Description and Operation

About This Manual

Introduction

This manual has been written in a format to meet the needs of technicians. This manual provides general descriptions for accomplishing service and repair work . Following them will help assure reliability.

Spare Parts

The parts from Changan Automobile Co., Ltd. are manufactured according to the original factory standard. Only the original parts from Changan Automobile Co., Ltd. can be used in repair.

Special Tool

The special tool(s) provided at the beginning of each procedure are the special tools required to carry out the repair. Where possible, illustrations are provided to assist in identifying the special tool required. The special tools can be ordered from Changan Automobile Co., Ltd.

Important Safety Instructions

Appropriate service methods and correct repair procedures are essential for the safe, reliable operation on the vehicles as well as the personal safety.

This manual can not possibly provide all such variations and advice or cautions as to each. Anyone who departs from the instructions provided in this manual must assure that the operation methods, tools and components used neither cause personal injury nor break the vehicle integrity.

Warnings, Cautions and Notes in This Manual

WARNING: Warnings are used to indicate that failure to follow a procedure correctly may result in personal injury.

CAUTION: Cautions are used to indicate that failure to follow a procedure correctly may result in damage to the vehicle or repair tools being used.

As you read through this manual, you will come across WARNINGS and CAUTIONS.

How to Use the Manual

This manual covers the maintenace and repair service procedures.

This manual is structured into groups and sections, with specific system sections collected together under their relevant group. A group covers a specific portion of the vehicle.

The manual is divided into five groups, Overview, Chassis, Powertrain, Electrical and Body.

The Table of Content of the manual can guide you to the section. Each section has a regular structure: Specifications, Description and Operation, General inspections, Symptom Diagnosis and Testing, DTC Diagnosis and Testing, Removal and Installation, Disassembly and Assembly.

All left-hand and right-hand references to the vehicle are taken from a position sitting in the driver seat looking forward.

All left-hand and right-hand references to the engine are taken from a position at the flywheel looking towards the front camshaft pulley.

Specifications

The specifications mainly describe the material specifications, component specifications, general specifications (the contents that can be included in other specifications) and torque specifications. The information in the specification shall use the metrics except the torque (Imperial) .

Description and Operation

The Description and Operation mainly describes the system components, functions and principles of the new systems. The “new systems” refers to the systems that never used on the previous models of the manufacturer. The purpose of the brief introduction is to make the technicians get familiar with the functions and principles of the systems. The component localtion view and the exploded view are also included in this section.

be avoided. The use of extraction ventilation to remove the fumes from the working area may be necessary particularly in cases where the general ventilation is poor, or where considerable welding work is anticipated. In extreme cases or confined spaces where adequate ventilation cannot be provided, air-fed respirators may be necessary.

3. Gas Welding (Gas Cutting)

   Oxy acetylene torches may be used for welding and cutting, and special care must be taken to prevent leakage of these gases, with consequent risk of fire and explosion.

   The process will produce metal spatter and eye and skin protection is necessary. The flame is bright, and eye protection should be used, but the ultra-violet emission is much less than that from arc welding, and lighter filters may be used.

   The process itself produces few toxic fumes, but such fumes and gases may be produced from coatings on the work, particularly during cutting away of damaged body parts. Inhalation of the fumes should be avoided.

   In brazing, toxic fumes may be produced from the metals in the brazing rod, and a severe hazard may arise if brazing rods containing cadmium are used. In this event particular care must be taken to avoid inhalation of fumes and expert advice may be required.

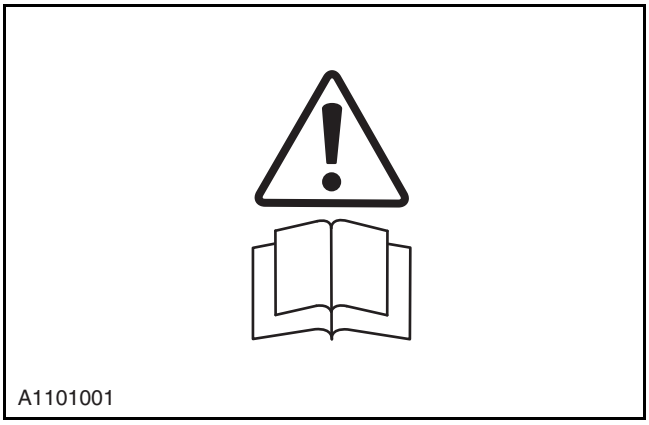
   SPECIAL PRECAUTIONS MUST BE TAKEN BEFORE ANY WELDING OR CUTTING TAKES PLACE ON VESSELS, WHICH HAVE CONTAINED COMBUSTIBLE MATERIALS, FOR EXAMPLE BOILING OR STEAMING OUT OF FUEL TANKS.

Warning Symbols on Vehicle

Decals showing warning symbols will be found on various vehicle components. These decals must not be removed. The warnings are for the attention of owners/operators and persons carrying out service or repair operations on the vehicle.

The most commonly found decals are reproduced below together with an explanation of the warnings.

