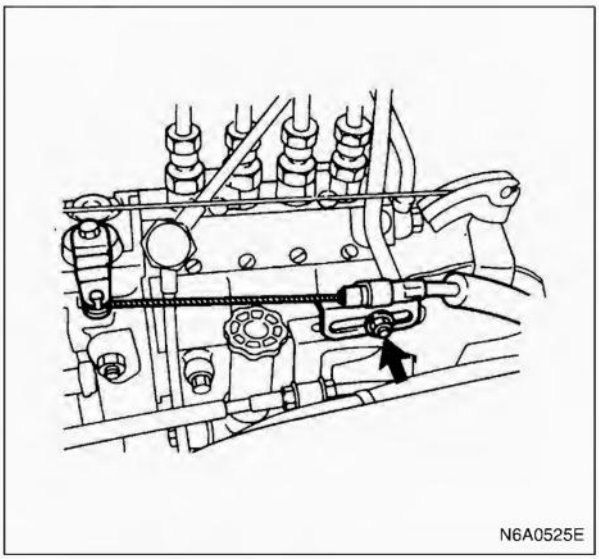
Resin Type



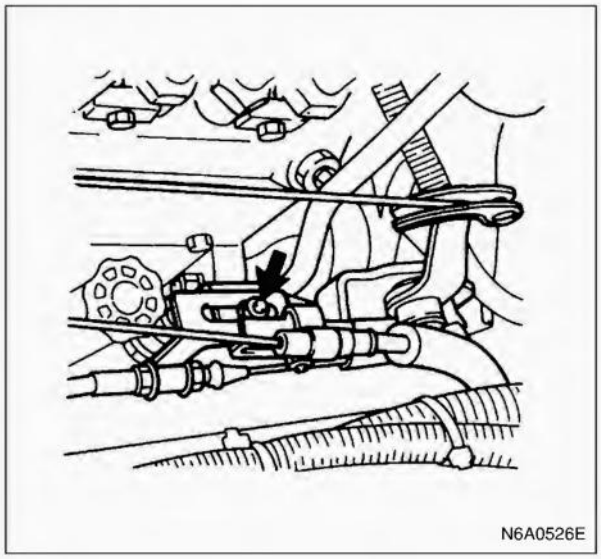
Legend

1. Intake air duct

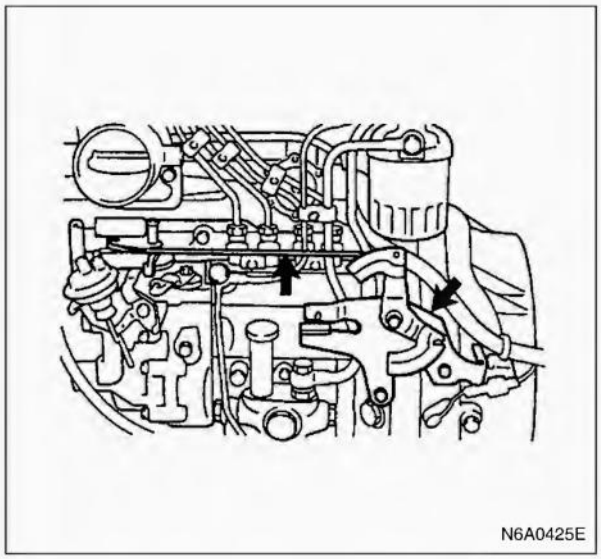
4. Engine Stop Cable
   Loosen the locking nut at the bracket and disconnect engine stop cable from injection pump stop lever.



5. Accelerator Control Cable
   Loosen the locking nut at the bracket and disconnect accelerator control cable from injection pump control lever.



