Service Information

Overview

About This Manual

Introduction

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

Spare Parts

Parts from CHANGAN Auto Co., Ltd. are manufactured according to original factory standard. Only genuine parts from CHANGAN Auto Co., Ltd. can be used in repair.

Special Tool

Special tool(s) list provided at beginning of each procedure lists all special tools required to carry out the repair. Illustrations are provided to assist in identifying the special tools when necessary. Special tools can be ordered from CHANA Auto Co., Ltd.

Important Safety Instructions

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

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

Warnings, Cautions and Notes in This Manual

Warning

It is used to indicate that failure to follow this manual may result in personal injury.

Caution It is used to indicate that failure to follow a procedure correctly may result in damage to vehicle or repair tools being used.

As you read through this manual, you will come across items marked with “WARNING” and “CAUTION”.

How to Use the Manual

This manual covers maintenance and repair service procedures.
This manual is structured in chapters and sections, with specific system sections collected together under their relevant sections. Each chapter covers a specific portion of vehicle.

Table of Contents of the manual includes all sections. Generally, each section contains the following: Specifications, Description and Operation, General Inspection, Symptom Diagnosis and Testing, DTC Diagnosis and Testing, Removal and Installation, Disassembly and Assembly.

Left and right of vehicle are determined as driver’s left and right when he or she sits on the driver’s seat and faces the front of vehicle. Left and right of engine are determined to face forward from flywheel at camshaft front-end pulley.

Specifications

Specifications section mainly describes material specifications, component specifications, general specifications (contents that cannot be classified in other specifications) and torque specifications. Units (except that for torque) in these lists adopt metric system instead of British system.

Description and Operation

Description and Operation section mainly describes system components, brief introduction of functions and principles for new systems. “New systems” refer to systems that are not used on previous models of manufacturer. Purpose of brief introduction is to make technicians become familiar with functions and principles of systems. Component location view and component exploded view are also presented.

General Inspection

General Inspection section mainly describes general inspection steps of system.

Splashes in eyes may cause severe irritation and could lead to loss of vision. Steam or mist of high concentrations of solvents exposed in air will cause eye and throat irritation, dizziness, headaches, and in worst circumstances, unconsciousness.

Solvent with low concentrations will produce vapor or mist if it is exposed to air for long time. Since there might be no obvious symptoms, it can cause more serious toxic and harmful effects.

Avoid splashing to eyes, skin and clothing. Wear protective gloves, goggles and clothing if necessary.

Make sure there is good ventilation when in use, avoid inhaling fume, steam and spray mist and keep containers tightly sealed.

Never use in a confined space.

When spraying materials containing solvents, for example paints and adhesive, use extraction ventilation or personal respiratory protection in the absence of adequate general ventilation.

Do not apply heat or flame except under specific and detailed manufacturer's guidance.

Suspended Load

Warning

Never improvise lifting tackle.

There is always a danger when loads are lifted or suspended. Never work under an unsupported, suspended or raised load, for example a suspended engine.

Always make sure that lifting equipment, such as jacks, hoists, axle stands and slings, are in good condition and regularly maintained.

Underseal

Refer to: Anti-corrosion Material.

Welding

Refer to: Fire Prevention, Electric Shock and High Pressure Gas Cylinder.

Welding procedures include (resistance welding) spot welding, arc welding and gas welding.

1 Resistance Welding

This process may cause particles of molten metal to be emitted at a high velocity, and the eyes and skin must be protected.

2 Arc Welding

This process emits a high level of ultra-violet radiation, which may cause arc-eye, and skin burns to operator and other persons nearby. Gas-shielded welding processes are particularly hazardous in this respect. Personal protection must be worn, and screens used to shield other persons.

Contact lens wearers are advised to revert to ordinary spectacles when arc welding. As the arc spectrum is believed to emit microwaves which dry out the fluid between lens and eyes, even result in blindness. Metal spatter will also occur, and appropriate eye and skin protection is necessary.

Heat of welding arc will produce fume and gas from metal molten pool being welded, when core or coat are contaminated. Gas and fume may be toxic and inhalation of these should be avoided. Extraction ventilation to remove the fume from working area may be necessary particularly in cases where general ventilation is poor, or where considerable welding work is anticipated. In extreme cases or confined spaces where adequate ventilation cannot be provided, respirators may be necessary.

3. Gas Welding (Gas Cutting)

Oxyacetylene torches may be used for welding and cutting, and special care must be taken to prevent such gas leakage, or fire and explosion may be caused.

Process will produce metal spatter and eye and skin protection is necessary. Flame is bright, and eye protection should be used, but ultra-violet emission is much less than that from arc welding, and protective glasses should be used.

Process itself produces few toxic fumes, but such fume and gas may be produced from coatings on the work, particularly during cutting off damaged parts. Inhalation of fume should be avoided.

