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# CHARGING AND STARTING SYSTEM

## REMOVAL/INSTALLATION OF BATTERY AND INSPECTION

**Removal:**

----Disconnect the negative and positive cables of battery.

----Loosen the bolt of front battery clamping steel plate, and remove the clamping steel plate.

----Move the battery forward, isolate the back clamping plate and take down the battery.

**Note: After removing of the battery, be sure not to simply dispose it around; it should be put horizontally in a designated place.**

**The installing steps are reverse to those for removal.**




Bolt of battery clamping plate

**Inspection procedure:**

**Battery inspection**

**Battery**

Inspect the battery according to the following procedure

| Procedure | Inspection description | Results | Measures |
|---|---|---|---|
| 1 | Measure the open circuit voltage of battery | Above 12.4V | Proceed to step 3 |
| | | Below 12.4V | Proceed to next step |
| 2 | Quick charge for 30 minutes<br>After that, re-inspect the voltage | Above 12.4V | Proceed to next step |
| | | Below 12.4V | Replace the battery |
| 3 | Use load tester to apply load current (refer to the load test table) for battery, record the battery voltage after 15 seconds. Is the battery voltage exceeding the specified value? | Yes | Battery is normal |
| | | No | Replace the battery |

**Battery anode voltage:**



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| Approximate temperature of battery | Minimum voltage (V) |
|---|---|
| 21°C（70°F） | 9.6 |
| 16°C（61°F） | 9.5 |
| 10°C（50°F） | 9.4 |
| 4°C（39°F） | 9.3 |
| -1°C（30°F） | 9.1 |
| -7°C（19°F） | 8.9 |
| -12°C（10°F） | 8.7 |
| -18°C（0°F） | 8.5 |

## CHARGING OF BATTERY

**Warning: Keep the battery away from any flammable materials. If not, the gas emitted from the battery liquid that is easily flammable may cause severe injury or even death of people.**

**Note: In order to prevent the battery and other components from being damaged, all attached devices and the generator should be shut down before maintaining or charging the battery.**

## REMOVAL/INSTALLATION OF THE GENERATOR

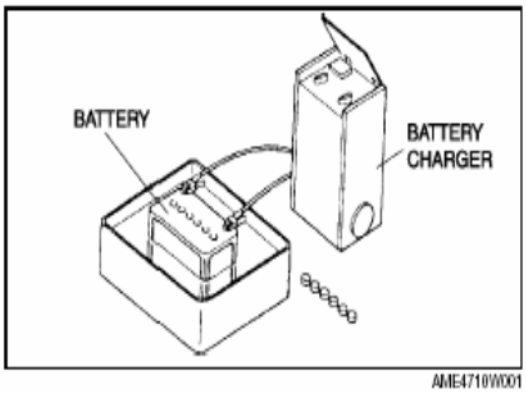
**Warning: When connecting wires of the battery are in on-state, and at this time if you contact the generator terminal with the car body, sparks will happen. It may cause body injury, fire and the sparks may damage electrical components. Therefore, before carrying the following operation, you must disconnect the negative grid of the battery first.**

**Note:**

— The negative grid of battery should be disconnected first during removal, and should be connected last during installation. It will avoid the damage to battery or any other electrical component.

— In order to prevent the battery or other components from being damaged, all auxiliary devices and the generator should be shut down during maintaining or charging the battery.

— Place the battery in water basin so as to prevent it from overheating; water level of the basin should be about half of the battery height. During charging, disconnect connectors of the battery and make sure to keep the upper



AME4710W001



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part of the battery away from water.

—Connect the battery to the charger, and adjust the charging current accordingly.

**As heat discharged by the exhaust manifold could damage the generator, you must ensure that the heat discharging guard and insulation device are firmly installed on the generator.**

**Installation of generator bracket:**

—Disconnect the negative grid of the battery.

—Mount the double-ended stud on top of cylinder cover.

—Install the bracket of generator.

—Tighten flange nut of the double-ended stud and bolt on the cylinder body, the tightening torque should be 40±4Nm.



**The installing steps are reverse to those for removal.**

**Installation of generator:**

—Disconnect the negative grid of the battery.

—Align one end of the generator with the installation hole of bracket, and push it in by force until the installation hole and the shaft hole of the generator are aligned.

— Use a long bolt and an Allen screw respectively to install the generator on its bracket, with a tightening torque of 25±2N.m.

—Connect the positive power source wire with the generator and the cable lug of the battery warning lamp to the wiring terminal.



**Note: The wiring harness must not be grounding so as to avoid from catching fire.**

**The installing steps are reverse to those for removal.**



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**Installation of driving belt and tensioner assembly:**



—Disconnect the negative grid of the battery.

— Use 3 M8 Allen screws to install the tensioner assembly on the bracket of the generator, with a tightening torque of 25±2N.m.

—Install the multi-wedged belting; Pull out the pin on the tensioner assembly so as to tension the driving belts in the tensioner pulley. Inspect the driving belts to see whether they are all inserted properly in the driving wedge of the pulley wheel.

**The installing steps are reverse to those for removal.**

**Adjusting method of multi-wedge belting and tensioner assembly alignment:**

—Disconnect the negative grid of the battery.

—Use spanner to rotate the engine crankshaft belt pulley to drive the multi-wedged belting for at least one revolution.



—Observe the alignment status of the multi -wedge belting and tensioner assembly, if the multi-wedge belting center exceeds the tensioner assembly center, then remove the tensioner assembly and add spacers to adjust the centering.

**The installing steps are reverse to those for removal.**

**Overhaul of generator:**

—Inspect the accuracy of deflexion and tension value of the driving belt, if it does not comply with the requirement, then the driving belts should be replaced.

—Shut down all the electro-devices, turn the ignition switch to start the engine, inspect the rotation process of the engine to see whether the rotation of generator is smooth without any noise.



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—Use voltmeter to measure the voltage value of the generator output terminal.



Standard value: Engine idling; Temperature: 20 ℃, Output voltage: 13-15V.

—Switch on the following devices and observe the increase of readings of the voltmeter:

• Headlamp

• Air conditioning

• Back window defroster

## INSPECTION OF GENERATOR

### Warning lamp of generator

1. Confirm that the battery has been fully charged;

● If it necessary, the battery should be charged.