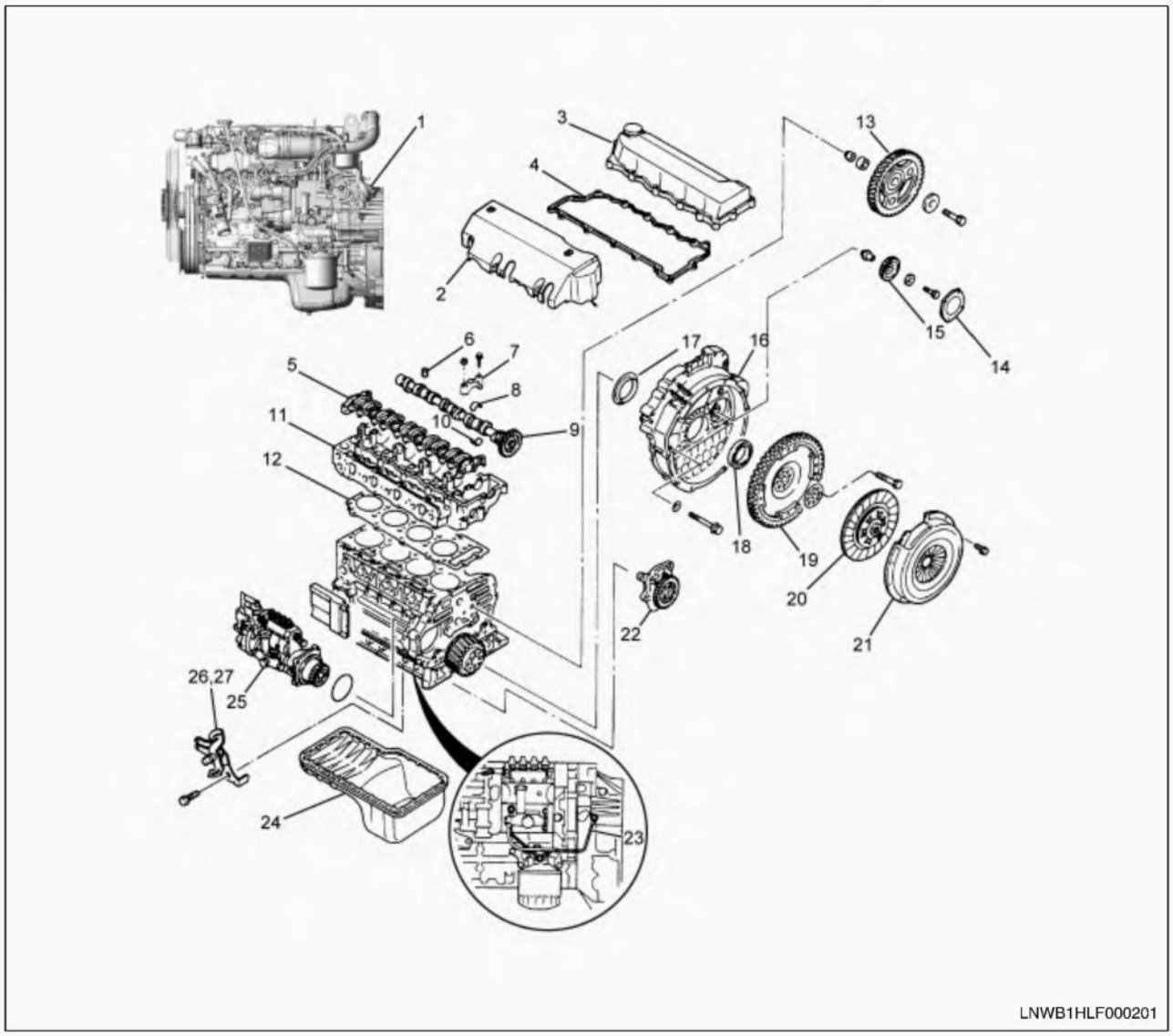
6. Engine Control Cable
7. Engine Control Lever Assembly



8. Oil Pipe
9. Fuel Return Hose
10. Fuel Feed Hose
    Disconnect fuel hose from injection pump side and take care not to spill and enter dust.
11. Nozzle Cover
12. Leak Off Pipe
13. Fuel Pipe
14. Positive Crankcase Ventilation (PCV) Hose
15. Water Bypass Hose
16. Injection Pipe
17. Injection Pump Assembly
    Above works refer to "Injection Pump Assembly" section in this manual.
18. Injection Pump Rubber Spacer
19. Air Conditioning (A/C) Drive Belt (If equipped with A/C)

