

Engine Volume

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- Generator
- Starter
- Air conditioner switch

4. Dismantlement of Elements Relevant to Vehicle Chassis

- ① Dismount the front drive shaft. See "Front Drive Shaft".
- ② Dismount the front exhaust pipe. See "Exhaust System".
- ③ Dismount the engine supporting beam. See "Engine Supporting Beam".

5. Dismantlement

- ① Mount the hanger on the engine hooks (front and rear). See Figures 1.1.005 and 1.1.006.
- ② Lift the engine and fix it in place.
- ③ Use the manual lifting table or the equivalent tools to firmly support the bottom of engine and transmission assembly, and adjust the lifting tension.

Attention:

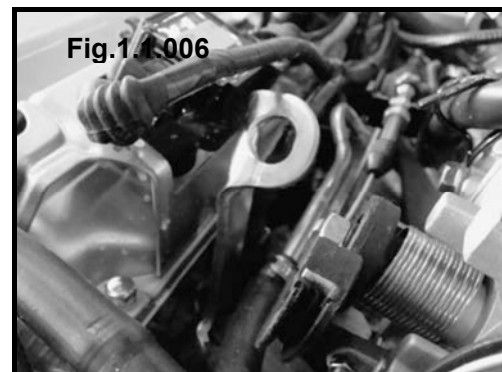
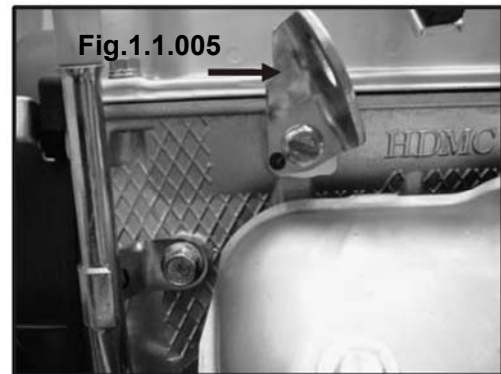
- It is permissible to place a soft pad on the supporting surface so as to ensure a totally stable state.
- ④ Detach the left, right, front and rear suspensions of engine. See "Engine Suspension".
 - ⑤ Carefully lower the engine and transmission assembly.

When carrying out the operation, note the following:

- Ensure that the vehicle is not disturbed.
- Ensure that all connecting parts have been disconnected.
- Remember that the vehicle's center of gravity may change. If necessary, use the jack to support the rear lifting point and to prevent the falling.

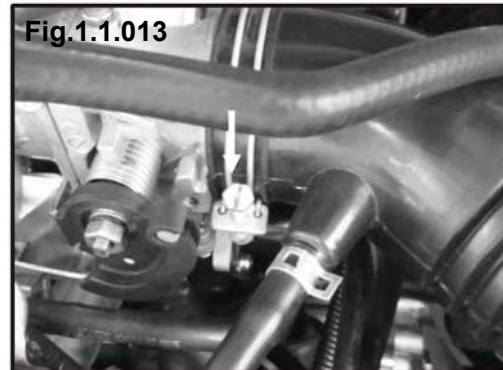
6. Detachment

- ① Dismount the power steering pump assembly and the air conditioner compressor assembly from the engine and transmission assembly. See "Power Steering Pump".



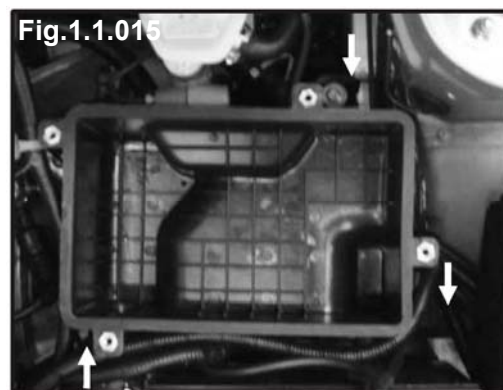
- ③ Disconnect the locking clamp of intake hose, and then take down the upper cover and the intake hose.

- Tightening torque: 6~9 N·m



- ④ Dismount the fixing bolt of air cleaner base, and then take down the base.

- Tightening torque: 8~12 N·m



2) Check after Dismantlement

Check whether there is any crack or abrasion on the air duct assembly. If any, replace the air duct assembly.

3) Installation

Perform the installation steps which are contrary to the dismantlement steps.

Attention:

- Properly mount every joint, and screw up the clamp.