2. Confirm the accuracy of deflexion and tension values of the wedge type belts.

● If it does not comply with the requirement, then replace it with a new type of wedge type belt.

3. Turn on the ignition switch, and inspect the generator warning lamp to see whether it is indicating.

● If it does not comply with the specified requirement, then inspect the generator warning lamp, or check whether the generator connectors are connected firmly.

4. Confirm whether the generator warning lamp is off after the engine is turned off.

● If it does not comply with the requirement, then inspect the instrument connector to see whether they are connected properly; if the instrument is malfunction free, then you need to further inspect the generator itself to see whether there is any short circuit.



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## REMOVAL/INSTALLATION OF STARTER

**Warning:**

**When connecting wires of the battery are in on-state, and at this time if you contact the generator terminal to the car body, sparks will happen. This may cause body injury, fire and the sparks may damage the electrical components. Therefore before carrying the following operation, you must disconnect the negative grid of the battery first.**



— Disconnect the negative grid of the battery.

— Apply lubricating grease of about 5 grams evenly on the inserting shaft of the starter.

— Insert the starter into housing of the clutch.

— Screw three bolts and tighten them，(one of the bolts is M10×1×35), with the tightening torque of 40±4Nm.

— Connect the wiring harness to the positive grid of the starter, and the starter wiring harness connector. Pay attention not to ground the wiring harness so as to prevent short circuit and catching fire.

**The installing steps are reverse to those for removal.**

## OVERHAUL OF STARTER

**No load test:**

— Verify that the battery is fully charged.

— Close the circuit of the starter, battery, voltmeter and ammeter according to the following diagram.

— Initiate the starter and check whether it operates smoothly.

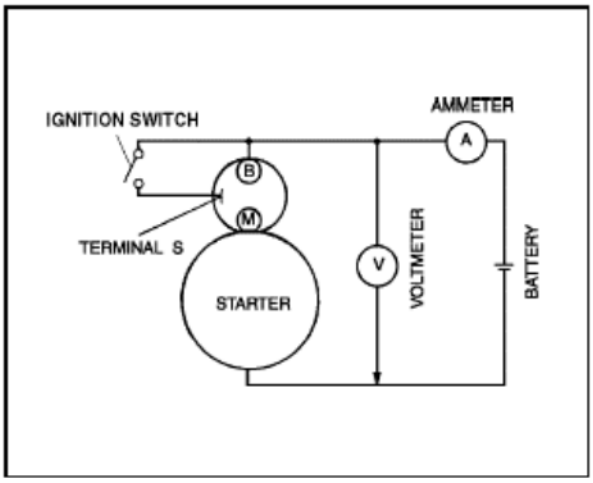
— When the starter is rotating, measure its voltage and current values. If these values do not meet the requirements, then replace the starter.



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**Technical parameters**

| Voltage value（V） | Current value（A） |
|---|---|
| 11 | Less than 90 |




**LOAD INSPECTION OF STARTER**

1. Verify that the battery is fully charged.
2. Initiate the engine, and check whether any block or noise during the rotation of the starter rotor.

● If there is no abnormality, then please check the followings:

—Remove the starter and check the solenoid switch and starter.

● Check the related winding coil and ignition switch.



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# LIGHTING SYSTEM

## REMOVAL/INSTALLATION OF LIGHTINGS FOR THE COMPLETE CAR

### 1. Headlamp

**Removal （Disconnect the negative grid of the battery）**

—Remove the radiator grille, and use sleeve to remove the four fixing bolts of the headlamp.

—Unplug the wiring harness connector behind the headlamp holder.

— Then place the headlamp on the corresponding position.



**Installation**

— Install the headlamp properly on the corresponding position, and ensure that the fixing hole position of the bolt is concentric with the welded nut on the crossbeam of the headlamp;

—Use 4 bolts, spacers and 1 nut to locate the position of the front headlamp, put down the front hood, confirm and adjust position of the headlamp (whether it is extruding or intruding; the requirement is such that the headlamp should be slightly extruded beyond the front hood border. The arc shape of the headlamp can be felt by hand), after that tighten the fastener, with a tightening torque of 1.5±0.2 N.m;



—Install the radiator grille, and pay attention not to scratch the paint on the protection bumper; ensure that the spacing between the left and right fenders is symmetrical.

—Connect the wiring harness plug to the lamp holder socket.

**2. Removal/Installation of the front fog lamp: (Disconnect the negative grid of the battery)**

—Connect the corresponding connector to the wiring harness of the fog lamp;



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—Place the fog lamp into the installation hole from the front, and ensure that the 3 screw holes are concentric with the holes on the front bumper;

—Tighten the 3 self-tapping screws, with a tightening torque of 1.5±0.2N.m;

—Install the grilles on the bottom part (see instruction in car body)

**3. Removal/installation of side turn signal lamp: (Disconnect the negative grid of the battery)**

—Connect the wiring harness from the lamp holder;

—First align the clipping end with car body in the correct direction, and then press it in by force.

**4. Removal/installation of fixed part of tail lamps (including position lamp/brake lamp, and turn signal lamp):**

—Align at the holes of car body, so as to install the lamp on the body properly;

—Tighten the 3 fixing screws, pay attention to adjust the facial gap with the car body, feel the difference in height with hand and make necessary adjustment while tightening;

—Plug the wiring harness onto the lamp holder, and put back the carpet.



**5. Removal/installation of moving part for the tail lamp (including the backup lamp and tail fog lamp)**

—Align at the holes of the car body, so as to install the lamp on the body properly;

—Tighten the 4 fixing screws, pay attention to adjust the facial gap and spacing (the trunk lid may be closed) with the car body and fixing parts, feel the difference in height with hand and make necessary adjustment while tightening;

—Plug the wiring harness onto the lamp holder, and put down the trunk lid.

**6. Removal/installation of license lamp**

—Connect the connector of the wiring harness properly;

—Align the self-tapping screw with the hole center of expansion nut; tighten two self-tapping screws with a tightening torque of 1.5±0.2N.m. Assemble the guard plate of license lamp;



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—Align lock core of the trunk with the hole, so as to match the guard plate with the car body properly;

—Tighten 2 self-tapping screw, pay attention to adjust the facial gap, spacing and other differences between the car body and the movable part, feel the difference in height with hand and make necessary adjustment while tightening;

—Open the trunk lid;

—Tighten 2 square nuts of the fixing bolt;

—Assemble the linkage rod, lid, etc. of the lock hole (see instruction of car body), and then put down the trunk lid.