Oil Pump Assembly

Component

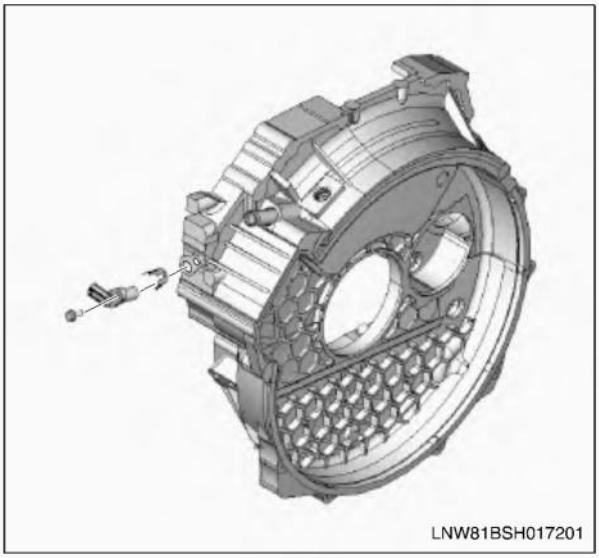


Legend

1. Engine assembly
2. Nozzle cover
3. Cylinder head cover
4. Head cover gasket
5. Rocker arm shaft assembly
6. Valve cap
7. Camshaft bearing cap
8. Camshaft bearing upper
9. Camshaft assembly
10. Camshaft bearing lower
11. Cylinder head assembly
12. Cylinder head gasket
13. Idle gear A
14. Power steering pump idle gear cover
15. Power steering pump idle gear
16. Flywheel housing
17. Slinger
18. Rear oil seal
19. Flywheel
20. Clutch disc
21. Clutch pressure plate assembly
22. Oil pump assembly
23. Oil pipe
24. Oil pan
25. Injection pump assembly
26. Engine control wire
27. Engine control lever assembly

8. Crankshaft Rear Oil Seal
9. Flywheel
   Above works refer to "Crankshaft Rear Oil Seal" section in this manual.
10. Tachometer sensor

Tighten:
Engine speed sensor bolt to 8 N·m (0.8 kg·m/69 lb·in)



11. Injection Pump Assembly
    Above works refer to "Injection Pump Assembly" section in this manual.
12. Oil Pipe
13. Engine Control Lever Assembly
14. Engine Control Wire
    Above works refer to "Injection Pump Assembly" section in this manual.
15. Clutch Disc
16. Clutch Pressure Plate Assembly
    Above works refer to "Timing Gear Replacement" section in this manual.
17. Cylinder Head Gasket
    Above works refer to "Cylinder Head" section in this manual.
18. Cylinder Head Assembly
    Above works refer to "Cylinder Head" section in this manual.
19. Camshaft Bearing Lower
20. Camshaft Assembly
21. Camshaft Bearing Upper
22. Camshaft Bearing Cap
23. Valve Cap
    Above works refer to "Camshaft Assembly" section in this manual.
24. Rocker Arm Shaft Assembly
    Above works refer to "Rocker Arm Shaft Assembly" section in this manual.
25. Head Cover Gasket
26. Cylinder Head Cover
    Above works refer to "Cylinder Head Cover" section in this manual.
27. Nozzle Cover
28. Engine Assembly
    Above works refer to "Engine Assembly" section in this manual.

