

WORKSHOP MANUAL

2007MY N-SERIES

ENGINE 4HK1-TC

SECTION 6

ISUZU

ISUZU



Isuzu Motors Limited

Service Marketing Department

NOTICE

Before using this Workshop Manual to assist you in performing vehicle service and maintenance operations, it is recommended that you carefully read and thoroughly understand the information contained in Section-0A under the headings “GENERAL REPAIR INSTRUCTIONS”.

All material contained in this Manual is based on latest product information available at the time of publication.

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Applicable Model:

N-Series

This manual is applicable to 2007 year model.

THIS MANUAL INCLUDES THE FOLLOWING SECTIONS:

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6A	ENGINE MECHANICAL (4HK1-TC)
6B	COOLING SYSTEM
6C	FUEL SYSTEM
6D	ENGINE ELECTRICAL
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ENGINE

Engine Mechanical (4HK1-TC)

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ISUZU DIESEL ENGINE (4HK1-TC)

Service Precautions

Matters that require attention in terms of maintenance

To prevent damage to the engine and ensure reliability of its performance, pay attention to the following in maintaining the engine:

- When lifting up or supporting the engine, do not apply a jack on the oil pan.
When taking down the engine on the ground, do not make the bearing surface of the oil pan touch directly the ground. Use a wood frame, for example, to support the engine with the engine foot and the flywheel housing.
Because there is only a small clearance between the oil pan and the oil pump strainer, it can damage the oil pan and the oil strainer.
- When the air duct or air cleaner is removed, cover the air intake opening to prevent foreign matter from getting into the cylinder. If it gets into it, it can considerably damage the cylinder and others while the engine is operating.
- When maintaining the engine, never fail to remove the battery earth cable. If not, it may damage the wire harness or electrical parts. If you need electricity on for the purpose of inspection, for instance, watch out for short circuits and others.
- To protect and lubricate the rotational surface during the initial operation, apply plenty of engine oil to it.
- When valve train parts, pistons, piston rings, connecting rods, connecting rod bearings or crankshaft journal bearings are removed, put them in order and keep them.
- When installing them, put them back to the same location as they were removed.
- Parts, such as gaskets, oil seals and O-rings, have to be replaced by brand-new ones every time the engine is dismantled.
- As for parts where a liquid gasket is used, remove an old liquid gasket completely and clean it up thoroughly so that no oil, water or dust may be clung to them. Then, apply the designated liquid gasket to each place anew before assembly.
- Assemble it within 7 minutes after applying the liquid gasket.
If 7minutes or longer passed, remove the liquid gasket and apply it again.
- When assembling or installing parts, fasten them with the prescribed tightening torque so that they may be installed properly.

Matters that require attention in specifically dealing with this engine

Holes or clearances in the fuel system which serve as a passage of fuel, including the inside of injector, are finished extremely precisely. For this reason, they are highly sensitive to foreign matter. If it gets inside, it can lead to breakdown on the road. Be sure to prevent it from getting inside.

Service Technical Information

How to use Plastigauge

Type	Measurable range (mm)
PG-1 (Green)	0.025 – 0.076
PR-1 (Red)	0.051 – 0.152
PB-1 (Blue)	0.102 – 0.229

<Example> Measurement of clearance between connecting rod bearing and crank pin.

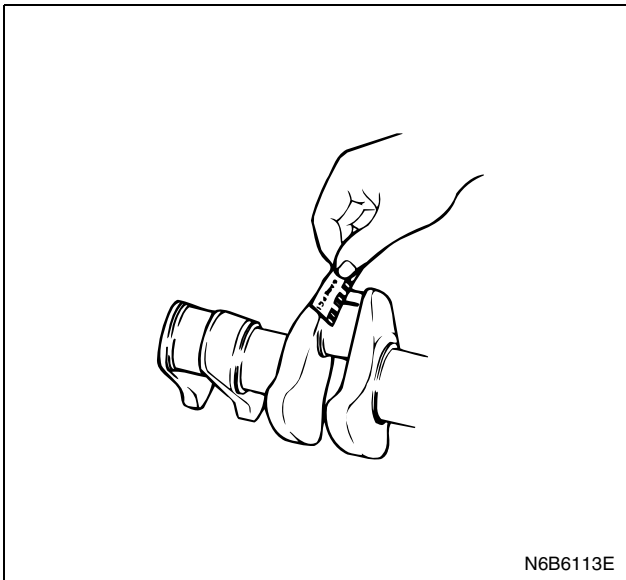
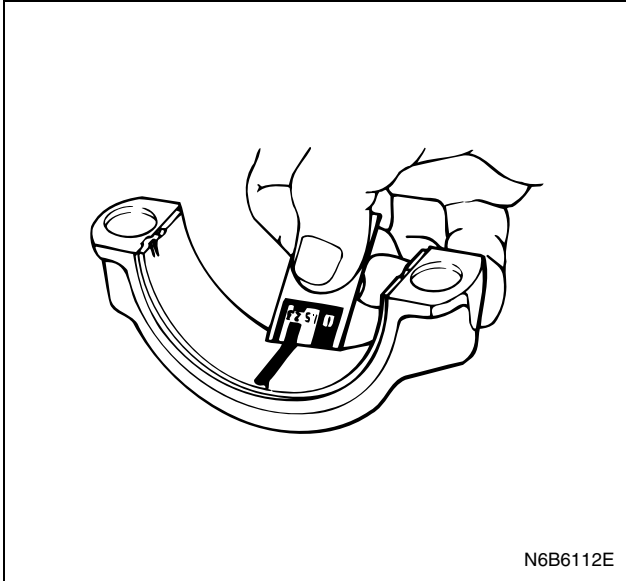
- Clean the connecting rod and the bearing, and assemble the bearing to the connecting rod.
- Cut the Plastigauge in the width of the crank pin, and place it parallel, away from the oil hole of the pin.
- Align the stamp mark of connecting rod with that of cap, and assemble them to the crank pin. Apply molybdenum disulfide to the threads and the seating surface of the tightening bolts, and tighten the bolts on the cap alternately to the specified torque.