1. Components or assemblies displaying the caution triangle and open book symbol advise consultation of the relevant section of the owner literature before touching or attempting adjustments of any kind.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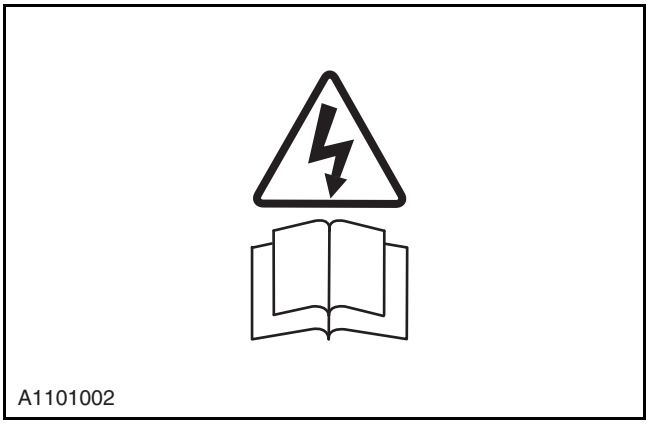
2. Components or assemblies displaying the warning triangle with the “electrified” arrow and open book symbol give warning of inherent high voltages. Never touch these with the engine running or the ignition switched on.

   Refer to: Electric Shock.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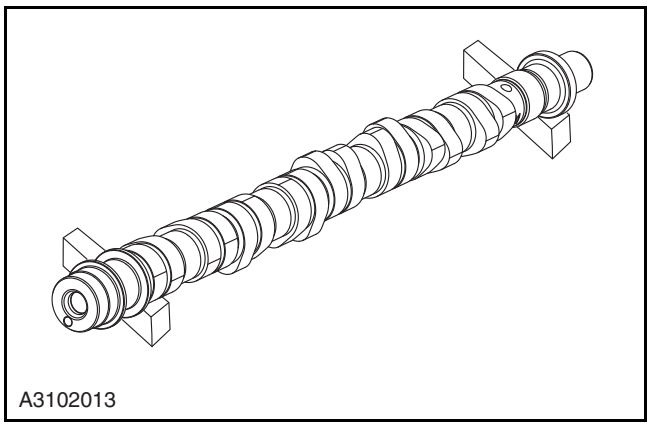
5. Inspect the rocker shaft runout with an V-shaped block and a micrometer. Install a new rocker shaft if the runout exceeds the limit.

   Radical runout standard value:0.03 mm

   General Equipment:dial indicator gauge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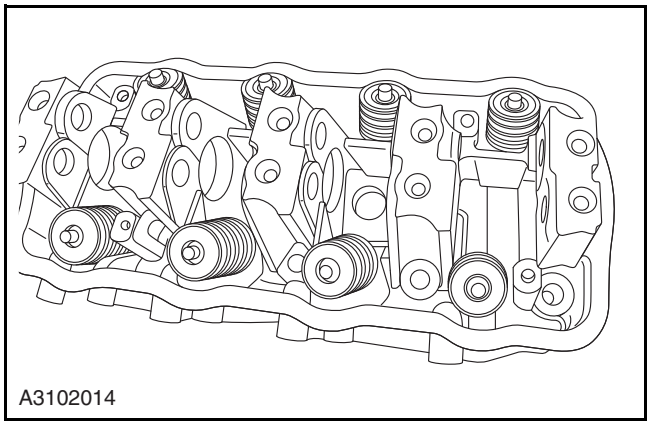
6. Inspect the camshaft journal and camshaft cover for any possible rust, scratch, wear or damage.

CAUTION: Replace camshaft or camshaft cover if any undesirable situation occurs; Camshaft and camshaft cover should be replaced if they are badly damaged.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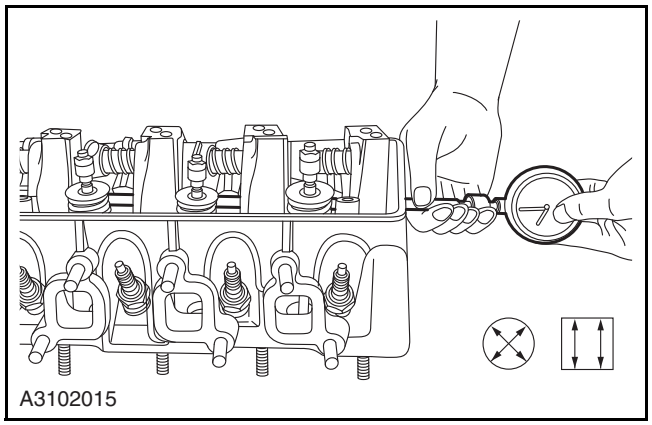
7. Measure the inner diameter of the cylinder head camshaft hole with an inside gauge.

   General equipment: inner diameter gauge.

Item	Standard(mm)
Camshaft journal hole diameter	Φ44.300 ~ 44.325 Φ44.100 ~ 44.125 Φ43.900 ~ 43.925 Φ43.700 ~ 43.725 Φ43.500 ~ 43.025

CAUTION: Replace the cylinder head if one exceeds limit.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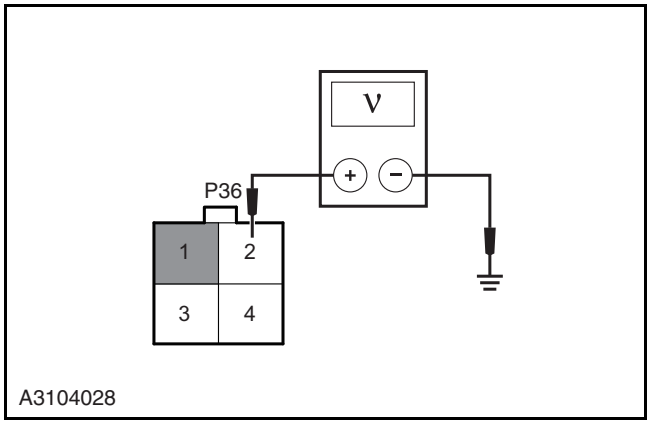
8.Inspect the power supply voltage of fan relay P36



A.Turn the ignition switch to "ON".