- ⑤ Dismount the valve chamber cover from the cylinder cover.
- ⑥ Dismount the valve chamber cover pad from the valve chamber cover, and take down the seal gasket of spark plug conduit from the spark plug conduit.
- ⑦ Dismount the timing belt. See "Timing Belt Mechanism".
- ⑧ Dismount the camshaft timing gear.
 - a. Lock the camshaft timing gear at the corresponding position with a special tool shown in Fig.1.1.042.
 - b. Loosen the bolt for camshaft timing gear.
 - Tightening torque: 78~98N·m
 - c. Take down the camshaft timing gear.
- ⑨ Dismount the camshaft position sensor support from the rear end of cylinder cover.
 - Tightening torque: 12~15N·m

Attention:

- Carefully perform the operation so as not to damage the elements.
- ⑩ Dismount the front oil seal of camshaft with proper tools.

Attention:

- Do not damage the matching face of cylinder cover and camshaft.
- ⑪ Dismount the fixing bolt of rocker arm shaft, and then take down the intake and exhaust rocker arms and the rocker arm shaft assembly.
 - Tightening torque: 28~34N·m
 - a. Loosen these elements in sequence as shown in Fig.1.1.043.
 - b. Loosen them in steps, and then take them down.

Note: The dismantled parts shall be placed in sequence.

- ⑫ Take out the camshaft from the cylinder cover.

2) Check after Dismantlement

① Camshaft

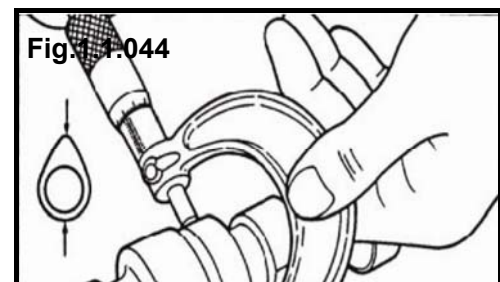
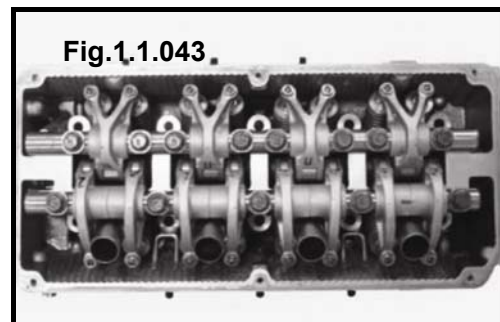
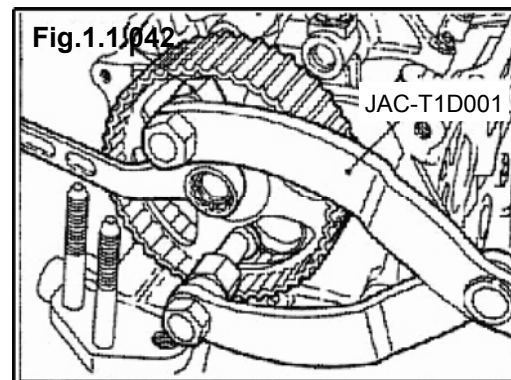
- Measure the height of the cam of the camshaft.

Standard value for intake: 37.298mm

Standard value for exhaust: 37.161mm

Limit value for intake: 36.80mm

Limit value for exhaust: 36.66mm



⑧ Gap between Piston and Cylinder Bore

Calculate the gap through the piston skirt and the inner diameter of cylinder.

$$(\text{Gap}) = (\text{inner diameter of cylinder}) - (\text{diameter of piston skirt})$$

Standard values: 0.02~0.04mm

If the calculated value exceeds the limit, replace the piston and piston ring assembly.

⑨ Boring of Cylinder

- a. The piston with extended size to be used shall be determined in accordance with the cylinder which has the widest bore.

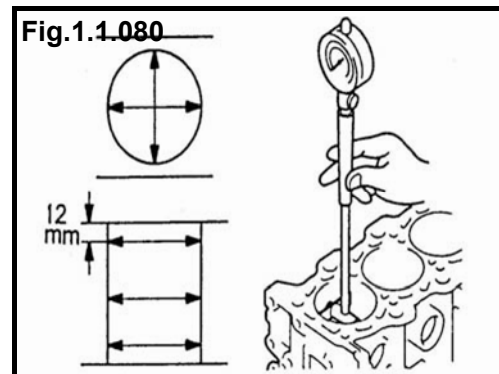
Pistons of the following extended sizes, i.e. 0.25mm, 0.50mm, 0.75mm and 1.00mm, are applicable.