Caution:

Never move the connecting rod while using the Plastigauge.

- Carefully remove the cap and the connecting rod, and measure the width (clearance) of flattened Plastigauge using the scale printed on the bag.

6A-4 Engine Mechanical (4HK1-TC)



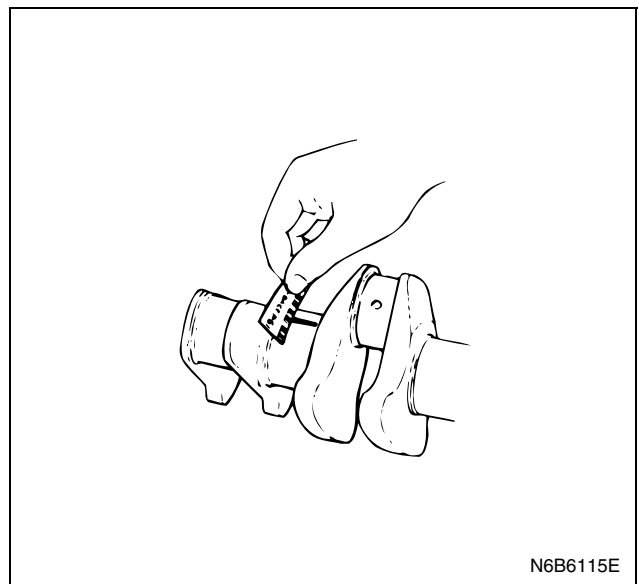
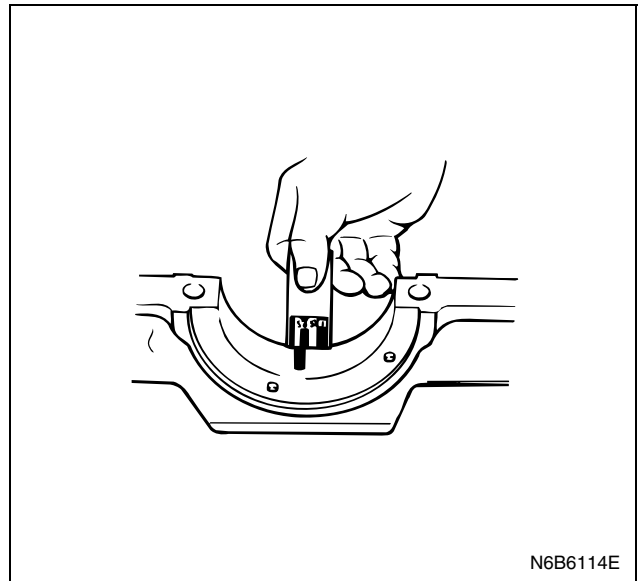
<Example> Measurement of clearance between crankshaft bearing and crankshaft journal.

- Clean the bearing installation surfaces on the crankcase and on the cylinder block, and the bearings. Then assemble each bearing to the cylinder block and the crankcase.
- Put the crankshaft on the cylinder block carefully, and rotate the crankshaft for approx. 30° to fit in.
- Cut the Plastigauge in the width of the crankshaft journal, and place it parallel, away from the oil hole of the journal.
- Put the crankcase on the cylinder block carefully, and apply molybdenum disulfide to the threads and the seating surface of the tightening bolts. Then tighten them to the specified torque in the specified order.

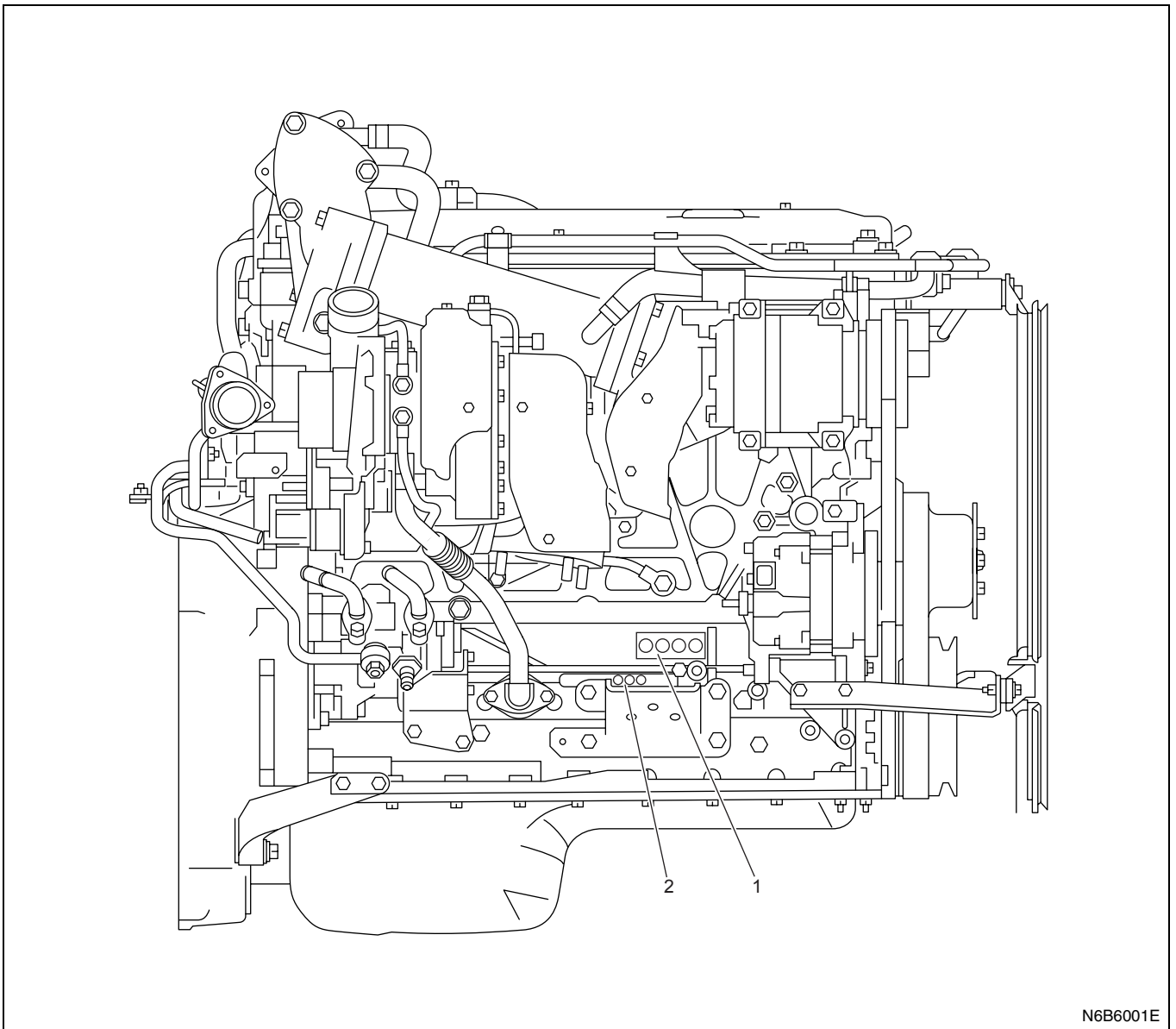
Caution:

Never rotate the crankshaft while using the Plastigauge.

- Carefully remove the crankcase, and measure the width (clearance) of the flattened Plastigauge using the scale printed on the bag.



How To Read The Model



N6B6001E

Legend

1. Engine Model

2. Engine Serial Number

Explanation of Functions and Operations

Electronic Engine Control

With the control unit, the range from injection to air intake/exhaust, including fuel injection quantity, injection timing, intake air restriction, EGR, and idling rpm, is controlled.

Cylinder Block

The cylinder block is cast-iron with the center distance of each bore being equal and is of the highly rigid, symmetrical structure with the crankshaft center being the center. The bearing cap is of the ladder frame structure and tightened up under the plastic range rotation angle method.

Cylinder Liner

The cylinder liner is selected to match an internal diameter of a bore of the cylinder block and built, which is imprinted on the left side of the cylinder.

Piston

The piston is aluminum-alloy and an autothermatic piston with a strut cast, while the combustion chamber is a round reentrant type.

Cylinder Head

The cylinder head is cast-iron and there are 4 valves per cylinder. The angular tightening method of the cylinder head bolt further increases reliability and durability.

6A-6 Engine Mechanical (4HK1-TC)

Crankshaft

Tuftriding is given, while on the No. 1 balance weight imprinted is the grade of each journal diameter.

EGR System

Based upon data, including water temperature, engine speeds or engine loads, it is controlled via Engine Control Module (ECM) to purify exhaust by recycling part of it.

Its main components include an EGR valve, an EGR cooler and various sensors.

Connecting Rod Cap Bolt

The angular tightening method of the connecting rod cap bolt further increases reliability and durability.

Common Rail-type Electronic Control Injection System

The common rail-type electronic control injection system is composed of a fuel supply pump that sets the target pressure of high-pressure fuel and supply it, a fuel rail that measures such high-pressure fuel and an fuel injector that turns it into a fine spray and injects it. Each is controlled via ECM based upon various signals, while injection timing or fuel injection quantity is controlled under every possible driving condition.

Fuel Injector

The fuel injector is a 7-hole nozzle that adjusts fuel injection quantity or injection timing by opening or closing an electromagnetic valve on the head of the fuel injector.

ECM corrects the dispersion of fuel injection quantity between fuel injectors according to ID code data in memory. At the replacement of fuel injectors, ID code data should be stored in ECM.

Fuel Filter with Sedimenter

It is a fuel filter with sedimenter that gets rid of water by making use of the difference in specific gravity between light oil and water, which comes with an indicator that notifies you that it is filled with water.

Preheating System

The preheating system consists the ECM, the glow relay, glow plugs and the glow indicator lamp. The preheating system is operated when the engine coolant temperature is low, and make the engine easy to start.

Lubrication System

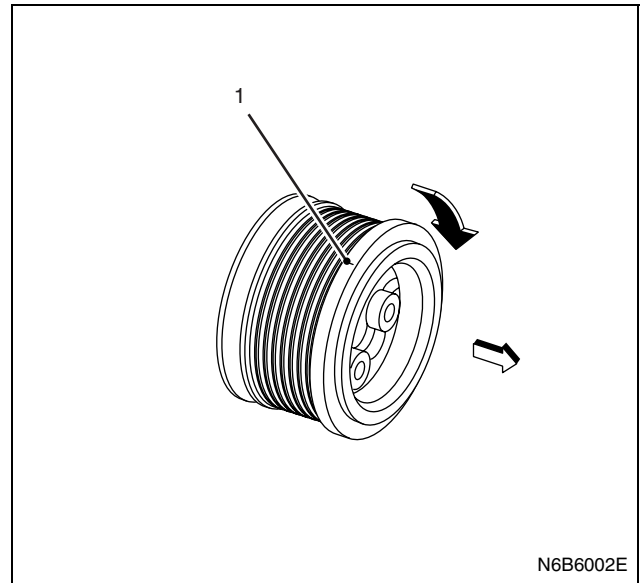
It is an oil filter with full-flow bypass, which uses a water-cool oil cooler and oil jet to cool the piston.

Functional Inspection

Inspection/adjustment of valve clearance

1. Inspection of valve clearance
 - a. Remove the cylinder head cover.
Refer to "Cylinder Head Cover".
 - b. Remove the fuel injector harness assembly.
 - c. Loosen the terminal nuts alternately to remove.
 - d. Remove the leak-off pipe.