**7. Removal/installation of interior ceiling lamp**

—Connect the connector of the wiring harness properly;

—Place it right into the installation hole of the ceiling towards the correct direction, firstly align one end with the ceiling and then press the ceiling light into the proper position with hand.



**8. Removal/installation of trunk lamp**

—Open the trunk lid;

—Connect the connector of the wiring harness properly;

—Use the clipping end side to latch with cover of the back loudspeaker, after that just press the light into it with hand. Put down the trunk lid;

**9. Removal/installation of high mounted stop lamp**

—Press the two ends so as to separate the lamp holder and the lamp housing, and then pull out the conducting wire connector;

—Plug both of the single-terminal sockets of the conducting wires into the inserting plates of the windscreen;

—Install the lamp housing according to the combination structure of the clipping slot, pay attention to the matching of the inverted slot with the fixing pin, so as to ensure that the lamp housing is firmly clipped to the position;

—Plug the conducting wire and lamp holder properly, and ensure that the lamp holder and housing are assembled in the proper position.



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10.**Removal/installation of door switch**

—Disconnect the negative grid of the battery.

—Loosen the self-tapping screw of the door switch with a cross screw driver.

—Pull out the door switch, and separate the wiring harness connectors.

11.**Removal/installation of control switch for dash lights**

—Disconnect the negative grid of the battery.

—Reach the bottom part of the instrument panel with hand, and press down the clip of the control switch for dash lights.

—Pull the control switch for dash lights forward and remove it.

**The installing steps of above components are reverse to those for removal**

**12. Beam adjustment for headlamp**

—The correctness of the beam adjustment for front headlamp is vital to the driving safety. Therefore, only special instruments are allowed to be used to adjust the beam, and pay attention to the stipulated laws during adjustment.

**13. The followings must be fulfilled before adjustment**

—Air pressure of car tyres must comply with the standard;

—The vehicle should be non-load (other than the spare tyre and tool kit, the weight of the car normally includes the weight of the driver);

—The car should be parked on a horizontal road or working site;

—The surface of the headlamp reflector must be clean without any contamination;

—Check whether power works normally and bulbs are installed properly.

—Two screws linking the front headlamp can be adjusted towards the horizontal or vertical position.

—When adjusting the front right headlamp, the protection cover must be removed. The adjustment screw for the front left headlamp is symmetrical with the front right one. The adjustment method is the same.



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## COMMON MALFUNCTIONS OF LIGHTING SYSTEM / TROUBLESHOOTING

### 1.COMMON MALFUNCTIONS OF FRONT HEADLAMP / TROUBLESHOOTING

| Malfunction | Malfunction Diagnosis | Troubleshooting |
|---|---|---|
| Neither high beam or low beam light is working | 1.All of bulbs have been damaged.<br>2.The fuse has been burned down.<br>3.Headlamp switch is faulty.<br>4.The circuit is faulty. | 1.Replace the bulb.<br>2.Replace the fuse.<br>3.Inspect and replace the headlamp switch.<br>4.Check the circuit. |
| Only one headlamp, that is either the high beam or low beam is working | 1.The bulb has been damaged.<br>2.The fuse has been burned down.<br>3.The lamp holder or conducting wire is faulty. | 1.Replace the bulb.<br>2.Replace the fuse.<br>3.Check the lamp holder or conducting wire. |
| Either side of the high beam or low beam is not working. | 1.The bulb has been damaged.<br>2.The fuse has been burned down.<br>3.The headlamp switch is faulty.<br>4.The conducting wire or the grounding is faulty. | 1.Replace the bulb.<br>2.Replace the fuse.<br>3.Check the headlamp switch.<br>4.Inspect the circuit. |
| Both headlamps are not working. | 1.The bulb has been damaged.<br>2.The fuse has been broken.<br>3.The headlamp switch is faulty.<br>4.The conducting wire or the grounding is faulty. | 1.Replace the bulb.<br>2.Replace the fuse.<br>3.Check the headlamp switch.<br>4.Check the circuit. |

**Warning:**

- **The bulb will generate heat of very high temperature during working. So if the surface of the bulb becomes dirty, the excessive heat will be accumulated, which would result in shortening the life span of the bulb. When replacing the bulb, pay attention to hold the metal edge rather than the bulb itself.**

### 2. COMMON MALFUNCITONS OF FOG LAMP AND TROUBLESHOOTING

| Malfunction symptom | Malfunction Diagnosis | Troubleshooting |
|---|---|---|
| Only one fog lamp is not working | 1. The bulb has been damaged.<br>2. The circuit or grounding is faulty. | 1. Replace the bulb.<br>2. Check the circuit. |
| Neither of fog lamps is not working | 1. The bulb has been damaged.<br>2. The fuse has been burned down.<br>3. The fog lamp relay has been damaged.<br>4. The fog lamp switch is faulty.<br>5. The circuit or grounding is faulty. | 1. Replace the bulb.<br>2. Replace the fuse.<br>3. Check the relay.<br>4. Check the switch.<br>5. Check the circuit. |
| Fog lamp is always working | 1. The switch of fog lamp is faulty.<br>2. The circuit is faulty. | 1. Check the switch.<br>2. Check the circuit. |



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**Warning:**

- **The bulb will generate heat of very high temperature during working. So if the surface of the bulb becomes dirty, the excessive heat will be accumulated, which would result in shortening the life span of the bulb. When replacing the bulb, pay attention to hold the metal edge rather than the bulb itself.**

## 3. COMMON MALFUNCTIONS OF BACKUP LAMP AND TROUBLESHOOTING

| Malfunction symptom | Malfunction Diagnosis | Troubleshooting |
|---|---|---|
| One side of the backup lamp is not working | 1. The bulb has been damaged.<br>2. The circuit or grounding is faulty. | 1. Replace the bulb.<br>2. Check the circuit. |
| Neither sides of the backup lamps is not working | 1. The bulb has been damaged.<br>2. The fuse has been burned down.<br>3. The backup lamp switch is faulty.<br>4. The circuit or grounding is faulty. | 1. Replace the bulb.<br>2. Replace the fuse.<br>3. Check the switch.<br>4. Check the circuit. |
| Backup lamp is continuously working | Incorrect adjustment or damage to the switch of backup lamp. | Check the backup lamp switch. |