B.Use a multimeter to measure the voltage between the fan relay wiring harness connector P36 terminal, 2 and the reliable grounding.

Standard voltage value:11 ~ 14 V

Is the voltage normal?

Yes

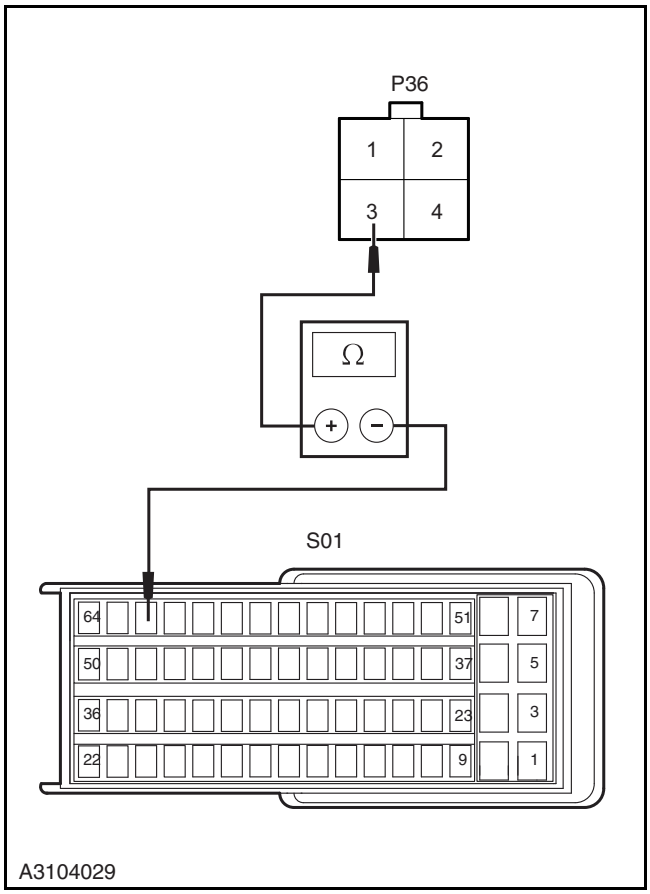
Go to step 9.

No

Inspect and repair the open circuit fault between relay P36 number 1 wiring harness terminal and relay IR01 number 87 wiring harness terminal.

Inspect and repair the open circuit fault between fuse IF06 number 12 wiring harness terminal and relay P36 number 2 wiring harness terminal.

9.Inspect the circuit between ECM and fan relay P36



A.Turn the ignition switch to "LOCK".

B.Disconnect the wiring harness connector S01 of ECM.

C.Remove the fan relay P36?

D.Measure the resistance value between fan relay P36 wiring harness connector terminal 3 and ECM wiring harness connector S01 terminal 62 with multimeter.

Standard resistance value: less than 5 Ω

Is the resistance value normal?

Yes

Go to step 10.

No

Inspect and repair the open circuit fault between fan relay P36 wiring harness connector terminal 3 and ECM wiring harness connector S01 terminal 62.

Assembling

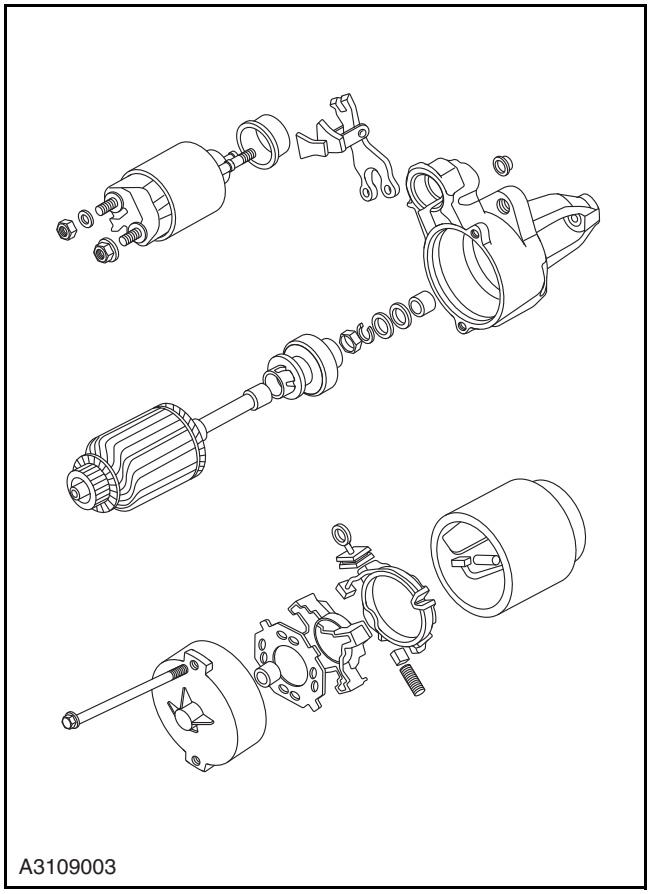
1. Inspect and replace the components as necessary.

   Refer to: 3.1.9 Starting system, General inspection.

2. Before installing the overdrive clutch, add grease,then fix the stop ring.
3. Fill the drive lever with grease and install it together with the armature and the drive cover.
4. Install the stator and brush holder,and then fix the four dynamo brushes with spring,and then install the insulation.

CAUTION: When installing the brush, remove the grease on the brush and the commutator completely.

CAUTION: Make sure that there is no unnecessary contact between the brush and other components.