- e. Rotate the crankshaft to make the No.1 cylinder meet the compression top dead center (TDC).



Legend

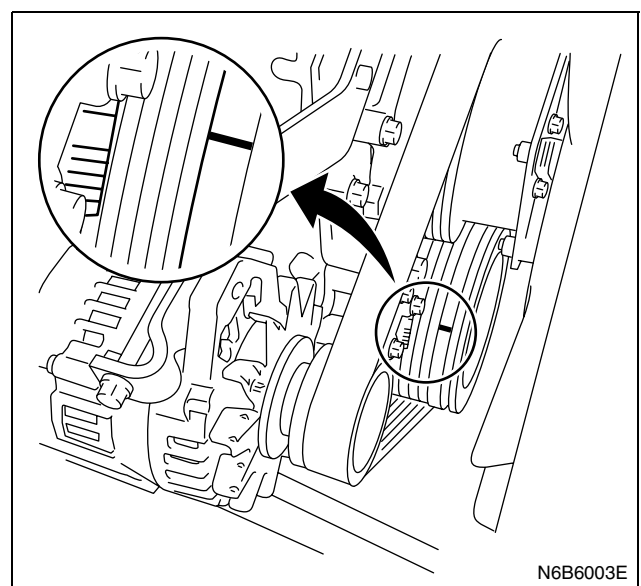
1. Timing Mark

- Insert a 0.4 mm (0.016 in) thickness gauge into a clearance between the rocker arm and the bridge to check it and adjust it if needed.

Valve clearance	mm (in)
Intake valve	0.4 (0.016)
Exhaust valve	0.4 (0.016)

Caution:

Adjust while being cold.



2. Adjustment of valve clearance

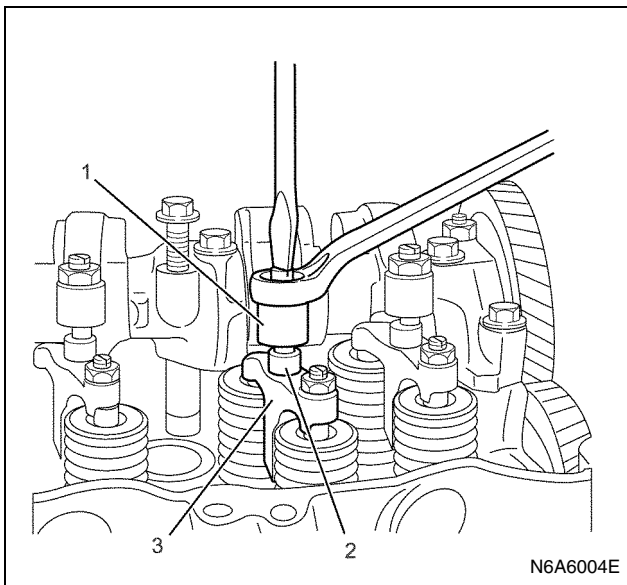
Caution:

Adjust valve clearance carefully so that the bridge contacts the end of the 2 valve stem.

- a. Completely loosen all of the bridge and rocker arm adjusting nuts and adjusting screws (8 nuts and 8 screws).
- b. Place a 0.4 mm (0.016 in) thickness gauge between the No. 1 cylinder rocker arm end and the bridge cap.
- c. Tighten the rocker arm adjusting screw until the thickness gauge is snug (not tight) between the rocker arm end and the bridge cap.
- d. Tighten the rocker arm lock nut.
- e. Tighten the bridge adjusting screw until the bridge contacts the valve head.
- f. Tighten the bridge lock nut.
- g. Check that the thickness gauge is still held snugly between the rocker arm end and the bridge cap. If it is too tight, slightly loosen the bridge adjusting screw and lock nut to restore snugness.
- h. Remove the thickness gauge.
- i. Repeat Steps b through h for the remaining cylinders.

Tighten:

Bridge lock nut to 22 N·m (2.2 kgf·m/16 lbf·ft)



Legend

1. Rocker Arm
2. Bridge Cap
3. Bridge

- a. With a thickness gauge kept inserted, tighten an adjusting screw of the bridge lightly and make sure that the tip of the adjusting screw touches the end of valve stem and the movement of the thickness gauge has become tight.
- b. Then, check if the end of the valve stem on the opposite side is unstable or hits diagonally. If so, loosen the bridge adjusting screw a little so that the end of the valves on both sides may touch properly.

Valve bridge clearance: ± 0.1 mm (0.0039 in) or less

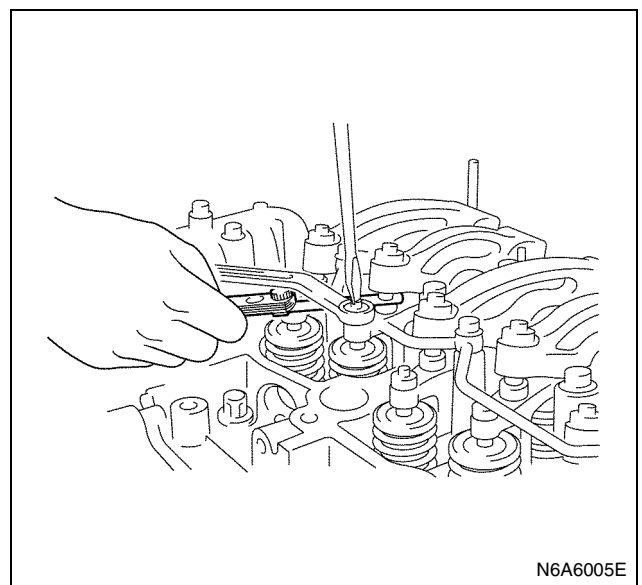
- c. After making an adjustment so that the end of the valves on both sides may touch properly, tighten up an adjusting screw nut of the bridge with a minus driver so that the bridge adjusting screw may not rotate.