## 4. COMMON MALFUNCTIONS OF STOP LAMP AND TROUBLESHOOTING

| Malfunction symptom | Malfunction Diagnosis | Troubleshooting |
|---|---|---|
| One side of the brake lamps is not working | 1 The bulb has been damaged.<br>2. The conducting wire or grounding is faulty. | 1. Replace the bulb.<br>2. Check the circuit. |
| Neither of the brake lamps is not working | 1. The bulb has been damaged.<br>2. The fuse has been burned down.<br>3. The brake lamp switch is faulty.<br>4. The conducting wire or grounding is faulty. | 1. Replace the bulb.<br>2. Replace the fuse.<br>3. Check the brake lamp switch.<br>4. Check the circuit. |
| Brake lamp is continuously working. | Incorrect adjustment or damage to the switch of backup lamp. | Check the brake lamp switch. |



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## 5. COMMON MALFUNCTIONS OF TURN SIGNAL LAMP AND TROUBLESHOOTING

| Malfunction symptom | Malfunction Diagnosis | Troubleshooting |
|---|---|---|
| Left and right flashing frequencies are not the same or one side is not flashing. | 1. The bulb of the "fast flashing frequency" side has been damaged.<br>2. The bulb power does not comply with the specification.<br>3. The relay of turn signal lamp is faulty.<br>4. The conducting wire or grounding is faulty. | 1. Replace the bulb.<br>2. Replace the standard bulb.<br>3. Check and replace the relay.<br>4. Check the circuit. |
| Both sides are not flashing | 1. The bulb has been damaged.<br>2. The fuse has been burned down.<br>3. The relay of turn signal lamp is faulty.<br>4. The switch of turn signal lamp is faulty.<br>5. The conducting wire or grounding is faulty. | 1. Replace the bulb.<br>2. Replace the fuse.<br>3. Check the relay.<br>4. Check the switch of turn signal lamp.<br>5. Check the circuit. |
| The flashing frequency is too low | 1. Battery voltage is too low.<br>2. The bulb power does not comply with specification.<br>3. The relay of turn signal lamp is faulty.<br>4. The circuit is faulty. | 1. Check the battery and recharge battery.<br>2. Change into the standard bulb.<br>3. Check/replace the relay.<br>4. Check the circuit. |



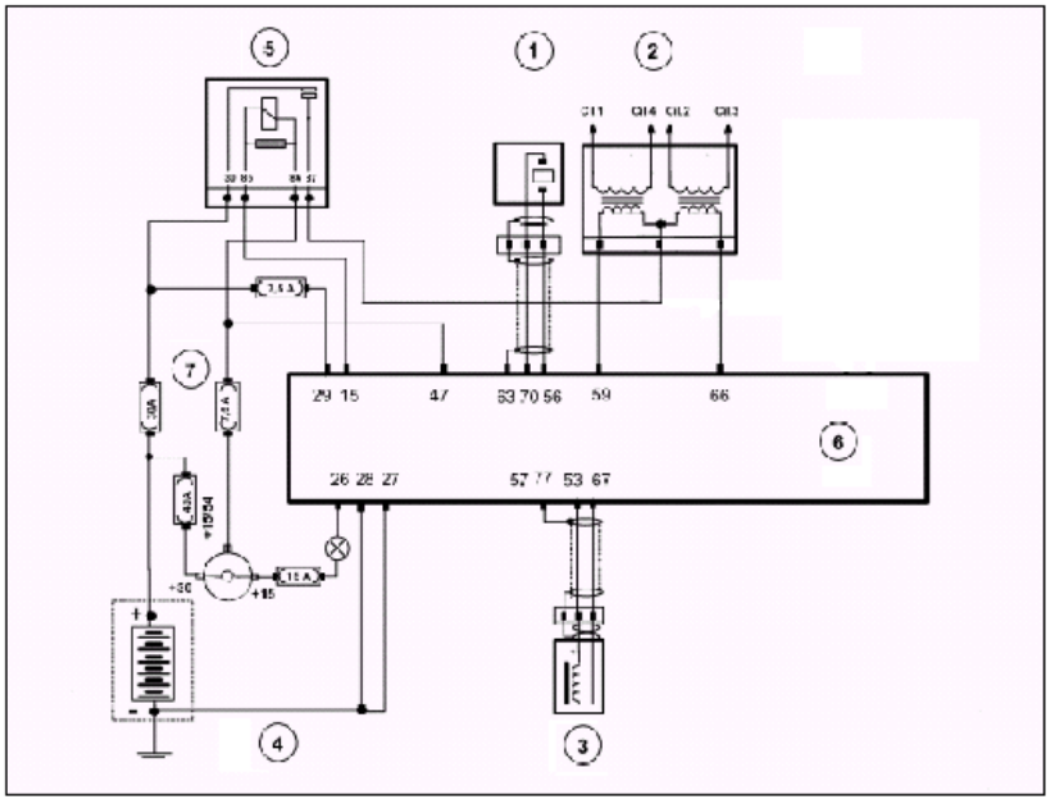
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# IGNITION SYSTEM

## SUMMARY OF IGNITION SYSTEM

The ignition system is integrated with the fuel injection system. It is an electronic system equipped with built-in power supply module. It can provide various kinds of optimum ignition angular values. This task is being carried out through referencing of the input instantaneous physical parameter related with the engine working conditions. With the help of a circuit analyzing microprocessor, it is capable of writing in the various optimum ignition values into the program.

### Circuit of ignition system




1. Knock sensor 2. Ignition coil 3. Rotary sensor 4. Ignition switch
5. Relay 6. Ignition / Fuel injection ECU 7. Fuse

When ECU is breaking off the current of the primary coil, the resulted induction effect of the secondary coil causes the voltage to rise (as high as 30,000V at idling speed), at this moment the breakdown voltage of the compression stroke stage in the cylinder is very high (>10,000V), and the breakdown voltage of the exhaust stroke stage in the cylinder is very low (approx. 500V). The spark plugs in the 1-4 cylinders and 2-3 cylinders are directly connected to the terminals of the secondary coils through high voltage cables.