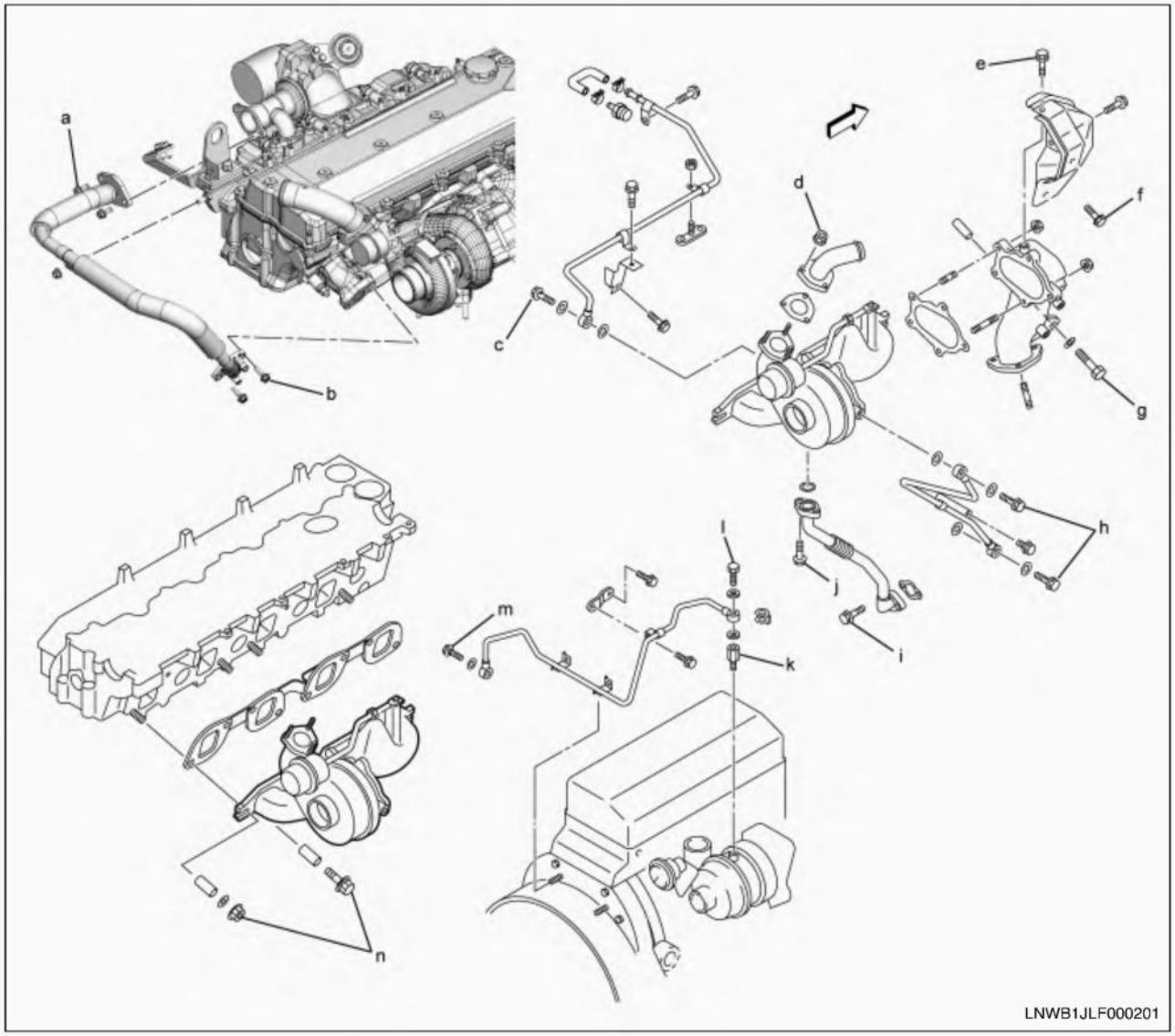
ENGINE

Induction
(4HG1)

TABLE OF CONTENTS

List of Tightening Torques

Turbocharger



(a) 24 N·m (2.4 kg·m/17 lb·ft)
(b) 28 N·m (2.9 kg·m/21 lb·ft)
(c) 41 N·m (4.2 kg·m/30 lb·ft)
(d) 10 N·m (1.0 kg·m/87 lb·in)
(e) 10 N·m (1.0 kg·m/87 lb·in)
(f) 32 N·m (3.3 kg·m/24 lb·ft)
(g) 25 N·m (2.6 kg·m/19 lb·ft)
(h) 41 N·m (4.2 kg·m/30 lb·ft)
(i) 21 N·m (2.1 kg·m/15 lb·ft)
(j) 9 N·m (0.9 kg·m/78 lb·ft)
(k) 23 N·m (2.3 kg·m/17 lb·ft)
(l) 27 N·m (2.8 kg·m/20 lb·ft)
(m) 23 N·m (2.3 kg·m/17 lb·ft)
(n) 34 N·m (3.5 kg·m/25 lb·ft)