In brazing, toxic fume may be produced from the metals in 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 fume and expert advice may be required.

P209700

DTC P209700: Post Catalyst Fuel Trim System Too Rich Bank 1

1. Malfunction trigger conditions:

1. Engine is running
2. Engine speed is between 1200 rpm and 2720 rpm
3. Engine coolant temperature is higher than or equal to 20℃
4. Closed loop correction value based on rear oxygen is too rich

2. Possible causes:

1. Intake and exhaust systems leakage
2. Front oxygen has a negative characteristic deviation (too rich)
3. A certain degree of aging in rear oxygen
4. Serious deterioration of catalytic converter

3. Troubleshooting and phenomena:

None

4. Diagnosis procedure:

Item	Operation Steps	Test Result	Subsequent Steps
1	Check intake and exhaust systems for leakage	Yes	Repair air leakage
		No	Go to next step
2	Replace front oxygen sensor, track whether the fault reoccurs	Yes	Go to next step
		No	End
3	Replace rear oxygen sensor, track whether the fault reoccurs	Yes	Go to next step
		No	End
4	Check catalytic converter for deterioration	Yes	Go to next step
		No	Diagnosis help
5	Replace catalytic converter, track whether the fault reoccurs	Yes	Diagnosis help
		No	End

P209600

DTC P209600: Post Catalyst Fuel Trim System Too Lean Bank 1

1. Malfunction trigger conditions:

1. Engine is running
2. Engine speed is between 1200 rpm and 2720 rpm
3. Engine coolant temperature is higher than or equal to 20℃
4. Closed loop correction value based on rear oxygen is too lean

2. Possible causes:

1. Intake and exhaust systems leakage
2. Front oxygen has a negative characteristic deviation (too lean)
3. A certain degree of aging in rear oxygen
4. Serious deterioration of catalytic converter

3. Troubleshooting and phenomena:

None

Removal and Installation

Timing Mechanism

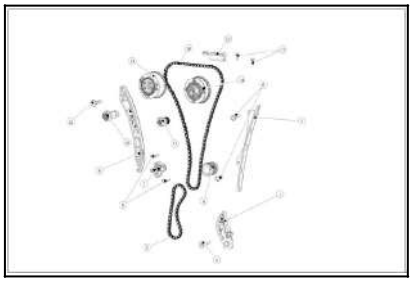


Figure 23:

Item	Description	Item	Description
1	Oil pump chain tensioner assembly	10	Intake center solenoid valve assembly
2	Oil pump chain tensioner mounting bolt	11	Exhaust center solenoid valve assembly
3	Oil pump chain assembly	12	Timing chain movable guide assembly mounting bolt
4	Crankshaft timing sprocket	13	Intake phaser assembly
5	Timing chain fixing guide assembly	14	Exhaust phaser assembly
6	Timing chain fixing guide mounting bolt	15	Camshaft center guide assembly
7	Timing tensioner assembly	16	Timing chain assembly
8	Timing chain tensioner assembly mounting bolt	17	Camshaft center guide mounting bolt
9	Timing chain movable guide assembly		

1 Fix timing position

Before installing timing chain, install and position the camshaft and flywheel with a special timing tool and prevent them from rotating. Timing plate is used at the upper end, horizontally position plane of hexagon mark on the intake and exhaust camshaft assembly upwards. Timing pin is used at the lower end, position the drive plate at the correct timing position.

2 Install VVT phase

Before installing the phaser, always use timing tool to position the camshaft timing phase; When installing the phaser, confirm that the installation end surface of the phaser is clean, the laser etching lines are complete, and there are no scratches, crushing, etc, the thread of center solenoid valve assembly is free of rotten teeth, missing teeth, etc. Push the thimble at the rear end of center solenoid valve assembly by hand to ensure that there are no stuck or jam, etc. First bring the center solenoid valve into phaser without torque. After the timing chain assembly, movable and fixing guide rail assembly, and timing chain tensioner assembly are all installed, tighten the intake phaser center solenoid valve and exhaust phaser center solenoid valve in turn. The center solenoid valve assembly is tightened according to the torque specified in table A.

3 Install crankshaft timing sprocket

When installing the crankshaft timing sprocket, the end with large chamfer on the hole edge and complete flange on the end face shall be installed inward, and the end with flange tooth face shall be installed outward.