Tighten:

Adjusting screw nut to 22 N·m (2.2 kgf·m/16 lbf·ft)

Caution:

If the adjusting screw of the bridge is poorly adjusted, the bridge would tilt and be pushed down and seized, which may damage the bridge guide, for example. Thus, adjust it accurately.



Tighten:

Rocker arm adjustment screw nut to 22 N·m (2.2 kgf·m/16 lbf·ft)

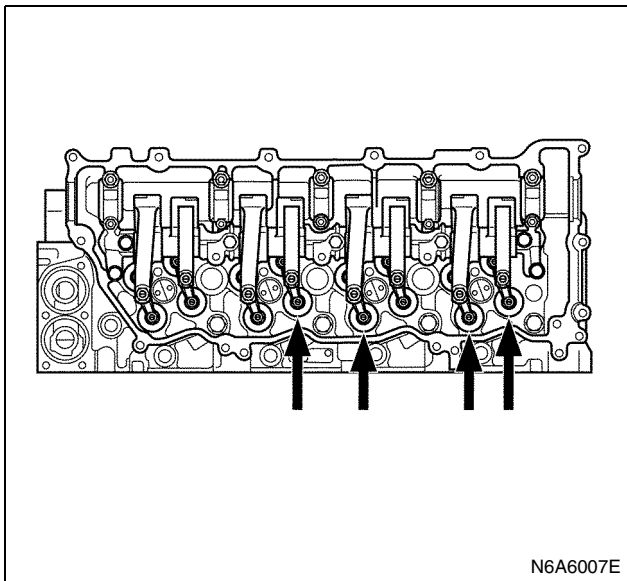
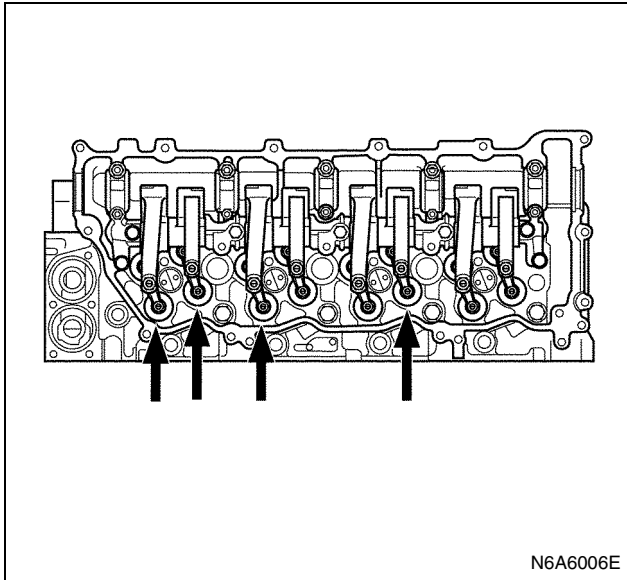
Bridge adjustment screw nut to 22 N·m (2.2 kgf·m/16 lbf·ft)

Adjustment table

Cylinder No.	1		2		3		4	
Valve arrangement	IN	EX	IN	EX	IN	EX	IN	EX
No. 1 cylinder Compression TDC	○	○	○			○		
No. 4 cylinder Compression TDC				×	×		×	×

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- If the No. 1 cylinder is the compression TDC, adjust a valve clearance with ○ mark given on the table and if the No. 4 cylinder is the compression top dead center, that with × mark.



- Attach the harness assembly to the fuel injector. Tighten the harness bracket with the designated torque.

Tighten:

Harness bracket to 48 N·m (4.9 kgf·m/35 lbf·ft)

- Attach the terminal nuts to the fuel injector.

Tighten:

Terminal nuts to 2 N·m (0.2 kgf·m/17 lbf·in)

Notice:

- Tighten the terminal nuts alternately in order to prevent imbalance in tightening because they are unified.
- Do not tighten the nuts too tightly because it leads to damage to the terminal studs.

- Install the cylinder head cover. Refer to "Cylinder Head Cover."

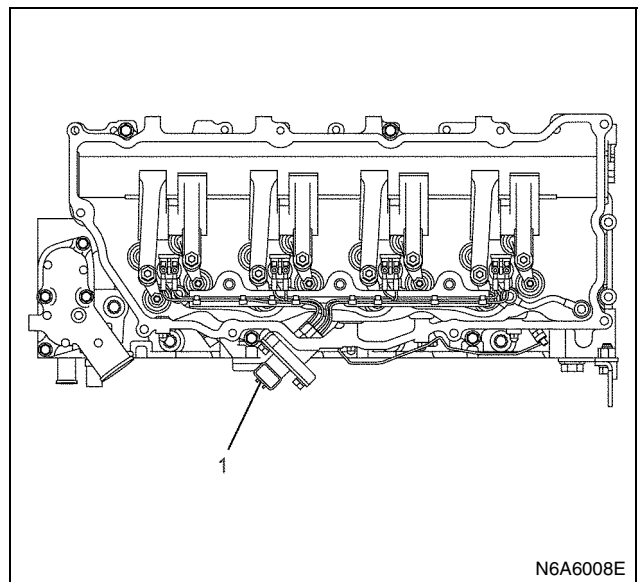
Compression pressure inspection

- Warm up the engine.
- Remove a minus terminal of the battery and remove all the glow plugs.
- Remove the harness connector for the fuel injector built on the lower head cover (no fuel will be injected).

Caution:

When the harness connector is removed, ECM judges that it broke down and DTC is recorded. Upon completion of measurement, never fail to clear memory of ECM.