**Note: Take extreme care not to reverse the connection of high voltage cable during reinstallation.**



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## REMOVAL /INSTALLATION OF IGNITION COIL AND SPARK PLUGS:

1. Disconnect the wiring harness terminal post from the negative grid of the battery.
2. Pull out the 4 connectors of high voltage cable and ignition module plug.
3. Unscrew the three fastening screws for the ignition module, and remove the ignition module.



4. Pull out the high voltage cables, and uses a special spark plug socket spanner to remove the spark plugs. **(Tightening torque: 10~14 Nm)**
5. The installing steps are reverse to those for removal.



**Note:**

**Ensure that the spark plugs are restored to their original positions during reinstallation. Any incorrect installation will not only damage the leading wires of the spark plugs and cause power losses, but also cause adverse impact to the electronic components.**



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## OVERHAUL IGNITION SYSTEM

----Disconnect the negative grid of the battery.

----Remove the spark plugs with a special tool, and check whether the spark plugs have been ablated and there is any crack at the skirt section.

----Check whether the gap of spark plugs complies with the requirement.

Standard value: 1.1±0.5mm

**----Check the spark plugs.**

**Note:**

- **Do not check, adjust or clean the gap of spark plugs with a metal brush. Otherwise, it will damage the platinum igniter.**

**When spark plugs are cleaned with compressed gas, the cleaning process should be completed within 20 seconds and the compressed gas value should not exceed 58.8kpa (6.6kgf/cm$^2$, 8.5psi). After completion of cleaning, make sure that no foreign materials such as carbon or sand are left in spark plugs.**

----Check whether there is any crack on the appearance of high voltage cables, and replace the high voltage cable if the resistance is too high.

----Check whether the resistance of ignition coils complies with the specification.

Standard value: Primary coil resistance: 0.4Ω ±10%（at the temperature of 23±5°C）

Secondary coil resistance: 4900Ω±10%（at the temperature of 23±5°C）

If the resistance of ignition coils does not comply with the specification, please replace with the original spare parts designated by Chery Automobile so as to prevent the improper operation of the ignition system.

**Inspection of ignition timing:**

**Note:**

- **The ignition timing must not be adjusted.**
- **Checking the ignition timing requires the usage of WDS or** corresponding **instrument.**

1. Switch off all the electrical devices in the vehicle.

2. The procedures of preheating the engine are as follows:

(1) Start the engine

(2) Keep the rotation speed of the engine at about 3,000 R.P.M. until the cooling fan starts to rotate.

(3) Release the fuel-accelerating pedal.



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(4) Wait until the cooling fan stops.

3. With the help of WDS or corresponding instrument, check whether the ignition timing falls within the scope of the specification.

**Ignition timing:**

**Approx.: 1065 degrees advancing TDC**

4. When the engine speed is gradually increasing, confirm that the ignition timing is also correspondingly advanced forward.

**Check idling engine speed**

**Note:**

- **The ignition timing must not be adjusted.**
- **Checking the ignition timing requires the use of WDS or corresponding instrument.**

1. Switch off all the electrical devices in the vehicle.

2. The procedures of preheating the engine are as follows:

（1）Start the engine.

（2）Keep the rotation speed of the engine at about 3,000 R.P.M. until the cooling fan starts to rotate.

（3）Release the fuel accelerating pedal.

3. With the help of WDS or corresponding instrument, check whether the ignition timing falls within the scope of the specification.

**Engine idle speed (480ED-1000010EA combined with electronics)**

| Conditions | Engine revolutions（RPM） |
|---|---|
| Non- load | 800-900 |
| Electrical devices in the vehicle start to work. | 800-900 |
| A/C is switched on, and cooling switch is switched off. | 800-900 |
| A/C is switched on, and cooling switch is switched on. | 950-1050 |



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# INSTRUMENTATION SYSTEM

## INTRODUCTION OF INSTRUMENTS

## SYSTEM DESCRIPTION

The Chery sedan A15LHD employs indicator needles and digital combination instruments, the combination instruments including various instruments and measuring equipments that are used to indicate the conditions of the car, various warning lamps that are used to monitor the abnormal conditions and notify the driver quickly, indicator lamps that are used to notify the driver for the condition of all parts, with the function of illuminating the instruments and meters.

It includes speedometer with mileage, water temperature meter, fuel meter, engine tachometer, fuel warning lamp, warning lamp for unclosed door, engine warning lamp, warning lamp for engine oil, brake system warning lamp, ABS warning lamp, seat belt warning lamp, air bag warning lamp, generator warning lamp, turning signal indicator lamp, danger warning flashing indicator lamp, headlight high beam indicator lamp, fog lamp, multi-function display, control unit, power supply assembly unit, printed circuit board, etc. (Illustration -1)



**External appearance of instruments (Illustration – 1)**



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System components and functions are as follows:

| Name of Component | | Function |
|---|---|---|
| Combination instrument | Speedometer | The indicator needle of speedometer is moving as per the signal from speed sensor, indicating the driving speed of the car. |
| | Tachometer | The indicator needle of tachometer is moving as per the signal from ignition, indicating the engine rotation speed. |
| | Water temperature meter | The indicator needle of water temperature meter is moving as per the signal from sensor, indicating the engine coolant temperature. |
| | Fuel meter | The indicator needle of fuel meter is moving as per the signal from sensor, indicating the remaining fuel quantity in the fuel tank. |
| | Odometer | The odometer, counting the car's gross traveling distance as per the pulse signal from speed sensor, may switch over within short distance. |
| | Dual short-range Odometer | The dual short-range odometer, counting the car's traveling distance as per the pulse signal from the speed sensor, and may be reset by the switch. |
| | Power module | The regulator circuit installed in the power module is supplying current to various components of the instruments through fuse S21 10A. |
| | Circuit board | This board is containing the circuitry systems of various meters and measuring instruments, warning lamps and indicator lamps, as well as warning activating circuits for the engine oil level, odometer and short-range odometer and the circuit system of various indicator lamps. |
| Speed sensor | | Installed in gearbox, this sensor transmits the pulse signal according to the output shaft rotation speed to the combination instrument. |
| Water temperature sensor | | This sensor, which converts the engine coolant temperature into resistance, transmits the relevant signal to the combination instrument. |
| Fuel sensor | | This sensor, which converts the residual fuel oil level in the fuel tank into resistance, transmits the relevant signal to the combination instrument. |
| Warning switch for fuel level | | When the fuel level drop down to the preset level, the level sensor signal activates the circuit in the fuel meter and switches on the warning lamp. |