4 Install timing chain assembly

Before installing timing chain, install and position the camshaft and flywheel with a special timing tool and prevent them from rotating.

procedure of nylon tube quick-change connector. Remove the connection between pipeline and fuel tank pipe clamp;

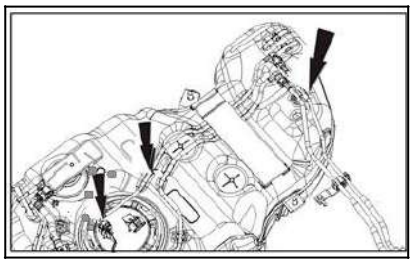


Figure 111:

6. Remove fuel tank filler hose and fuel tank circulating pipe assembly by referring to removal procedure of fuel filler pipe assembly;
Tightening torque for worm drive clamp at the connection of fuel tank filler hose: 5 ± 0.5 Nm

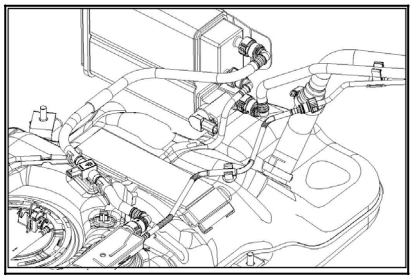


Figure 112:

7. Remove fuel pipe clamp from frame, and separate fuel supply connecting pipe assembly and pipe clamp.

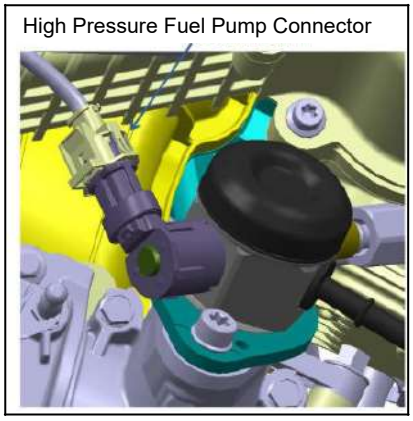
Installation

Installation is in the reverse order of removal.

High Pressure Fuel Pump

Removal

1. Disconnect the high pressure fuel pump solenoid valve connector;



2. Remove the high pressure fuel pump outlet pipe nut. Refer to removal and installation of high pressure fuel pump outlet pipe;

Interface Definition

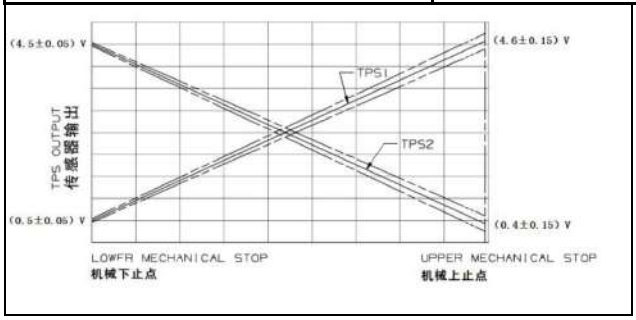
1	2	3	4	5	6
M-	**GND**	**VCC**	**M+**	**TPS2**	**TPS1**

TPS Output Characteristics

Temperature: At room temperature (23℃)

Sensor operating voltage: V CC = 5 V

	TPS1 (V)	TPS2 (V)
Mechanical bottom dead center	**0.5 ± 0.05**	**4.5 ± 0.05**
Mechanical top dead center	**4.6 ± 0.15**	**0.4 ± 0.15**



Malfunction Inspection

Warning Before performing single product troubleshooting, perform related wiring harness connection inspections first to confirm there is no problem.

Warning Before performing single product troubleshooting, first observe whether there is serious carbon deposition/oil stain in main passage of throttle body, and if so, first clean throttle body according to throttle body cleaning manual.

1 Throttle Body Sensor Inspection

Depress accelerator pedal, throttle body 1-way signal voltage value and 2-way signal voltage value are read by diagnostic tool of electronic injection system. Observe whether it conforms to the following output characteristics, if so, throttle body should be replaced.

- Temperature: At room temperature (23℃)
- Sensor operating voltage Vcc
- V_{TPS1}: 0.45-4.75V
- V_{TPS2}: 0.25 V -4.55V

12. Measure resistance between terminals of fuel metering valve wiring harness connector

Normal resistance: More than 1 MΩ

Tip

〉 If the measured resistance is not within the normal resistance range, the possible causes are as follows:

〉 Internal short circuit in wiring harness.

〉 Connector is damaged.

〉 If the measured resistance is within the normal resistance range, proceed to the next step.

13. Replace ECM

14. Install ECM wiring harness connector

15. Install fuel metering valve wiring harness connector

16. Turn ignition switch to ON

17. Check if fault disappears

Tip

〉 If fault disappears, the ECM may be damaged.

〉 If fault does not disappear, the fuel metering valve may be damaged.

Fuel Metering Control Failure

P10A500

DTC Definition: IMV Rail Pressure Control Failure - Drive Pulse Remain High

DTC Reporting Conditions: Fuel metering valve drive signal duty cycle > 97% for 0.48 sec.

Possible Fault Symptom

〉 OBD indicator comes on.

Possible Causes

〉 ECU driver failed.

Troubleshooting Method

1. Turn ignition switch to OFF

Tip

〉 If previous status of ignition switch is ON, turn it to OFF, wait at least 60 s before performing the subsequent operations.