- b. Measure the diameter of piston to be used.

After boring the cylinder, it is required to make the gap between piston and cylinder meets the standard value. The piston diameter shall be measured at the position shown in the figure.

- c. Calculate the boring size based on the piston diameter.

$$[\text{Boring size}] = [\text{outer diameter of piston}] + [\text{gap between piston and cylinder (0.02~0.04mm)}] - [\text{grinding tolerance (0.02mm)}]$$



- d. Boring each cylinder till it obtains the calculated boring size.

Attention:

- To avoid the distortion due to heat during the boring course, bore the cylinders in the following sequence: Cylinder 2 → Cylinder 4 → Cylinder 1 → Cylinder 3

- e. Grind the cylinder till it meets the final processing size (outer diameter of piston + gap between piston ring and cylinder)

⑩ Diameter of Main Crankshaft Journal

Measure the main crankshaft journal by the dial indicator for outer diameter.

Standard value: 48.0mm

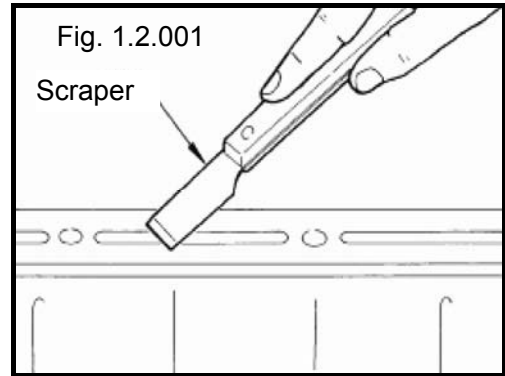
Replace the main bearing shell if the measured value exceeds the standard value.

Section II Engine Lubrication System

I. Precautions

Application Steps of Sealant:

1. Clear the used sealant attached on the application surface and matching surface of pad with scraper.

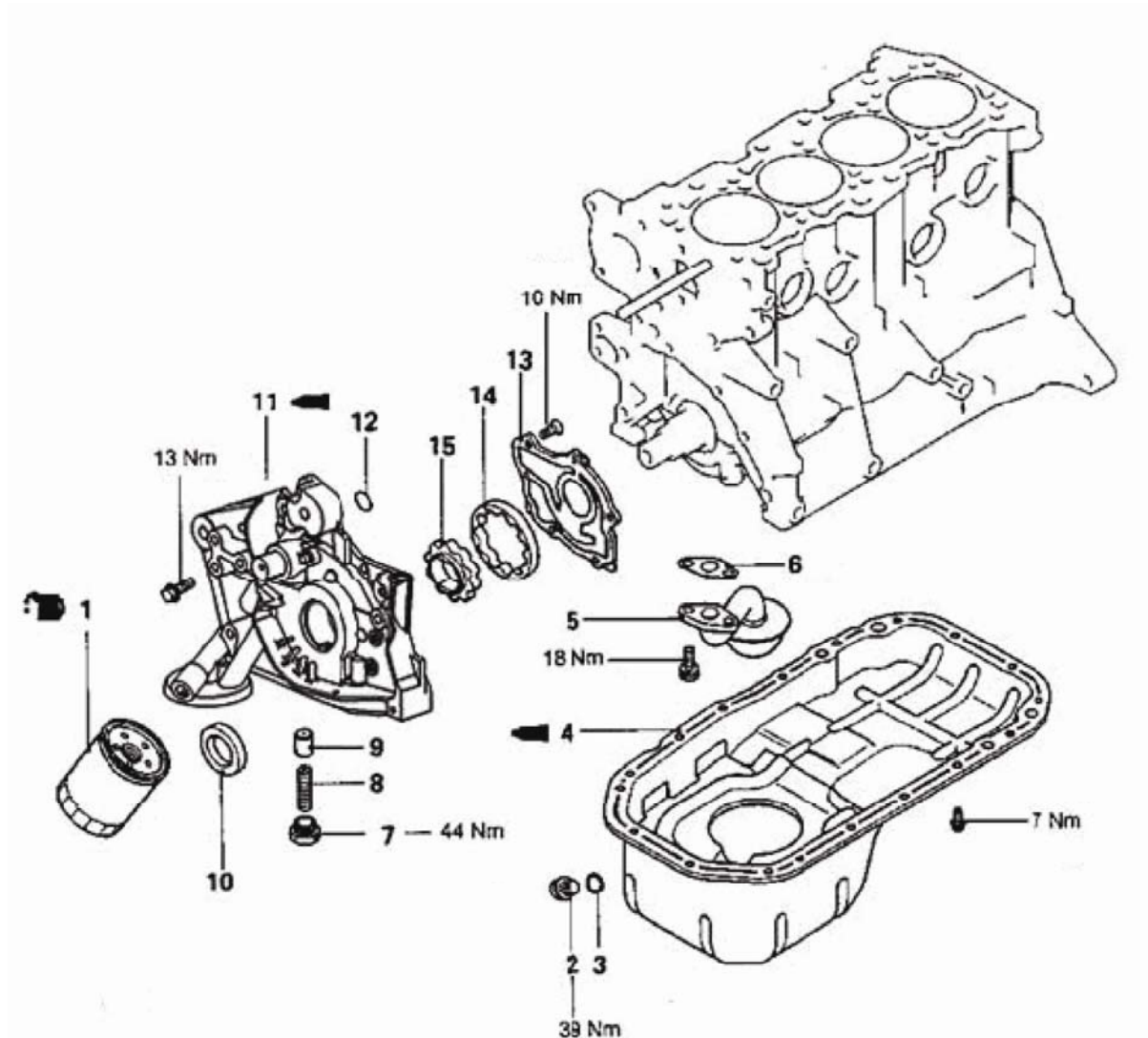


Attention:

- Thoroughly clear the used sealant from grooves, fixed bolts and bolt holes on sealant application surface.
2. Clean the application surface and matching surface of sealant with unleaded petrol, and clear the attached water, lubricant and foreign substances.
 3. Set the complete sealant with specified dimension on appointed position.
 - 1) Mount the connecting element with properly applied sealant within 5min.
 - 2) If there is any dirt on sealant, please clear it as soon as possible.
 - 3) Do not retighten the bolt and nut after installation.
 - 4) Fill engine oil and engine coolant 30min after the installation.

V. Oil Pan and Engine Oil Pump

1. Element



Breakdown drawing of oil pan and oil pump

- 1-Oil filter 2-Oil drain bolt 3-Oil drain bolt gasket 4-Oil pan 5-Oil pickup 6-Oil pickup gasket
7-Relief valve 8-Relief valve spring 9-Relief valve piston 10-Front oil seal 11-Oil pump casing
12-O-ring 13-Oil pump cover 14-Outer rotor of oil pump 15-Inner rotor of oil pump

2. Dismantlement

Caution:

- Do not discharge engine oil when engine is hot, so as to avoid being hurt.

- 1) Discharge engine oil. Please refer to "Replace engine oil".

V. Fuel Filter

1. Dismantlement

Caution:

- Read the “General Precautions” before dealing with fuel system. Please refer to “General Precautions”.

Attention:

- The fuel filter should be periodically replaced in accordance with the maintenance instruction specified in “User’s Manual”.

1) Release the fuel pressure in fuel pipeline. Please refer to “Release Fuel Pressure”.

6) Cut off the fuel pipe joint 1 (at fuel pump side), joint 2 (at fuel filter side) and grounding end 3 of fuel filter.

Attention:

The fuel filter should be wrapped up with towel or equivalent, so as to avoid injection of residual fuel pressure.

Cut off the joint according to following methods:

2) Open the fuel filler cap.

3) Release the pressure in fuel tank.

4) Dismount the rear seat cushion. Please refer to “Rear Seat”.

5) Dismount the service lid for fuel tank.

- Directly prize it up with right-angled screwdriver.

- Hold the side edge of joint and press the raised position of joint to pull out the fuel pipe.

- If the joint attaches to the resin pipe, push and pull the joint for several times until it moves, and then pull out the joint.

Attention:

- The joint can not be cut off until the raised position is fully pressed down. Do not excessively distort the joint.