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| | |
|---|---|
| Warning switch for low oil pressure | The switch is installed on the engine body. When the oil pressure drops, the switch will be activated and switched on the warning lamp. |
| Warning switch for engine oil level | The switch is installed in the engine oil tank. When the level of engine oil drops, the warning lamp will be switched on. |
| Warning switch for brake oil level | The switch is installed in the main pump oil storage tank of the brake. When the brake oil level drops, the warning lamp will be switched on. |
| Brake switch | The switch is installed on the driving brake pedal bracket. When the pedal is pressed, the switch will be activated to switch on the warning lamp. |
| Courtesy lamp switch | When the car door is opened, the switch will be activated to switch on the warning lamp. |
| Warning lamp | When an abnormal condition is detected, the warning signal will be transmitted or grounded automatically, thus switching on the relevant warning lamp. |
| Indicator lamp | The warning signal will be transmitted or grounded automatically, thus switching on the relevant indicator lamp or keep the driver informed of the relevant status. |

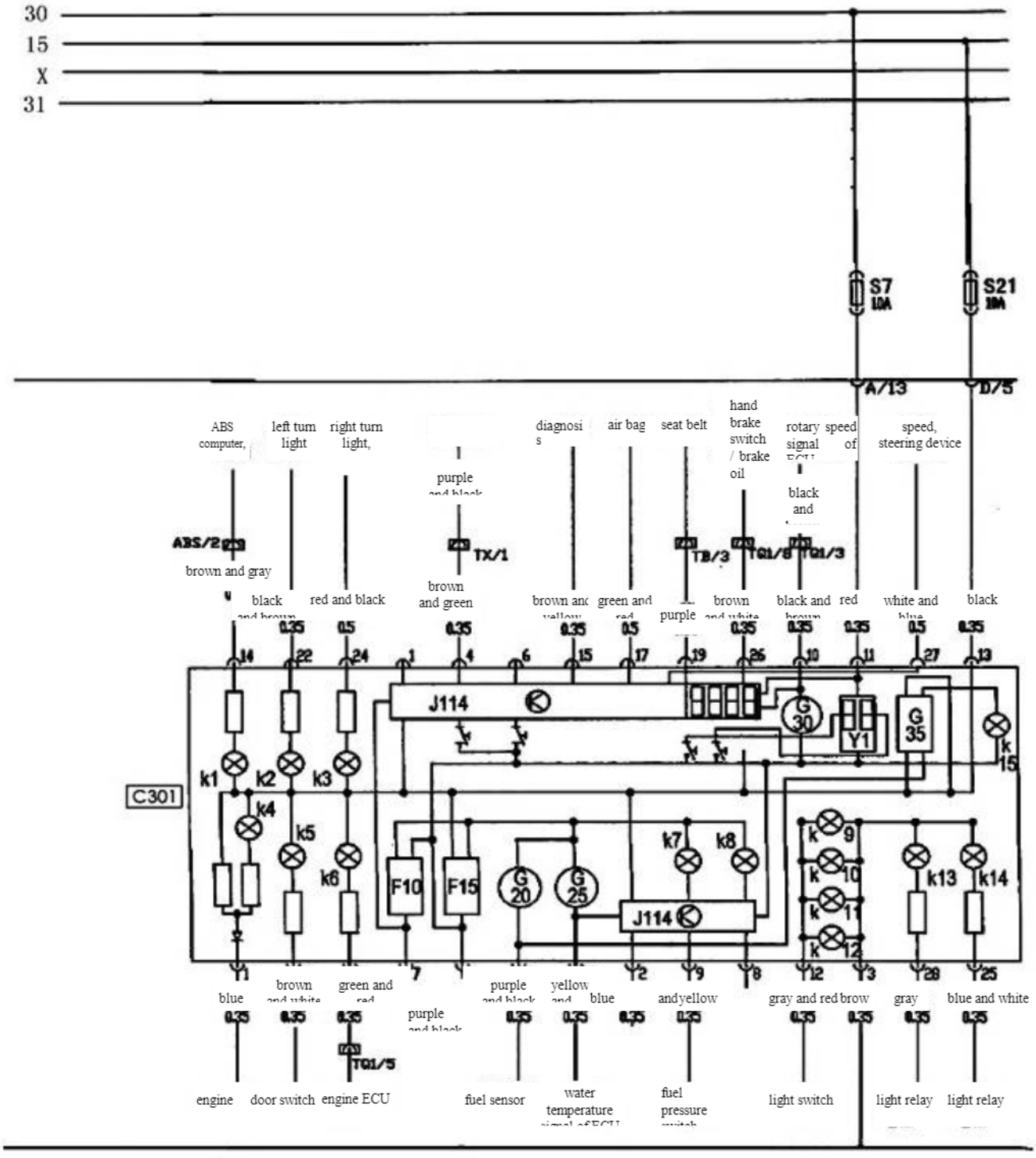
**PRINCIPLE OF INSTRUMENTATION SYSTEM**

Schematic diagram of instrumentation circuit

The combination instrument is connected with the wiring harness of the instrument via a 28-socket connector.



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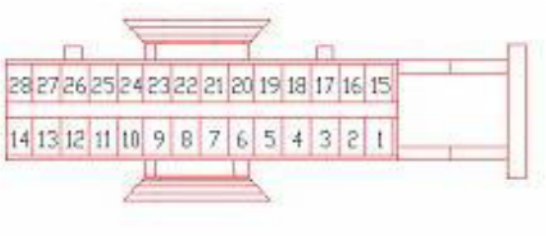



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| F10 | Multiplexer | J119 | multi function display | K7 | fuel pressure warning lamp | K14 | high beam warning lamp |
| F15 | voltage regulator | K1 | ABS warning lamp | K8 | engine over temperature warning | K15 | fuel warning lamp |
| G20 | fuel sensor | K2 | left turn light | K9 | lamp | Y1 | digital clock |
| G25 | coolant temperature sensor | K3 | right turn light | K10 | instrumental panel illuminator | T1 | single socket plug in connector |
| G30 | RPM sensor | K4 | generator charging warning lamp | K11 | instrumental panel illuminator | | |
| G35 | preset level comparator | K5 | hand brake warning lamp | K12 | instrumental panel illuminator | | |
| J114 | | K6 | | K13 | instrumental panel illuminator | | |