2. Disconnect fuel metering valve wiring harness connector

1. Measure voltage between power supply terminal of DCU wiring harness connector and ground

Normal voltage: Between 11 ~ 16 V.

Tip

〉 If the measured voltage is not within the normal voltage range, the possible causes are as follows:

〉 Wiring harness is damaged.

〉 Connector is damaged.

〉 If the measured voltage is within the normal voltage range, proceed to the next step.

2. Check if DCU wiring harness and ECM corresponding wiring harness are normal

〉 If it is normal, go to next step.

〉 If it is abnormal, repair the wiring harness.

3. Clear DTC, read again and check if DTC still exists

〉 If DTC does not exist, test ends.

〉 If DTC still exists, replace DCU.

Cold Start Emission Reduction Failure (Fuel Injector Fault)

P182700

DTC Definition: Cold Start Emission Reduction Failure - Injection Pattern - Cylinder 1

DTC Reporting Conditions: The difference between demand for cold start and actual number of injection pulses ≠ 0.

P182800

DTC Definition: Cold Start Emission Reduction Failure - Injection Pattern - Cylinder 3

DTC Reporting Conditions: The difference between demand for cold start and actual number of injection pulses ≠ 0.

P182900

DTC Definition: Cold Start Emission Reduction Failure - Injection Pattern - Cylinder 2

DTC Reporting Conditions: The difference between demand for cold start and actual number of injection pulses ≠ 0.

P182A00

DTC Definition: Cold Start Emission Reduction Failure - Injection Pattern - Cylinder 4

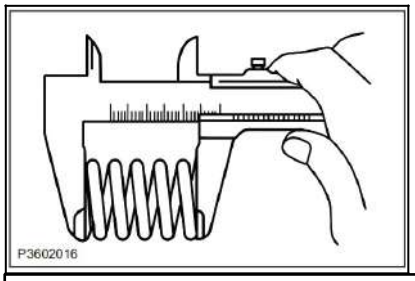
DTC Reporting Conditions: The difference between demand for cold start and actual number of injection pulses ≠ 0.

P21B600

DTC Definition: Cold Start Emission Reduction Failure - Injection Timing - Cylinder 1

DTC Reporting Conditions: The difference between demand for cold start and actual injection timing angle is more than 6°.

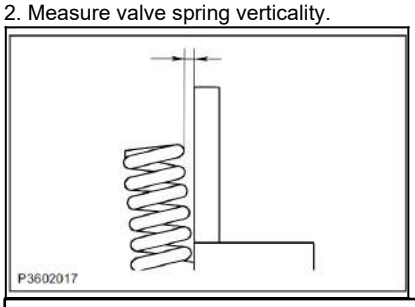
P21B700



Valve Spring Free Height	Parameter (mm)
Standard value	43.6 ± 1

If the height is lower than the specified value, the spring must be replaced.

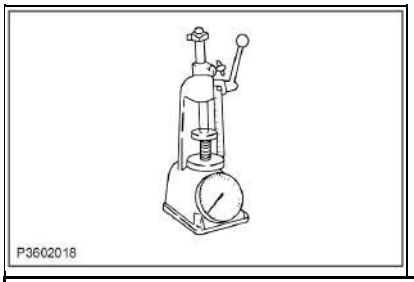
2. Measure valve spring verticality.



Valve Spring Verticality	Parameter (mm)
Standard value	1.3

If the measured value exceeds the specified value, the valve spring should be replaced.

3. Measure the compression spring tension by compressing the spring to the mounting height and working height with a spring tester.

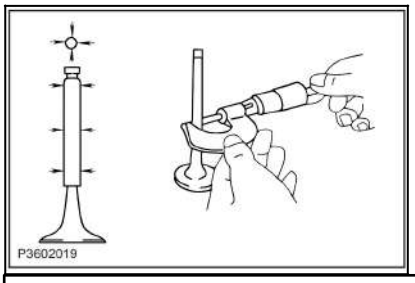


Valve Spring Tension	Parameter (N)
Mounting height (31.2 mm)	194 ± 11
Working height (22.65 mm)	344 ± 15

If the measured tension is below the specified value, the valve spring should be replaced.