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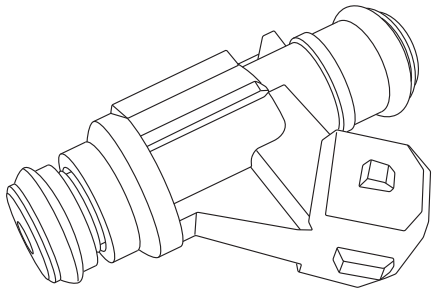
5. Fill the grease inside the bushing, and then install the rear cover.
6. Install a new solenoid switch or its cover set. Add grease on the top of on the plunger as necessary.
7. Turn the drive lever to hook the solenoid switch plunger and then use nut to solid tight the magnetic switch assembly.
8. Connect wires in place and then inspect the work of the solenoid switches.

CAUTION: Before installing the nut, ensure that the plunger is well connected to the drive lever.

Fuel Injector

Nozzle structure is an electromagnet switch ball valve device. Two terminals of coil lead-out are connected to ECM and power through the engine wiring harness. After turning on by ECM control over system grounding, the coil generates magnetic force to overcome spring force, fuel pressure and manifold vacuum suction. After the valve core is sucked, the fuel would pass through the valve seat hole, and then would be blown out through the guide hole, and to the intake valve as haze shape. After the power is cut off, the magnetic force would disappear, and then the nozzle closes under action of spring force and fuel pressure.

The top of fuel injector applies the rubber lock ring, which then forms reliable pressure fuel sealing with the fuel guide connector; its lower part also applies rubber lock ring, which is air proof with the engine intake manifold. Fuel injector is fixed at intake manifold through fuel rail.



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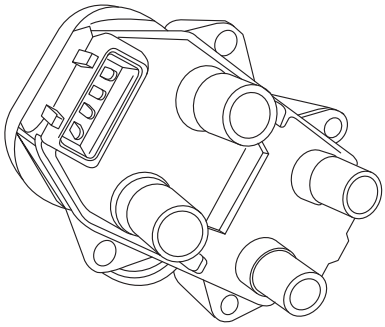
Ignition Coil

Ignition coil of cylinder 1 and 4 and ignition coil of cylinder 2 and 3 is integrated as a whole, and fixed at the vehicle body close to the engine. Ignition coil transforms the low voltage of primary winding into secondary winding high voltage, spark discharge through the spark plug, igniting the mixture of air and fuel within the cylinder. ECM controlls the ignition coil primary coil to ground.



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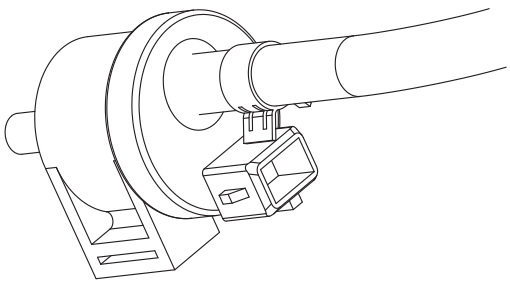
Carbon Canister Solenoid Valve

ECM controls fuel vapor amount from carbon canister to intake manifold through the cleaning control solenoid valve; ECM is in linear relation with its output pulse square wave, duty ratio of ventilatory capacity and control pulse square wave. ECM changes cleaning time and speed according to engine rotating speed and load. Idle control valve is to control flow area of bypass duct of throttle body. Carbon canister solenoid valve is installed at the engine compartment, between fuel vapor carbon canister and intake manifold.



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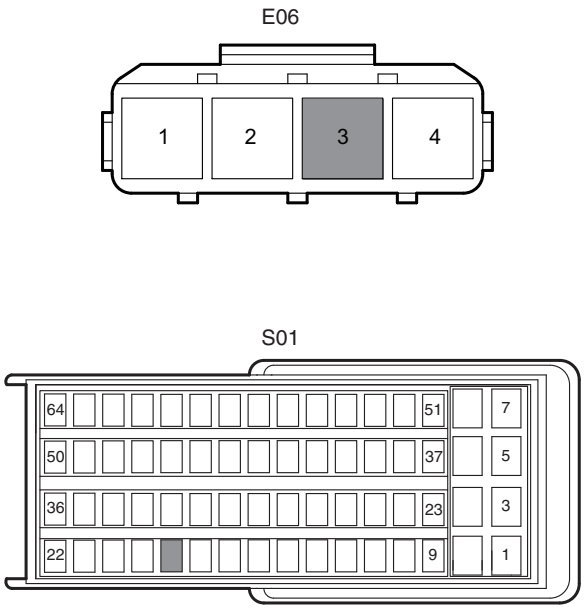
3.Inspect air intake pressure sensor power supply circuit



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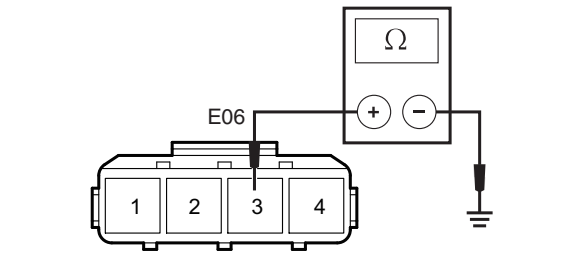

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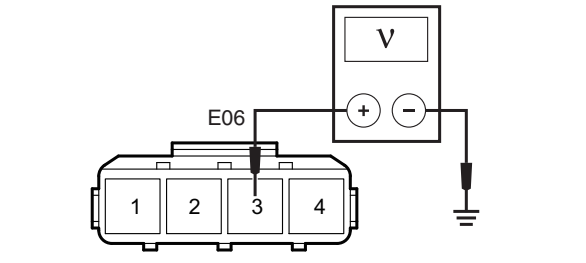

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A.Turn the ignition switch to "LOCK".