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The 28-socket connector of the wiring harness of combination instrument




The function of each socket is described in the table below:

| Socket | Function | Socket | Function |
|---|---|---|---|
| 1 | No connected | 16 | Connecting to the terminal D+ of generator |
| 2 | Connecting to the water warning switch of water tank | 17 | Air bag warning signal |
| 3 | Terminal 31# (ground) | 18 | Door light |
| 4 | TX1 speed signal of Hall Sensor | 19 | Seat belt warning lamp |
| 5 | Terminal 31# | 20 | Engine malfunction warning lamp |
| 6 | | 21 | Connecting to the fuel meter sensor |
| 7 | | 22 | Left-turn signal lamp |
| 8 | | 23 | Water temperature signal of the ECU |
| 9 | Oil pressure warning switch (30kpa) | 24 | Right-turn signal lamp |
| 10 | The ECU A20RPM | 25 | Power supply terminal for high beam indicator lamp |
| 11 | Terminal 30#, power supply for clock and multi-function display | 26 | Warning switch for brake oil level; indicator lamp switch for hand brake |
| 12 | Terminal 58b#, power supply for instrument panel illumination | 27 | Speedometer sensor |
| 13 | Terminal 15# | 28 | Night illumination |
| 14 | ABS warning lamp | | |
| 15 | Diagnostic wire | | |



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## 1. SPEED ODOMETER

The Chery sedan A15LHD employs the cross coil type speedometer to indicate the driving speed and accumulated road mileage, as well as equipped with digital odometer. The section for measuring car speed employs a magnetic type of structure, while the section for recording mileage is controlled by multifunction liquid crystal display.

See figure (Illustration-2)




Speedometer (Illustration-2)

The indicator needle is located at the scale zero when the speedometer is not in use. When the car is driving, the transmission gear in the gearbox is activating and cutting the magnetic flux of the permanent-magnet of the Hall Speed Sensor, so that the latter will produce pulse signals to the cross coil type Speed Odometer to drive the indicator needle of speedometer, and meanwhile it will also provide the same signal to the mileage-recording multifunction liquid crystal display to control the mileage counting.

## 2. WATER TEMPERATURE METER

Water temperature meter

The Chery sedan A15LHD employs the water temperature meter equipped with cross coil type indicator needle. See figure (Illustration-3)—the water temperature meter is located at left.




Water temperature meter (Illustration-3)



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The pointer head of the cross coil meter is a kind of electromagnetic device. The coils are round on the surface of its magnetic rotor in four directions, with an included angle of 90° between the two adjacent coils. The strength of the current passing through the coils is depended on the resistance of the sensor, so that the magnetic flux densities produced by the coils in four directions are varied correspondingly, which subsequently activates the rotation of the magnetic rotor and the movement of indicator needle.

## 3. FUNCTION AND PREINCIPLE OF WATER TEMPERATURE SENSOR

The water temperature sensor of Chery sedan A15 LHD employs the thermo-sensitive resistance, which is shown in the figure above:

The coolant temperature sensor is used to inspect working temperature of the engine; the ECM will provide the best control program for the engine according to different temperature environment;

**Composition and working principle:** The sensor is a thermo-sensitive resistance of negative temperature coefficient (NTC). Its resistance will decrease as the coolant temperature increases, but not linearly related. This thermo-sensitive resistance of negative temperature coefficient is loaded into a copper heat-conducted sleeve. The ECU converts the changes of value of the thermo-sensitive resistance into variable voltages supplying the ECU via a divider circuit so as to monitor the changes of the water temperature. (ECU's internal structure)

**Pin:** the sensor has 3 interchangeable pins totally.

1 Coolant temperature sensor signal (ECU39#)

2 Sensor signal ground (ECU35#)

3 Another wire is used to connect the water temperature signal of the instrument.

Installation: the coolant temperature sensor is mounted on the sub-loop passage of the coolant behind the engine.



Figure of coolant temperature sensor

**Notes on installation:** Maximum tightening torque is 15Nm.

## 4. PRODUCT CHARACTERISTICS

Working voltage: 5V DC

Working temperature: -40 ~ 135°C



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The thermo-sensitive resistance is made of a kind of semiconducting material with negative temperature coefficient, where its resistance will sharply decrease as the temperature increases.

## 5. FUEL METER

The operation of the fuel meter is basically the same as the water temperature meter. It is also the cross coil type of indicator needle meter. See figure below (Illustration-5)—the fuel meter is located at right of the figure.




Fuel meter (Illustration-5)

When the float is moving along with the fuel level in the fuel tank, the sliding contact linked with the float staff will respond accordingly so as to change the value of the thick-film resistance. When the fuel tank is full, the value of the thick-film resistance will be the minimum and the current of the cross coil will be the maximum. The indicator needle of the fuel meter points at the maximum scale F. On the contrary, when the fuel in the tank is exhausted, the value of thick-film resistance will be the maximum, and the indicator needle deflexion value of the fuel meter points being the minimum scale E.

The relationship between fuel quantity and resistance is indicated in the table below.

The relationship between fuel quantity and resistance

| Float position | Capacity (L) | Resistance (Ω) |
|---|---|---|
| Empty | 0 | 283 |
| Half full | 30 | 89 |
| Full | 55 | 36 |

**FAULT DIAGNOSIS AND TROUBLESHOOTING**



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| Components | Malfunction symptoms | Malfunction reasons | Malfunction diagnosis and troubleshooting | Remarks |
|---|---|---|---|---|
| The speedometer does not function or have an excessive error. | The speedometer does not function or there is a large error between the indicated speed and the actual speed. | (1) The Hall Speed Sensor of speedometer.<br>(2) The indicator needle of speedometer is jammed.<br>(3) Output shaft driving gear of gearbox is seriously worn out or the gear's engagement clearance is excessive.<br>(4) The speedometer is damaged.<br>(5) The engine is damaged.<br>(6) The connecting circuit is faulty. | (1) If the speedometer does not function, firstly inspect the engagement of Hall Speed Sensor and the drive gear to verify that there is any malfunction. If everything is normal, then remove and inspect the speedometer.<br>(2) In the case of only inaccurate indication malfunction, it is caused usually by the damage of the interior part of the meter.<br>(3) Inspect the link between the speed signal and the ECU, and the signal wire between engine and instrument. | |
| The water temperature meter does not function. | The indicator needle of water temperature meter does not function after engine starting. | (1) The water temperature meter is damaged.<br>(2) The water temperature sensor is ineffective.<br>(3) The circuit of water temperature meter is open.<br>(4) The voltage regulator is damaged.<br>(5) The ECU is damaged. | (1) Open the engine bonnet and pull out the connector of the water temperature sensor. Inspect whether the resistance of water temperature sensor is normal; if it is normal, inspect the signal from sensor to the ECU, and signal from the ECU to instrument.<br>(2) If the above circuits are normal, connect it to the connector of combination instrument and turn on the ignition switch. Inspect to see whether voltage appears at the yellow/red wires of water temperature sensor connector. If voltage appears, it indicates that the water temperature sensor is damaged; if there is no voltage, it indicates that | |