Valve and Valve Guide Inspection

1. Measure valve stem outer diameter with micrometer.



Valve Stem Outer Diameter	Parameter (mm)

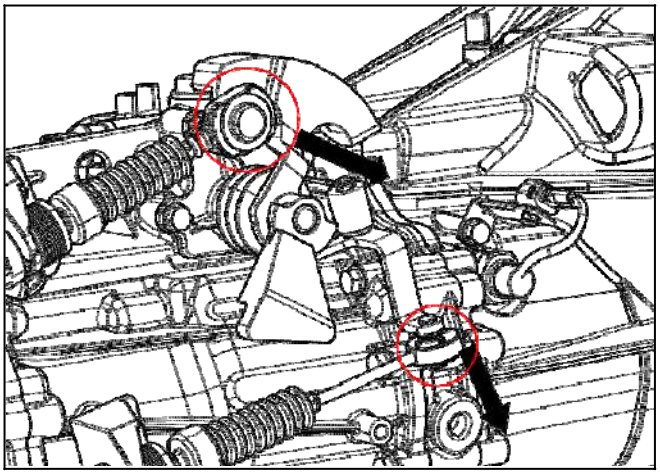


Figure 188: Gasoline model

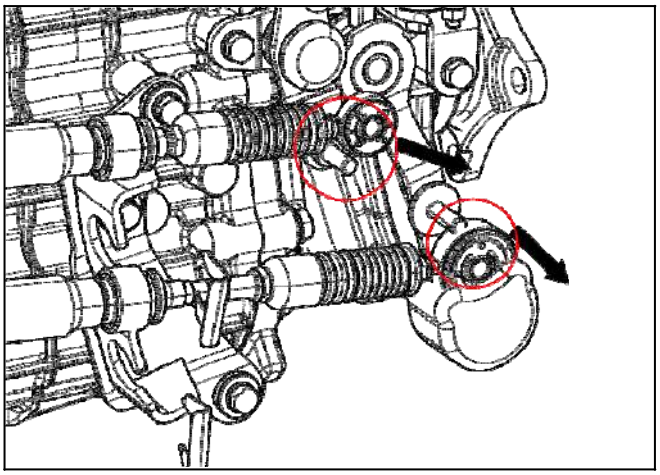


Figure 189: Diesel model

10. After removing all fixed points of the cable, take the cable out from the opening of floor gasket.

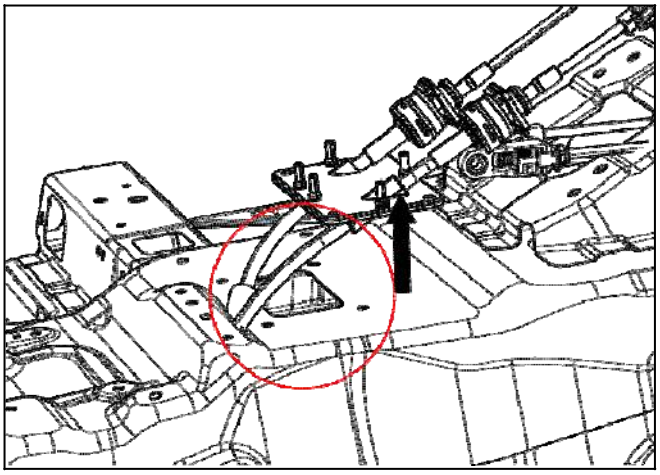


Figure 190: Gasoline model

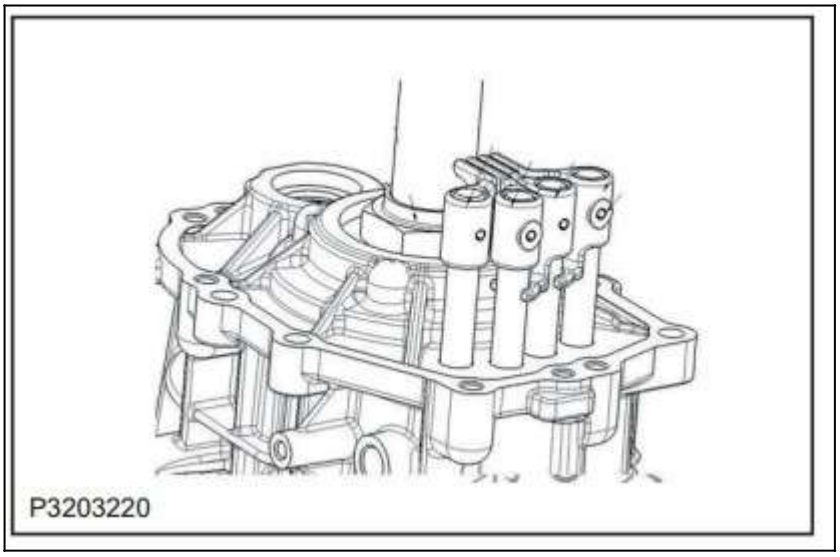


Figure 479

8. Install the rear body.

Apply sealant on the small face of the clutch housing, that is, the center of the sealing surface. Snap the rear case sub-assembly onto assembled assembly, then tighten them with bolts. Before installing bolts, install the wiring harness bracket onto rear case.