B.Disconnect the intake air pressure temperature sensor wiring harness connector E06.

C.Disconnect the wiring harness connector S01 of ECM.

D.Measure the resistance between terminal 3 of air intake pressure temperature sensor wiring harness connector E06 and terminal 18 of ECM wiring harness connector S01.Inspect for open circuit.

Standard resistance value: less than 5 Ω

E. Measure the resistance between terminal 3 of air intake pressure temperature sensor wiring harness connector E06 and reliable grounding.Inspect for short circuit to ground .

Standard resistance: 10 MΩ or more

F.Measure the voltage between terminal 3 of air intake pressure temperature sensor wiring harness connector E06 and reliable grounding. Inspect for short circuit to power supply.

Standard voltage:0 V

Is it normal?

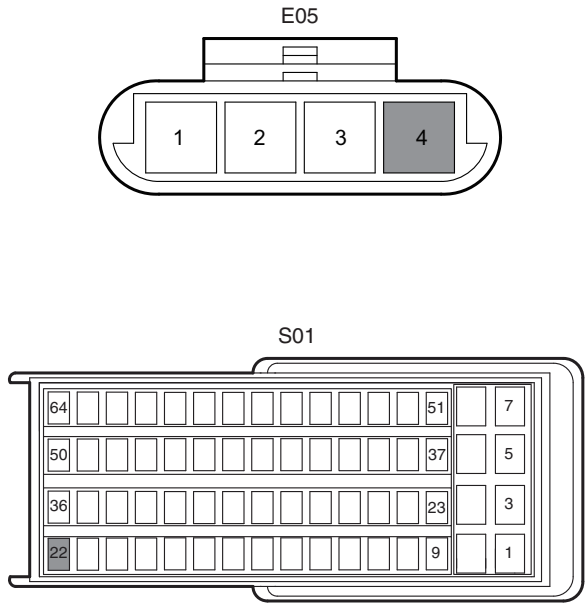
Yes

Go to step 4.

No

Repair the circuit fault between terminal 3 of E06 and terminal 18 of S01, and verify if the system is normal.

6.Inspect terminal 4 of idle control valve wiring harness connector E05 and terminal 22 of ECM wiring harness connector S01



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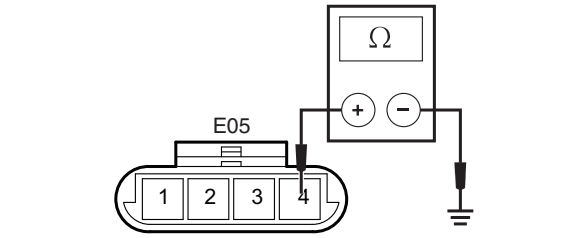

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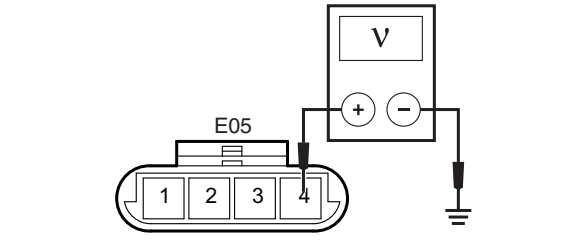


A3112113

A.Turn the ignition switch to "LOCK".

B. Disconnect the idle control valve wiring harness connector E05.

C. Disconnect the engine control module wiring harness connector S01.

D.Measure resistance value between terminal 4 of idle control valve wiring harness connector E05 and terminal 22 of engine control unit wiring harness connector S01.Inspect for open circuit.

Standard resistance value: less than 5 Ω

E.Measure the resistance between terminal 4 of idle control valve wiring harness connector E05 and the reliable grounding.Inspect for short circuit to ground.

Standard resistance: 10 MΩ or more

F.Measure the voltage between terminal 4 of idle control valve wiring harness connector E05 and the reliable grounding. Inspect for short circuit to power.

Standard voltage:0 V

Is it normal?

Yes

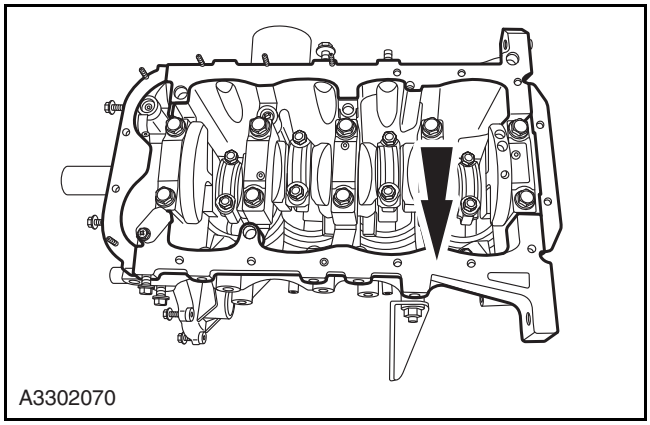
Go to step 7.

No

Repair circuit fault between terminal 4 of idle control valve wiring harness connector E05 and terminal 22 of engine control module ECM wiring harness connector S01.

Assembling

CAUTION: Two models of piston are standard spare parts. The piston can be used only if it guarantees a correct piston clearance and cylinder clearance.When installing the standard piston, match the piston to the cylinder as the following description.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CAUTION: Each piston has number indication 1 or 2 as shown in the figure, which means outside diameter of the piston.