(For how to clear memory of ECM, refer to Section 6E)

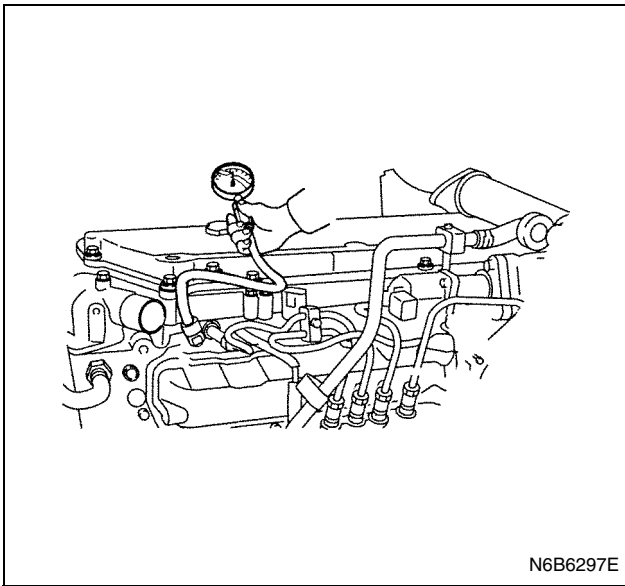


Legend

1. Fuel Injector Harness Connector

- Install the minus terminal of the battery.
- Turn on the starter to emit foreign matter within the cylinders.

- Install an adapter and a gauge of a compression gauge of the special tool.



Compression gauge set: 5-8840-2008-0
 (Compression gauge: J-26999-12,
 Gauge adapter: EN-46722)

- Turn on the starter to inspect compression pressure.

Compression pressure	MPa (kg/cm ² / psi) / rpm
Standard	2.60 – 2.90 (26.5 – 29.5 / 377 – 421) / 220
	2.50 – 2.80 (25.5 – 28.6 / 363 – 406) / 185
	2.40 – 2.70 (24.5 – 27.5 / 348 – 391) / 150
Limit	2.16 (22.0 / 313)
Differences among the cylinders	294 kPa (3.0 kg/cm ² / 43 psi)

- Measure each cylinder one by one.

Caution:

To keep engine speed at 220 rpm or more, use fully charged batteries.

- Remove a compression gauge of the special tool.
- Remove a minus terminal of the batteries.
- Install a harness connector for the fuel injector built on the lower head cover.
- Install all the glow plugs.

Tighten:

Glow plugs to 20 N·m (2.0 kgf·m/15 lbf·ft)

- Install a minus terminal of the batteries.

Judgment of time to overhaul

Rate of increase in engine oil consumption

Overhaul is needed when the consumption rate (travel distance of kilometers per liter) drops to less than 50% of that of new vehicle (100%).

Rate of increase in fuel consumption

Overhaul is needed when the consumption rate (km/L) drops to less than 60% of that of new vehicle (100%).

Noise in engine

If the noise is caused by internal parts of the engine, carry out overhaul earlier.

* Many reasons are considered to cause noise. However, noise is caused mainly by excessive wear of engine parts, seizure, or pinched foreign objects.

A list of defective phenomena

- Engine does not turn over.
- Engine turns over but does not start.
- Excessive black exhaust smoke.
- Excessive white exhaust smoke.
- Engine knocking.
- Abnormal engine rotation.
- Abnormal battery charging.

6A-10 Engine Mechanical (4HK1-TC)

Trouble Shooting

Engine does not turn over

Condition	Possible Cause	Correction
Starter motor does not rotate	Dead or weak battery	Charge or Replace battery
	Incomplete circuit	Connect Repair
	Starter relay	Replace starter relay
	Starter motor brushes stuck, worn, or broken	Replace brushes
	Starter motor internal damage	Repair motor
Starter motor not meshed with flywheel	Ring gear abrasion	Replace ring gear
	Pinion gear abrasion	Replace pinion gear
	Magnetic switch (starter motor) not properly adjusted	Adjust
Starter motor pinion meshed with ring gear but does not rotate	Dead or weak battery	Charge battery Replace battery
	Insufficient contact pressure between starter motor brushes and commutator	Adjust pressure
	Armature (starter motor) stuck	Repair armature
	Engine internal damage (Seizure)	Repair engine

Engine turns over but does not start

Condition	Possible Cause	Correction
No fuel flows in the supply pump.	Air in fuel system	Air bleeding
	Air suction from fuel pump	Bleed air or replace.
	Running out of fuel	Add.
	Clogged strainer at fuel suction part	Clean or replace.
	Clogged fuel pipe	Clean or replace.
	Malfunction of supply pump	Replace.
	Severe cold weather = fuel is not for severe cold weather.	Replace with appropriate fuel.
	Clogged fuel filter	Replace.
	Defective engine control system	Diagnose the engine control system.
Fuel flows in the supply pump.	Loose connection of injection pipe	Further tighten each part.
	Leakage in overflow valve	Replace.
	Supply pump internal failure	Replace.
	Poor connection or open circuit in wiring	Repair or replace.
	Defective engine control system	Diagnose the engine control system.

Condition	Possible Cause	Correction
Shortage or instability of fuel injection amount	Air in fuel system	Air bleeding
	Clogged fuel pipe	Clean or replace.
	Malfunction of supply pump	Replace.
	Stuck injector nozzle	Replace.
	Poor connection or open circuit in wiring	Repair or replace.
	Clogged fuel filter	Replace.
	Defective engine control system	Diagnose the engine control system.

Excessive black exhaust smoke

Condition	Possible Cause	Correction
Bad injection timing	Defective engine control system	Diagnose the engine control system.
Poor injection condition of injector	Stuck nozzle	Replace.
	Defective engine control system	Diagnose the engine control system.
Faulty compression pressure	Excessive valve clearance	Adjust.
	Stuck valve stem (remains open)	Overhaul.
	Faulty valve spring	Replace.
	Worn valve seat	Overhaul.
	Poor compression due to faulty piston rings etc.	Overhaul.
	Faulty gasket	Overhaul.
	Piston seizure	Overhaul.
Bad fuel	Water in fuel	Replace.
	Inferior fuel	Replace.
Air intake failure	Clogged air intake pipe	Repair or replace.
	Clogged air cleaner element	Clean or replace.
	Stuck throttle valve	Overhaul.
Fault detection by engine control system	Fault in each sensor etc.	Repair or replace.
	Defective engine control system	Diagnose the engine control system.
Throttle valve or EGR valve failure	Stuck intake throttle valve	Repair or replace.
	Stuck EGR valve	Repair or replace.
	Stuck exhaust brake valve	Replace.
	Defective engine control system	Diagnose the engine control system.
Turbocharger malfunction	Deformed or damaged turbine fin	Replace.
	Nonsmooth or stuck turbine shaft	Replace.
	Air leakage from compressor discharge side	Repair.