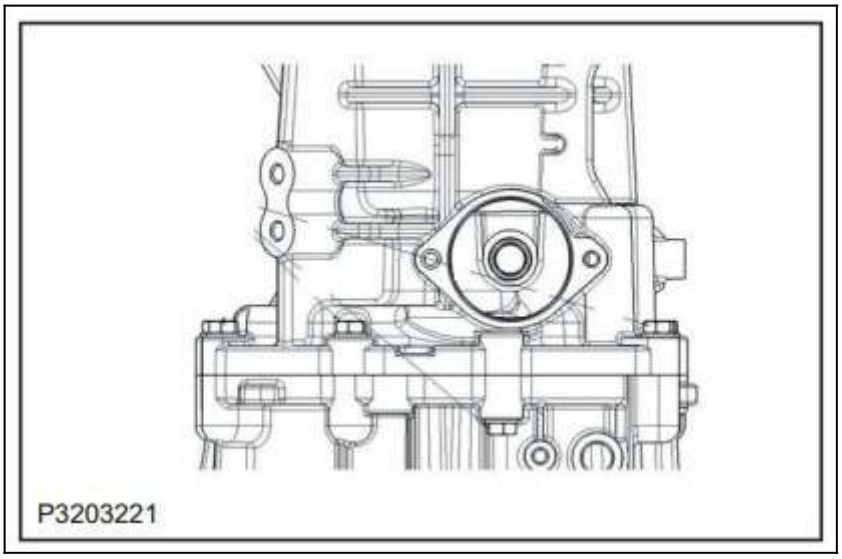


Figure 480

9. Install the control cover sub-assembly.

Install the control cover onto rear body at the position shown in figure and secure it with bolts.

Abnormal Noise Symptom Chart

Symptom	Possible Causes	Solutions
Front vehicle noise during driving	Insufficient chassis torque Wheel and tire Brake Brake disc Wheel hub bearing Drive shaft Steering column Steering gear Shock absorber Front swing arm Sub frame Stabilizer bar Connecting rod Rear mounting A/C high/low pressure pipe Fuel pipe Shift cable Front cover	

Diagnosis Procedure for Abnormal Noises During Driving

Because there are various types of malfunctions caused by abnormal noise and various factors that cause abnormal noise (road surface, vehicle speed, engine speed, gear position, temperature, etc.), main reasons of noise and sound types should be determined at first: Generally, the abnormal noise occurs while driving on roads with good condition such as high speed is mainly related to the power system and driveline system, and sound types: continuous "Buzz" sound; The bumpy road is mainly related to the chassis parts, and sound types: either of "Knock", “Click”, “Bang” sound.