CAUTION: There are also number mark 1 or 2 on the engine block as shown in the illustration. The first number represents the inside diameter of the No.1 cylinder. The second number represents the inside diameter of the NO.2 cylinder. The third number represents the inside diameter of the NO.3 cylinder. The fourth number represents the inside diameter of the NO.4 cylinder.

CAUTION: Match the piston to the corresponding cylinder by following the cylinder inside diameter mark on the cylinder block.

CAUTION: There are also letters like A, B or C printed on the piston head. It is not necessary to use these letters to distinguish each piston.

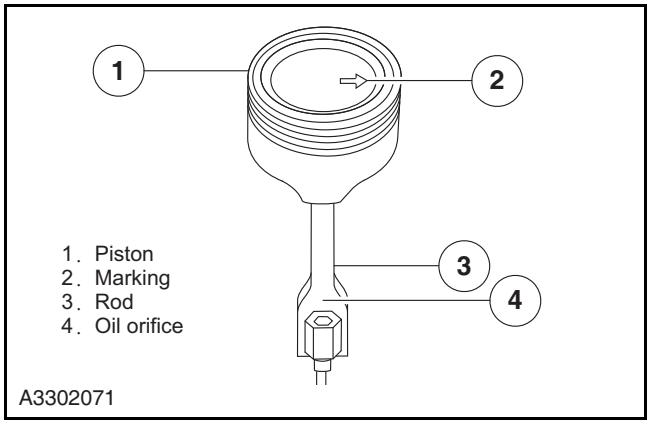
1. Install the piston pin on the piston and connecting rod.

1.Smear moderate engine oil on the piston pin and piston pin hole.

2.Install the piston connecting rod on the piston.

3.Inset the piston pin in the piston and connecting rod.

4.Install the piston pin circlip.



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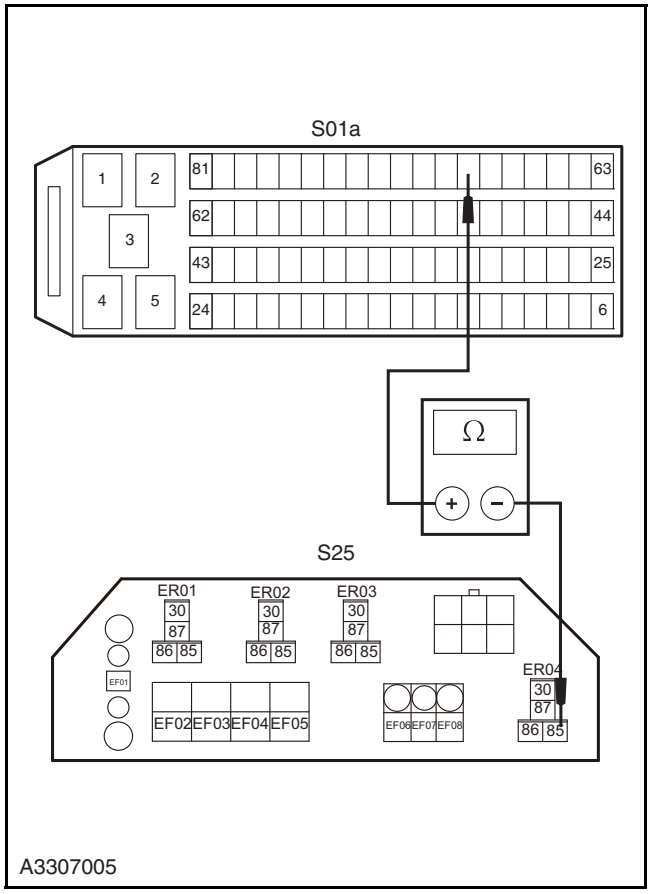
CAUTION: Install the piston pin circlip with its mouth facing upwards or downwards.

7. Inspect the fuel pump relay control circuit



A.Turn the ignition switch to "LOCK".

B. Disconnect the engine control module wiring harness connector S01a.

C. Remove the fuel pump relay.

D.Measure the resistance between terminal 69 of ECM wiring harness connector S01a and terminal 85 of fuel pump relay.

Standard resistance value: less than 5 Ω

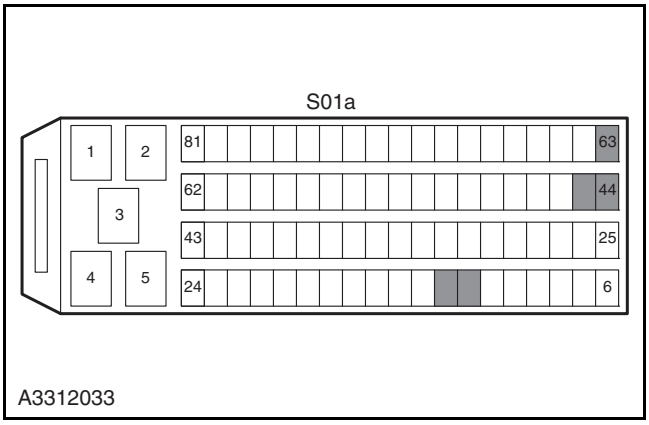
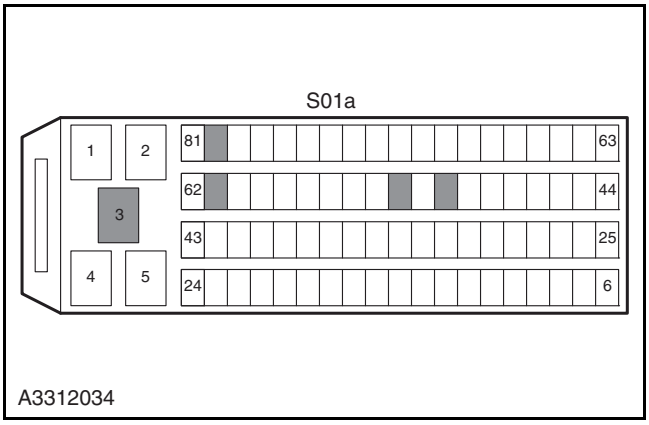
Is the resistance value normal?