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Excessive white exhaust smoke

Condition	Possible Cause	Correction
Bad injection timing	Engine control system malfunction	System diagnosis
Malfunction detected by engine control system	Engine control system malfunction	System diagnosis
	Control unit malfunction	Replace unit
	Defective sensor	Replace sensor
Insufficient compression pressure	Excessive valve clearance	Adjust clearance
	Sticking valve stem (valve open)	Repair or replace valve
	Damaged valve spring	Replace spring
	Valve seat abrasion	Repair valve seat
	Compression leakage due to damaged piston ring	Replace piston ring
	Damaged gasket	Replace gasket
	Piston scoring	Replace piston
Fuel condition	Water in fuel	Drain existing fuel and replace with new fuel
Excessive oil consumption	Worn or damaged piston ring(s)	Replace ring(s)
	Defective valve stem oil seal	Replace oil seal
	Defective turbocharger oil seal	Replace turbocharger
	Clogged turbocharger oil return pipe	Repair pipe

Engine knocking

Condition	Possible Cause	Correction
Bad timing	Engine control system malfunction	System diagnosis
Malfunction detected by engine control system	Defective sensor	Replace sensor
	Control unit malfunction	Replace unit
	Engine control system malfunction	System diagnosis
Fuel condition	Poor quality fuel	Drain existing fuel and replace with new fuel
Poor engine aspiration	Clogged intake pipes	Clean or replace pipes
	Engine control system malfunction	System diagnosis
Engine break-down	Foreign material in cylinders	Engine overhaul
	Scored pistons and/or bearings	Replace pistons and/or bearings

Abnormal engine rotation

Condition	Possible Cause	Correction
Engine speed does not rise.	Control unit failure	Replace.
	Defective engine control system	Diagnose the engine control system.
Unstable engine revolution	Control unit failure	Replace.
	Defective engine control system	Diagnose the engine control system.
	Clogged fuel filter element	Replace element
	Injector failure	Replace.
	Water in fuel	Replace.
	Air in fuel system	Air bleeding
	Stuck exhaust brake valve	Replace.
	Stuck intake throttle valve	Repair or replace.

Abnormal battery charging

Condition	Possible Cause	Correction
No charging	Open circuit, short circuit or poor contact	Repair or replace.
	Generator internal malfunction	Overhaul.
Insufficient charging	Short circuit or poor connection	Connect or repair.
	Generator internal malfunction	Overhaul.
	Loose generator drive belt	Replace.
	Faulty battery	Replace.
Excessive charging	Shorted wiring	Connect or repair.
	Generator internal malfunction	Overhaul.

Turbocharger Troubleshooting

Condition	Possible Cause	Correction
Engine has less than normal power	Air leakage from intake pipe rubber hose	Repair
	Air leakage from inlet cover	Repair
	Clogged intercooler cooling section	Clean
	Clogged air cleaner element	Clean or replace
	Exhaust brake valve stuck	Repair or replace
	Turbine and housing contact (Interference)	Replace
	Excessive carbon deposit near turbine exhaust port that interferes with turbine	Clean or repair
	Rough turbine shaft rotation	Repair or replace
	Damaged turbine fan	Repair or replace

6A-14 Engine Mechanical (4HK1-TC)

Condition	Possible Cause	Correction
Blue exhaust smoke	Oil leakage from turbocharger oil seal	Repair or replace
	Clogged turbocharger oil return pipe	Repair
	Clogged center housing oil passages	Repair or replace
	Engine oil deterioration	Change engine oil
Noisy turbocharger operation	Gas leakage from intake or exhaust system	Repair
	Turbine and housing contact (Interference)	Repair or replace
	Damaged turbine fan	Replace
	Turbine shaft bearing abrasion or scoring	Repair or replace
Excessive rotating part wear	Engine oil deterioration	Change engine oil
	Clogged turbocharger oil feed pipe	Repair
	Low engine oil pressure	Repair