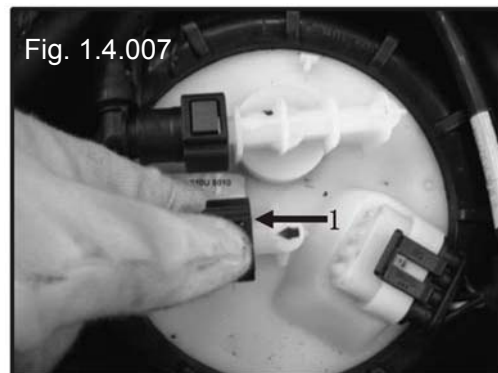


Fig. 1.4.007



Fig. 1.4.006

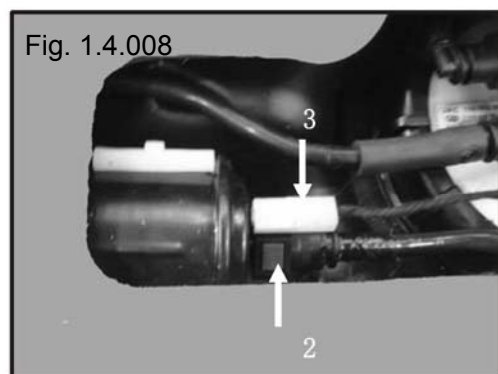
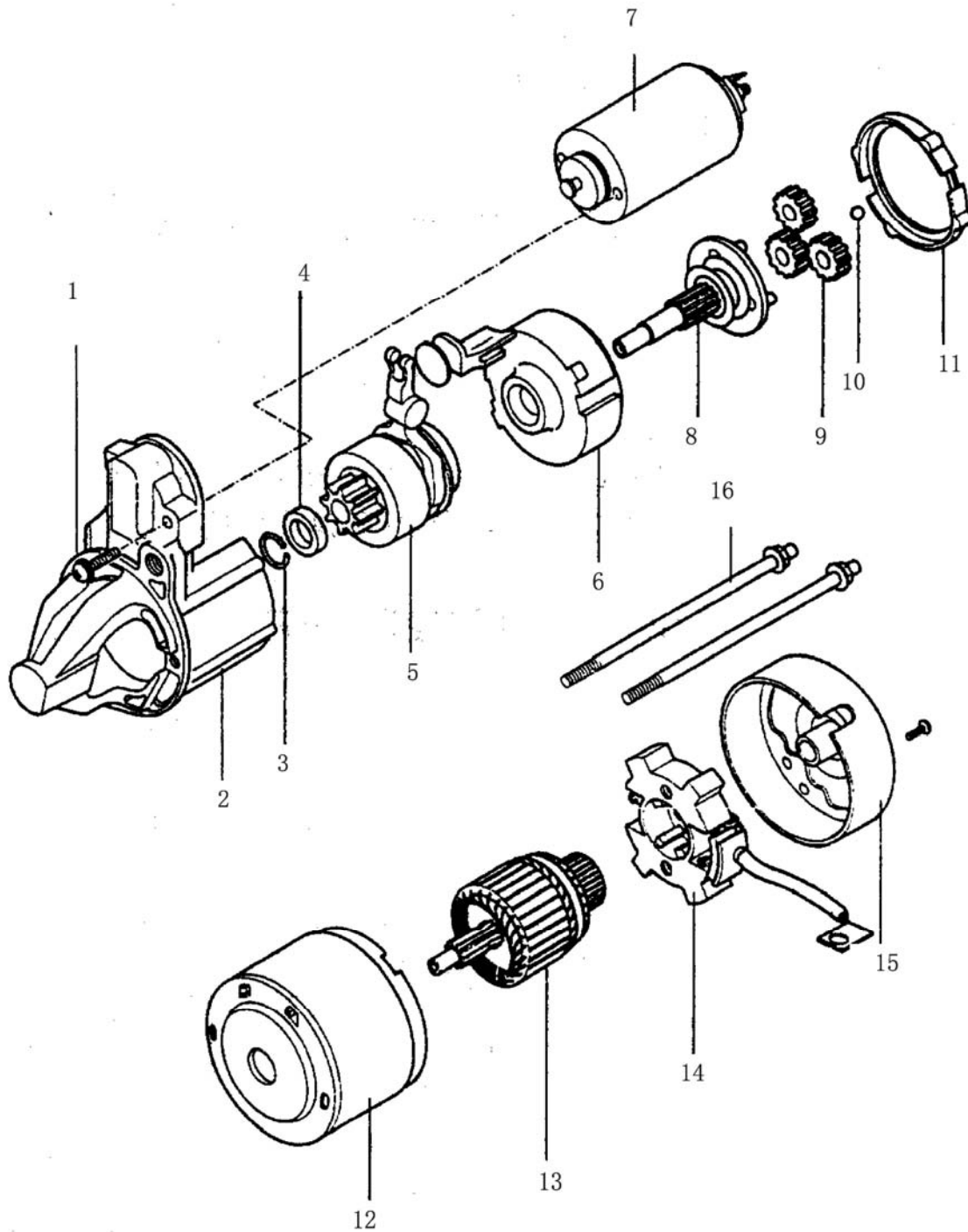