Diagnosis Procedure for “Buzz” Sound During Driving

Test Conditions	Details/Results/Actions
1. Check chassis	

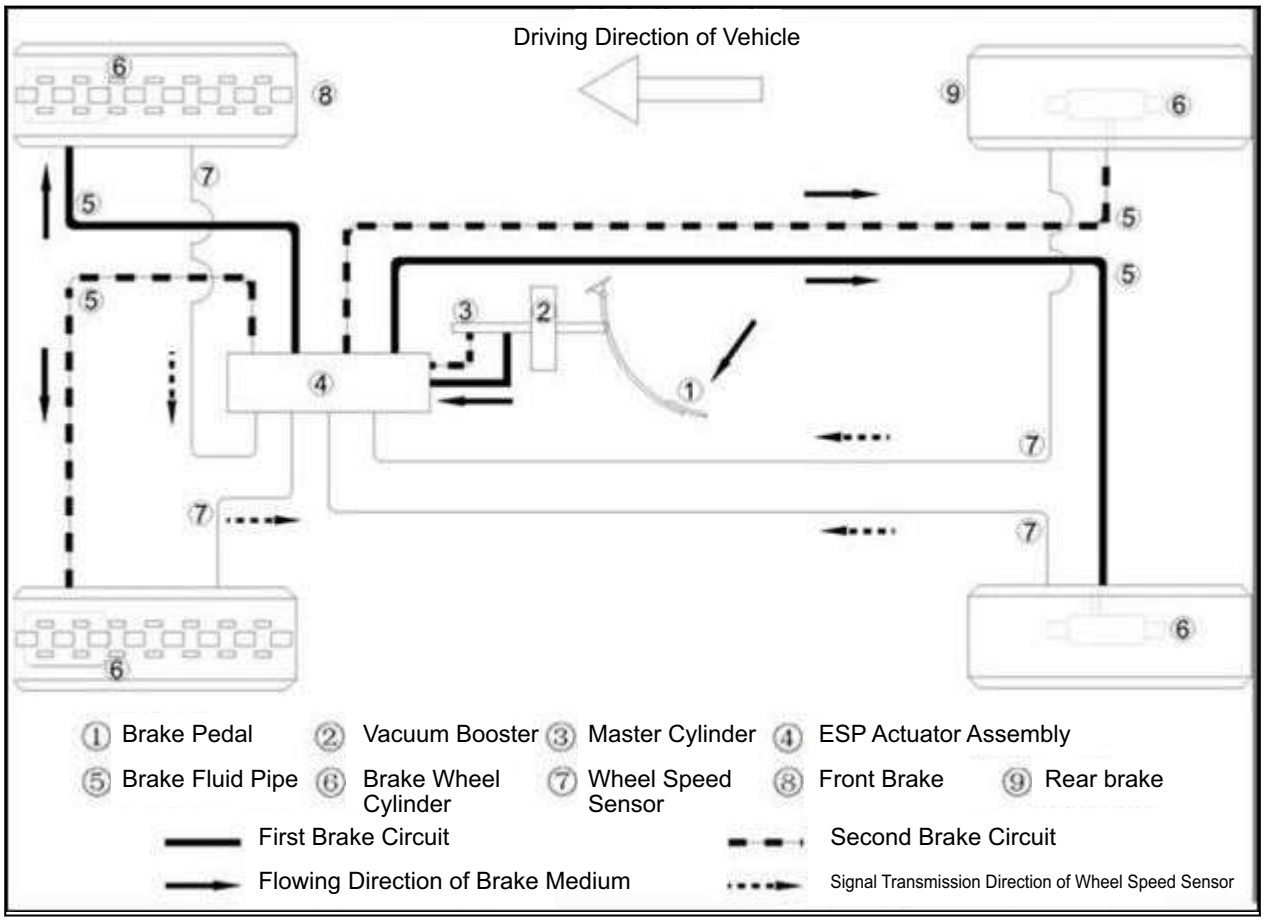


Figure 542:

The electronic control unit continuously detects the state of wheel through wheel speed sensor, and controls the slip ratio of wheel in a certain range by the solenoid valve to maintain the stability of vehicle. ESC control module continuously compares the slip limit stored by itself, and the deceleration value detected by wheel speed sensor, and lock tendency of each wheel can be detected. If lock tendency is detected in a wheel, ESC will control the pressure of four wheel cylinders independently by controlling the opening or closing of corresponding hydraulic valve in the control valve body to avoid wheel locking. While ABS does not work, EBD function still can adjust rear wheel brake force to make sure rear wheels will not be locked earlier than front wheels, thus ensuring vehicle safety.

The ESC electronic control unit activates the ESC pump by controlling ESC pump relay during system self-test and ABS operation.

When turning on ignition switch, instrument cluster controls the ABS/ESC warning lamp to perform self-check and then comes on for 3 seconds, the lamp will go off after 3 seconds if the system is normal. When system is malfunctioning, the module informs the instrument cluster to illuminate the indicator as a warning.

ESC control module keeps monitoring any possible system malfunction, which will be stored automatically once it occurs. Use diagnostic tool to access ESC control module via OBD interface.

ESC hydraulic control module 4 inlet valves and normally open solenoid valve control each wheel respectively. Four oil outlet valves and normally closed solenoid valve control each wheel respectively. Two low voltage accumulators and hydraulic pipe. ESC motor works during the process of self-test and ESC is operating, it can also be driven by diagnostic tool.