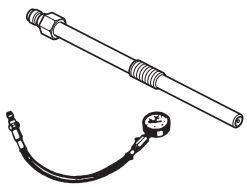
Main Data and Specifications

Item		Engine model 4HK1-TCS	Engine model 4HK1-TCN
Type		Diesel/4-cycle/water cooling type in-line OHC	Diesel/4-cycle/water cooling type in-line OHC
Combustion chamber type		Direct injection type	Direct injection type
Cylinder liner type		Dry type	Dry type
Number of cylinders -cylinder bore × strokes	mm (in)	4-115 (4.53) × 125 (4.92)	4-115 (4.53) × 125 (4.92)
Displacement	cc (cu.in)	5193(317)	5193(317)
Compression ratio		17.5	17.5
Compression pressure	MPa (kg/cm ² /psi)/rpm	2.60 – 2.90 (26.5 – 29.5/377 – 421)/220	2.60 – 2.90 (26.5 – 29.5/377 – 421)/220
Idling speed	rpm	650 (Smoother) 575 (MT)	650 (Smoother) 575 (MT)
Valve clearance	Intake	0.4 (0.016) (cold)	0.4 (0.016) (cold)
	Exhaust	0.4 (0.016) (cold)	0.4 (0.016) (cold)
Ignition type		Compressed ignition	Compressed ignition
Injection order		1 - 3 - 4 - 2	1 - 3 - 4 - 2
Injection timing (TDC)		0°	0°
Lubricating system			
Lubricating type		Pressure type	Pressure type
Oil pump type		Gear type	Gear type
Volume of lubricating oil	Liters (US/Imp gal.)	13.0 (3.43/2.86)	13.0 (3.43/2.86)
Oil filter type		Full flow filter (cartridge type)	Full flow filter (cartridge type)
Oil cooling type		Built-in-type, water cooling	Built-in-type, water cooling
Cooling system			
Cooling type		Water cooling type	Water cooling type
Radiator type		Corrugated fin(pressure type)	Corrugated fin(pressure type)
Water pump type		Centrifugal, belt type	Centrifugal, belt type
Thermostat type		2 wax-type units	2 wax-type units
Thermostat valve-opening temperature	°C (°F)	82 (180), 85 (185)	82 (180), 85 (185)
Volume of coolant	Liters (US/Imp gal.)	18 (4.76/3.96) (incl. radiator)	18 (4.76/3.96) (incl. radiator)
Fuel system			
Injection pump type		Electronic control common rail type	Electronic control common rail type
Governor type		Electronic type	Electronic type
Timer type		Electronic type	Electronic type

6A-16 Engine Mechanical (4HK1-TC)

Item	Engine model 4HK1-TCS	Engine model 4HK1-TCN
Injection nozzle type	Multi-hole type 7-holes $\phi 0.14$ mm (0.0055 in) inside diameter	Multi-hole type 7-holes $\phi 0.14$ mm (0.0055 in) inside diameter
Charging system		
Generator type	AC type	AC type
Power output	24 - 80, 24 - 50	24 - 80, 24 - 50
Regulator type	IC	IC
Starting system		
Starter type	Reduction type	Reduction type
Power output	24 - 4.5	24 - 4.5
Preheat system type	Glow plug	Glow plug
Glow plug standard voltage/ electric current	24	24

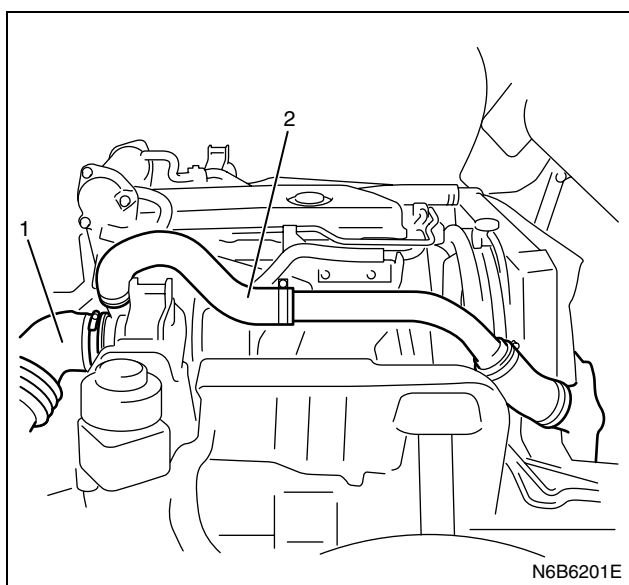
Special Tool

Illustration	Tool Number / Description / Remarks
 <p>5884020080</p>	<p>5-8840-2008-0 Compression Gauge Set (J-26999-12 / Compression Gauge, EN-46722 / Gauge Adapter)</p>

Engine Assembly

Removal

1. Remove a minus (-) terminal of the battery.
2. Drain the coolant.
3. Remove the starter motor.
 - Disconnect the front frame harness connector in the vicinity of the control box of the transmission and remove each clip that fixes the harness.
 - Remove 2 bolts that fasten the starter and remove the starter from the clutch housing.
 - Fix the starter motor with wire, for instance, in a place that does not get in the way in removing the transmission.
4. Remove the transmission assembly. Refer to "Transmission Assembly".
5. Remove the charge air hose (between turbocharger and inter cooler).

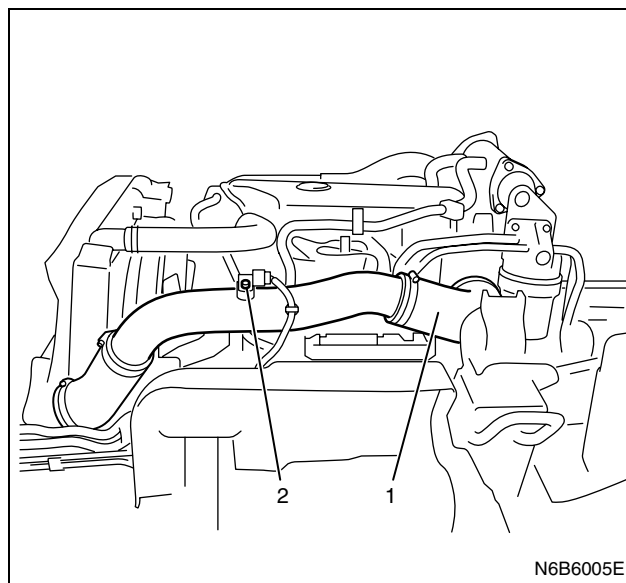


Legend

1. Inlet Hose
2. Charge Air Hose

6. Disconnect the IAT&MAF sensor connector.
7. Remove the inlet hose (between air cleaner and turbocharger).
 - Remove the PCV hose.
8. Remove the charge air hose (between intercooler and inlet pipe).

- Remove the connector of the boost pressure sensor.



Legend

1. Charge Air Hose
2. Boost Pressure Sensor

9. Remove the upper hose of the radiator.



10. Remove the coolant reserve tank hose from the radiator side.
11. Remove a bracket of the fan guide.
12. Remove the fan assembly.
 - Remove the nuts and pull them out upward.
13. Remove the heater hoses.
 - Remove 2 hoses on the engine side.