Yes

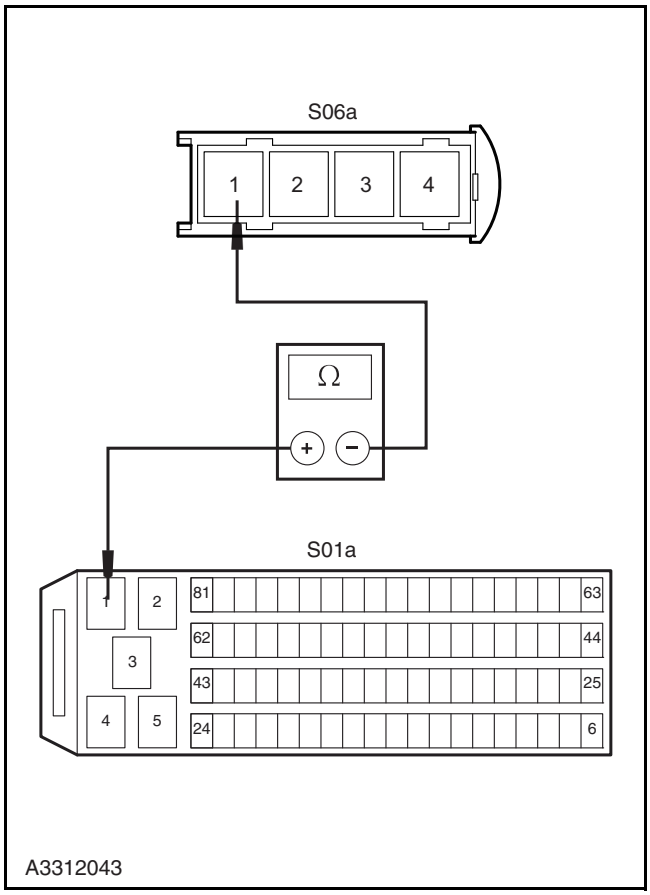
Go to step 8.

No

Repair the circuit fault.

7. Inspect the water in the fuel	
	A. Remove the fuel filter connector. **Refer to: Fuel Filter (3.1.7 Fuel System, Removal and Installation).** B. Drain the fuel in the filter and inspect the water in the fuel. Is there any water in fuel tank? **Yes** Remove the water mixed in the fuel, add high standard pure fuel. **No** Go to step 8.
8. Inspect the engine control module circuit	
 A3312033  A3312034	A. Turn the ignition switch to position "LOCK". B. Disconnect the wiring harness connector S01a of ECM. C. Turn the ignition switch to position "ON", inspect the power supply of terminal 12, 13, 44, 45 and 63. D. Turn the ignition switch to position "LOCK", inspect the grounding of terminal 3, 51, 53, 61 and 80. Is the circuit of the engine control module normal? **Yes** Replace the engine control module. **Refer to: Engine Control Module(3.3.12 Electrical Control System - M7,Removal and Installation).** **No** Repair the circuit.

6.Inspect heater control signal circuit



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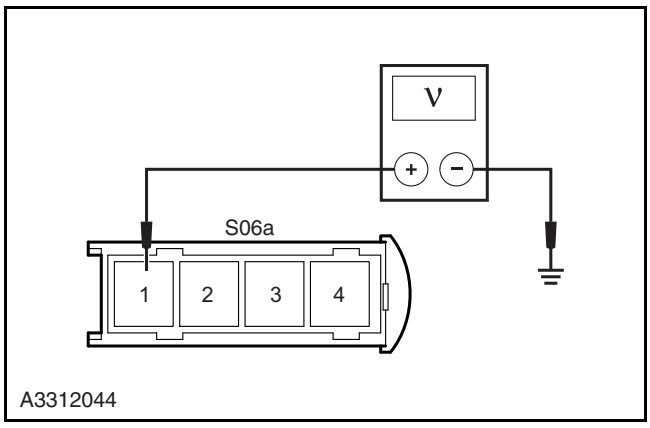

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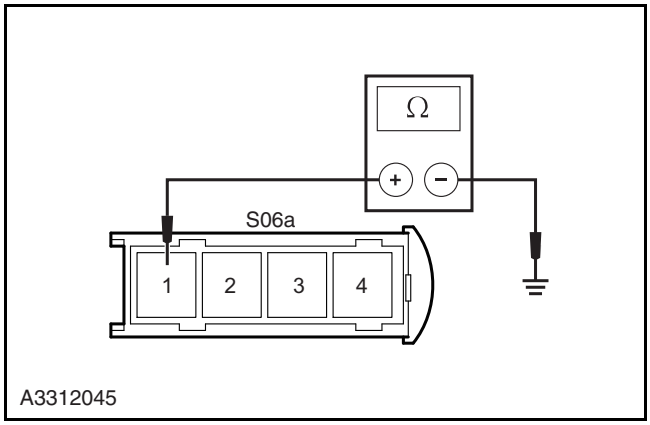


A3312045

A. Turn the ignition switch to position "LOCK".

B. Disconnect the battery negative cable.

C.Disconnect the wiring harness connector S01a of ECM.