Fig. 1.4.008

3. Disassembly and Assemblage

1) Disassembly



Exploded View of Starter

- 1-Screw 2-Front support 3-Stop ring 4-Snap ring 5-Pinion 6-Gear ring 7-Solenoid switch 8-Sun gear
 9-Planetary gear 10-Ball 11-Pad 12-Stator 13-Armature 14-Electric brush retainer 15-Rear support
 16-Fastening bolt

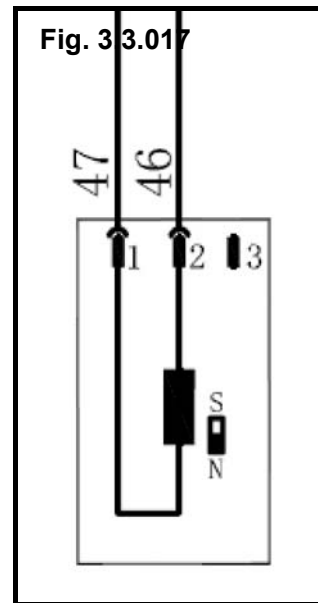
P0264	Short circuit to ground of fuel injector control circuit of cylinder No. 2
P0265	Short circuit to power supply of fuel injector control circuit of cylinder No. 2
P0267	Short circuit to ground of fuel injector control circuit of cylinder No. 3
P0268	Short circuit to power supply of fuel injector control circuit of cylinder No. 3
P0270	Short circuit to ground of fuel injector control circuit of cylinder No. 4
P0271	Short circuit to power supply of fuel injector control circuit of cylinder No. 4
P0300	Accidental fire of multiple cylinders
P0301	Accidental fire of cylinder No. 1
P0302	Accidental fire of cylinder No. 2
P0303	Accidental fire of cylinder No. 3
P0304	Accidental fire of cylinder No. 4
P0317	Trouble of ABS signal for detecting damaged circuit
P0318	Trouble of sensor signal for detecting damaged circuit
P0321	Trouble of reference point of rotation speed
P0322	No crankshaft position sensor pulse signal (open circuit or short circuit)
P0327	Too low voltage of knock sensor signal circuit
P0328	Too high voltage of knock sensor signal circuit
P0340	Improper mounting position of camshaft position sensor
P0341	Poor contact of camshaft position sensor
P0342	Short circuit to ground of camshaft position sensor
P0343	Short circuit to power supply of camshaft position sensor
P0420	Aging of oxygen storage capability of three-way catalyst (emission exceeding limit)
P0444	Open circuit of control circuit of carbon canister solenoid valve
P0458	Too low voltage of control circuit of carbon canister solenoid valve
P0459	Too high voltage of control circuit of carbon canister solenoid valve
P0480	Open circuit of control circuit of cooling fan relay (low speed)
P0481	Open circuit of control circuit of cooling fan relay (high speed)
P0501	Unreasonable signal of speed sensor
P0506	Controlled rotation speed of idle below target idle
P0507	Controlled rotation speed of idle above target idle
P0508	Short circuit to ground of drive pin of stepper motor
P0509	Short circuit to power supply of drive pin of stepper motor
P0511	Open circuit of drive pin of stepper motor
P0532	Too low voltage of air conditioner pressure sensor circuit
P0533	Too high voltage of air conditioner pressure sensor circuit
P0537	Too low voltage of temperature sensor circuit of air conditioner evaporator
P0538	Too high voltage of temperature sensor circuit of air conditioner evaporator
P0560	Unreasonable voltage signal of system storage battery
P0562	Too low voltage of system storage battery
P0563	Too high voltage of system storage battery
P0602	Coding trouble of electronic control module
P0627	Open circuit of control circuit of fuel injection pump relay
P0628	Short circuit to ground of control circuit of fuel injection pump relay
P0629	Short circuit to power supply of control circuit of fuel injection pump relay
P0645	Open circuit of control circuit of A / C compressor relay
P0646	Short circuit to ground of control circuit of A / C compressor relay
P0647	Short circuit to power supply of control circuit of fuel injection pump relay
P0650	Trouble of drive circuit of MIL

3. Circuit Diagram of Element

Pin 1: Signal wire A

Pin 2: Signal wire B

Pin 3: Shielded wire



4. Element Check

- 1) Disconnect the wire harness connector to check the resistance value between pin 2 and pin 3.