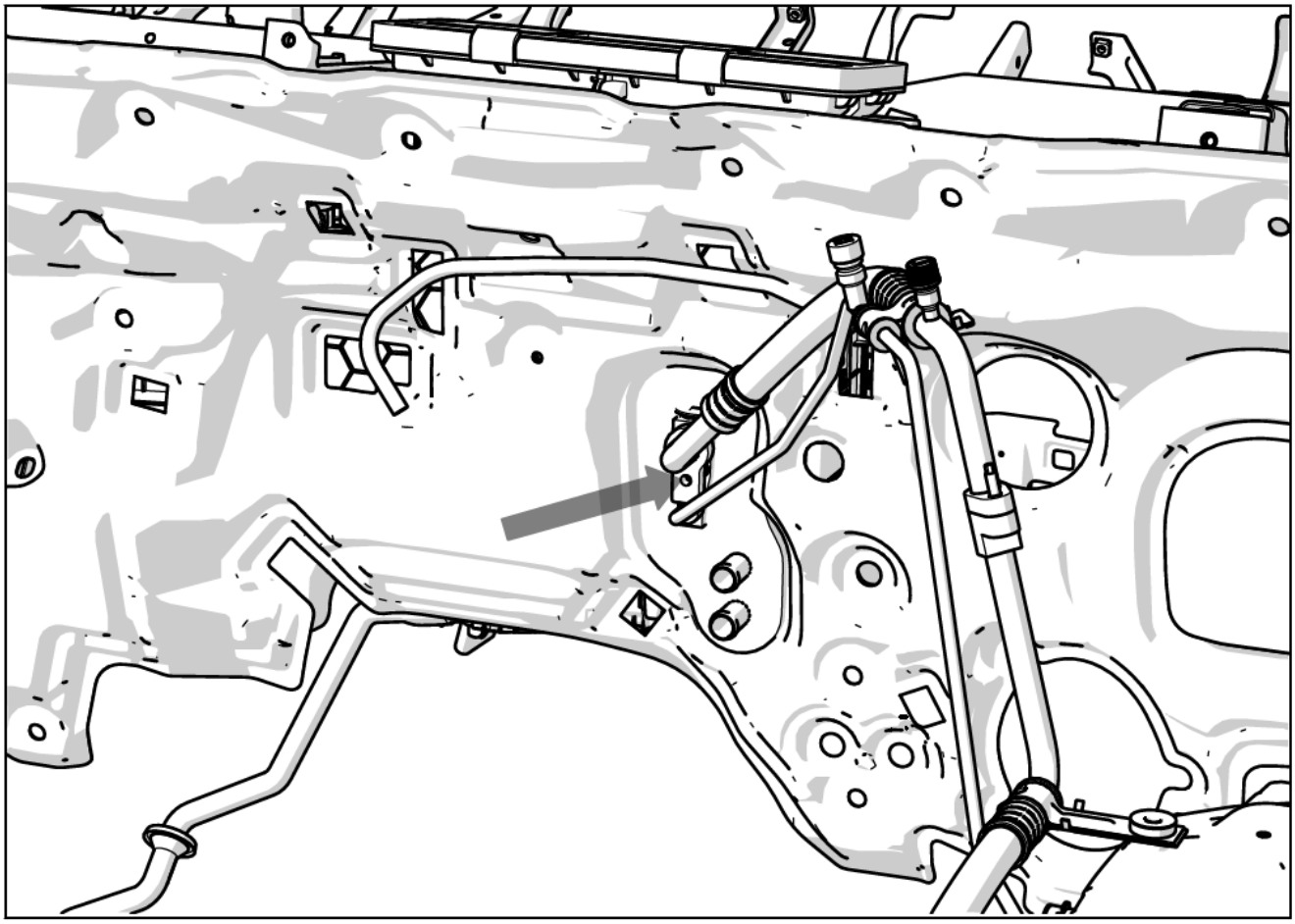


Figure 595:

7. Remove heater water pipe in front of front wall plate assembly.

On-board Network System

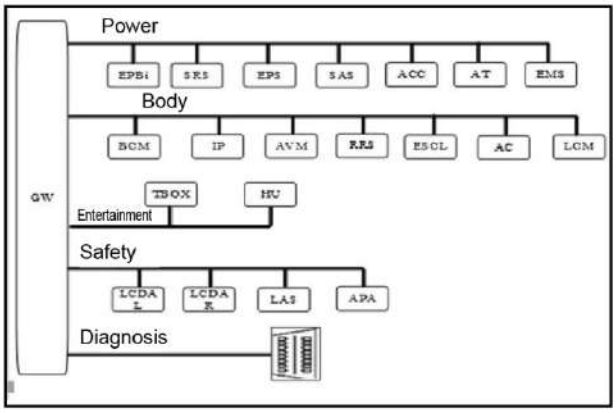
Specifications

General Specifications

Description	Specification
Power CAN bus	Baud rate 500 kbps Operating voltage range: 9 V - 16 V
Body CAN bus	Baud rate 500 kbps Operating voltage range: 9 V - 16 V
Entertainment CAN bus	Baud rate 500 kbps Operating voltage range: 9 V - 16 V
Safe CAN bus	Baud rate 500 kbps Operating voltage range: 9 V - 16 V
LIN bus	Baud rate 19.2 kbps

Description and Operation

System Description



CAN is abbreviation for Controller Area Network, and the full name is controller local network bus, that is, control equipment is connected to each other for data exchange.

The 120 Ω resistors of the power CAN bus terminal are arranged in the Engine Management Unit (EMS) and Gateway (GW); The 120 Ω resistance of body CAN bus terminal is built in Gateway (GW) and Instrument Panel (IP); The 120 Ω resistors of entertainment CAN bus terminal are arranged in Gateway (GW) and On-board Entertainment Terminal Module (THU); The 120 Ω terminal resistor of safe CAN bus is built in the Gateway (GW).

Nodes with diagnosis function on power CAN include: Engine Management System (EMS), Transmission Control Unit (TCU), Electronic Shifter (ESL), Airbag Control Unit (SRS), Rotation Angle Sensor (SAS), Electronic Stability Program (ESP), Electronic Integrated Parking Brake (EPBi), Electric Power Steering (EPS) and Gateway (GW).

Nodes with diagnosis function on body CAN include: Electric Steering Column Lock (ESCL), Body Control Module (BCM), Air Conditioning (AC), Instrument Panel (IP) and Gateway (GW).

Nodes with diagnosis function on entertainment CAN include: On-board Entertainment Basic Terminal (THU), Telematics Controller (TBOX) and Gateway (GW).

Nodes with diagnosis function on safe CAN include: Lane Assist System (LAS), Automatic Parking Assist (APA), Side Assist Module