D. Disconnect front oxygen sensor wiring harness connector S06a.

E. Connect the battery negative cable

F. Measure the circuit between the 1 terminal of front oxygen sensor wiring harness connector S06a and the 1 terminal of ECM wiring harness connector S01a.

Standard resistance value: less than 5 Ω

G.Measure the voltage between the 1 terminal of front oxygen sensor wiring harness connector S06a and the reliable grounding.

Standard voltage:0 V

H.Measure the resistance between the 1 terminal of front oxygen sensor wiring harness connector S06a and the reliable grounding.

Standard resistance: 10 MΩ or more

Is it normal?

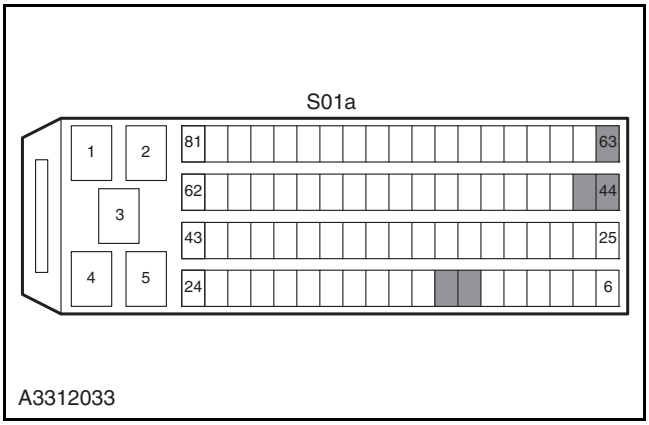
Yes

Go to step 7.

No

Repair the fault circuit between the 1 terminal of front oxygen sensor wiring harness connector S06a and the 1 terminal of ECM wiring harness connector S01a.

6. Inspect the engine control module circuit



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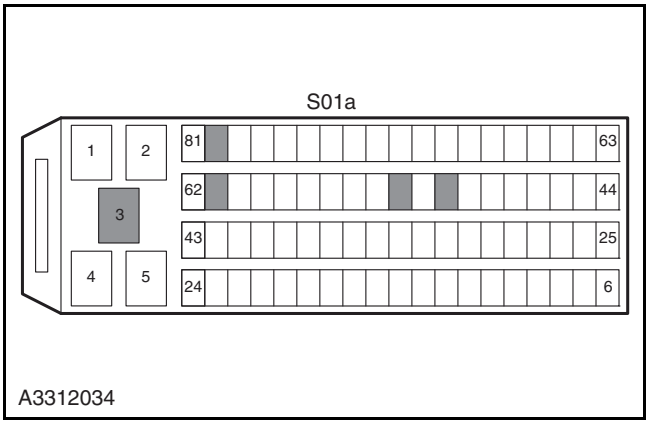

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A. Turn the ignition switch to position "LOCK".

B. Disconnect the wiring harness connector S01a of ECM.

C. Turn the ignition switch to position "ON",inspect the power supply of terminal 12, 13, 44, 45 and 63.

D. Turn the ignition switch to position "LOCK",inspect the grounding of terminal 3, 51, 53, 61 and 80.

Is the circuit of the engine control module normal?

Yes

Replace the engine control module.

Refer to: Engine Control Module(3.3.12 Electrical Control System - M7,Removal and Installation).

No

Repair the circuit.

Diagnosis Procedure of Clutch Slippage

Test Conditions	Details/Results/Actions
1. Inspect the clutch slip	
	A.Inspect wheel and apply parking brake. B.Turn the ignition switch to "START" position. C.Start engine, shift transmission into fourth gear. D.Operate engine at the speed of 2,000 rpm. E.Release clutch pedal slowly. Whether the engine stalls when clutch pedal is released completely? **Yes** Clutch is normal. **No** Go to step 2.
Inspect free stroke of brake pedal	
	A.Press clutch pedal with hands until feeling resistance. B. Inspect pedal stroke Is the measured dimension between 1.6 ~ 4.8 mm? **Yes** Go to step 3. **No** Adjust free stroke of clutch pedal
3. Clutch pedal maneuverability	
	A.Inspect the lubrication Is the lubrication of clutch pedal shaft good? **Yes** Go to step 4. **No** Lubricate clutch pedal shaft.
4. Inspect whether clutch system fluid is polluted	
	A.Remove the transmission. **Refer to: Manual Transmission (3.4.6 Manual Transmission-MR510B04, Removal and Installation).** B.Inspect whether clutch system is polluted by oil leak. Is the clutch system polluted by oil leak? **Yes** Repair the oil leak. **No** Go to step 5.

4.Inspect the compressor function state	
	A. Inspect the items below: • Compressor belt working state. • Compressor clutch working state. • Compressor working state. Is the system working normal? **Yes** Go to step 5. **No** Repair and adjust as below and make sure the system is normal. • Adjsut the compressor belt,replace it when necessary. • Inspect the refrigerant,lubricant and supplement them when necessary. • Inspect and repair the compressor clutch circuit. • Inspect and repair the compressor clutch,replace it when necessary. • Inspect and repair the refrigerant pressure switch,replace it when necessary. • Inspect and repair the AC temperature sensor,replace it when necessary. • Inspect and repair the compressor, replace it when necessary. • Inspect and repair the engine control module,replace it when necessary.
5. Inspect the temperature in the condenser	
	A. Inspect the output state of the condensor. Is the system working normal? **Yes** Go to step 6. **No** Repair and adjust as below and make sure the system is normal. Inspect ,repair and clean the condensor ,reoplace it as necessary.