Resistance value: 731~989Ω

- 2) Check the gap between the crankshaft position sensor and the tooth tip of signal disk.

Standard gap: 0.8~1.2mm

- 3) Check the signal of crankshaft position sensor.

Note: use the vehicle oscilloscope to check when the engine is starting.

Test waveform (AC signal) figure is as follows:

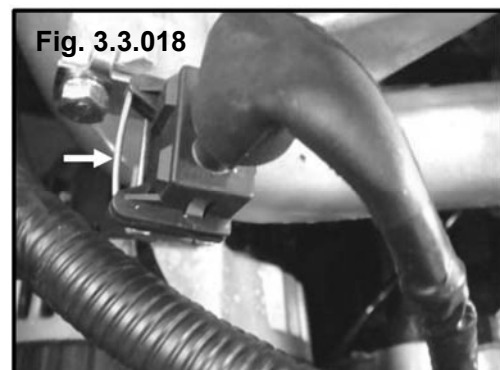


Waveform Figure of Crankshaft Position Sensor

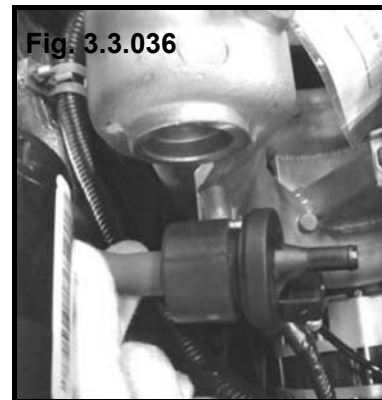
5. Dismantlement and Installation

- 1) Dismantlement

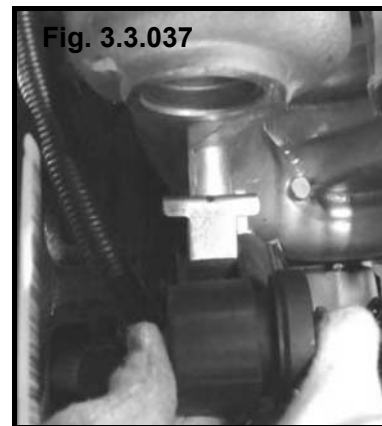
- ① Disconnect the CKP sensor wire harness connector.



- ③ Disconnect the hose at the side of carbon canister.



- ④ Take off the carbon canister solenoid valve from the retainer.



2) Installation

Pay attention to the following items and install in the reverse order with dismantlement.

- The airflow direction should meet the requirement during the installation.
- It is necessary to try to keep the water and oil away from the valve during the dismantlement and installation.

Trouble phenomenon 1: during the start-up, the engine does not run or runs slowly

General trouble position:

1. Storage battery; 2. Starter; 3.Wire harness or ignition switch; 4.Mechanical part of engine

General diagnosis procedure:

No.	Operating Steps	Detection Results	Subsequent Steps
1	Use the multimeter to check the voltage between the two terminals of storage battery to see whether it is about 8-12V during the start-up of engine.	Yes	Next step
		No	Replace the storage battery
2	Maintain the ignition switch at the starting position and use the multimeter to check whether there is a voltage above 8V at the cathode terminal of starter.	Yes	Next step
		No	Repair or replace wire harness
3	Dismantle the starter to check its operating state. Mainly check whether there is a broken circuit in the starter or whether it is blocked due to the poor lubrication.	Yes	Repair or replace the starter
		No	Next step
4	If the trouble only happens in the winter, then check whether too large resistance of starter is caused due to the improper selection of the lubricating oil for engine or the gearbox oil.	Yes	Replace with the lubricating oil of the proper grade
		No	Next step
5	Check whether the internal mechanical resistance of engine is too large; if so, the failure of rotation or the slow rotation of starter may occur.	Yes	Overhaul the internal resistance of engine
		No	Repeat the above steps