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| | | | | |
|---|---|---|---|---|
| | | | water temperature meter or voltage regulator is faulty.<br>(3) Remove the instrument panel and maintain the normal connection of the wiring harness. Connect a multimeter between the output terminal 1 of voltage regulator positive grid and the grounding terminal 2 to measure the voltage. If the voltage is higher than 10.5V or lower than 9.5V, it indicates that the voltage regulator is faulty; Otherwise it indicates that water temperature meter is faulty itself. | |
| The fuel meter does not function | The indicator needle does not move after ignition switch is turned on. | (1) The fuel meter is damaged.<br>(2) The fuel meter sensor is ineffective.<br>(3) The circuit of fuel meter is open.<br>(4) The voltage regulator is damaged.<br>(5) There is no fuel in the fuel tank. | (1)Verify that there is gasoline in the tank.<br>(2)Turn on the ignition switch and verify that the water temperature gauge functions properly. If the water temperature gauge functions properly, it indicates that the voltage regulator of the combined instrumentation functions properly.<br>(3) Disconnect the plug of the sensor of the fuel meter, inspect with multimeter that there is electricity in the purple/black wire, and then inspect the grounds of the brown wire and the body. If there is electricity in the purple/ black wire and the brown wire is normal, which indicates that there is malfunction in the fuel meter sensor, and it must be replaced.<br>(4) If there is no electricity in the purple/black wire, then verify that the circuit between purple/black wire | See circuitry diagram of the fuel meter |



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| | | | | |
|---|---|---|---|---|
| | | | of the plug of the fuel meter sensor, and the 21# socket of the connector of the combined instrumentation is open, the route of the circuit is: purple /black wire of the plug of the fuel meter sensor→ the 3# socket of the connector M of the relay plate → the #12 socket of the connect U1 of the relay plate → the brown wire → the #21 socket of the connector of the combined instrumentation.<br>(5) If the circuit is on and the brown wire is normal, then there is malfunction in the fuel meter. | |
| Oil warning lamp always on | The warning lamp for engine oil pressure is always on while driving. | (1) Malfunction of low pressure switch (30KPa switch).<br>(2) Low pressure switch circuit is short.<br>(3) Malfunction of high pressure switch (180kPa switch).<br>(4) High-pressure switch circuit is open.<br>(5) Pressure in the lubricating oil circulation can not reach the specified requirement. | Firstly identify whether the lubricating system or warning system is faulty. This is normally done by measuring the oil pressure to diagnose the malfunction.<br>(1) When connecting the positive grid of the battery and the low-pressure switch with a diode testing light, the latter will be lighted. Start up the engine and increase the speed slowly. When the pressure reaches 15-45KPa, the diode-testing light should be off. Otherwise it indicates that the low-pressure switch is faulty; run the engine at idle speed, with oil pressure higher than 45KPa, the light-emitting diode should be off. If the pressure is lower than 15KPa, it indicates that the lubricating system is faulty. | |



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| | | | | |
|---|---|---|---|---|
| | | | (2) Connect the diode-testing light to high-pressure switch and increase the engine speed slowly. When the oil pressure reaches 160-200KPa, the light-emitting diode should be lighted. If it is not lighted, then it indicates that the high pressure switch is faulty; further increase the engine speed up to 2000r/min, then the oil pressure should reach at least 200KPa. Otherwise it indicates that the lubricating system is faulty.<br>Upon the above inspection, if the lubricating system and lubricating oil pressure switch are both normal, but the warning lamp keeps on indicating that the malfunction is still present, and it should inspect the circuit malfunction according to the circuit diagram.<br>Pay attention when carrying out the inspection: for low pressure warning switch circuit, the warning lamp will be lighted when there is a short circuit to ground, so it should emphasize on inspecting to see whether there is any grounding; while for high pressure warning switch circuit, the warning lamp will be lighted when there is an open circuit as well as when the engine speed is over 2000r/min, so it should emphasize on inspecting to see whether there is any open circuit. | |



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| | | | | |
|---|---|---|---|---|
| Coolant warning lamp is always on. | The warning lamp for coolant is always on while driving, whatever it's in cold condition or hot condition. | (1) Coolant level in storage tank is too low.<br>(2) Malfunction of coolant level switch.<br>(3) Malfunction of warning switch for coolant temperature.<br>(4) Warning lamp circuit is grounded. | (1) Inspect to see whether the engine coolant temperature is actually too high and the level of the storage tank is too low.<br>(2) If all the above inspection are normal, then pull out the connector of the storage tank level switch. If the warning lamp is off, it indicates that the liquid level switch is faulty.<br>(3) If the warning lamp is still on, then connect the connector of coolant level switch and pull out the connector of the coolant temperature warning switch. If the warning lamp is off, it indicates that the warning switch of coolant temperature is faulty; If the warning lamp is still on, it indicates that the circuit is grounded somewhere. | |
| Brake warning lamp is always on. | Brake warning lamp is still on even if the hand brake is released. | (1) Brake oil level is too low.<br>(2) Malfunction of brake oil level switch.<br>(3) Malfunction of hand brake switch.<br>(4) Warning lamp circuit is faulty. | (1) Inspect to see whether the brake oil level is too low or not.<br>(2) If the oil level is normal, then pull out the connector of brake oil level switch. If the warning lamp is off, it indicates that the brake oil level switch is faulty.<br>(3) If the warning lamp is still on, pull out the connector of the brake switch. If the warning lamp is off, it indicates that the brake switch is faulty; If the warning lamp is still on, it indicates that the circuit is grounded somewhere. | |

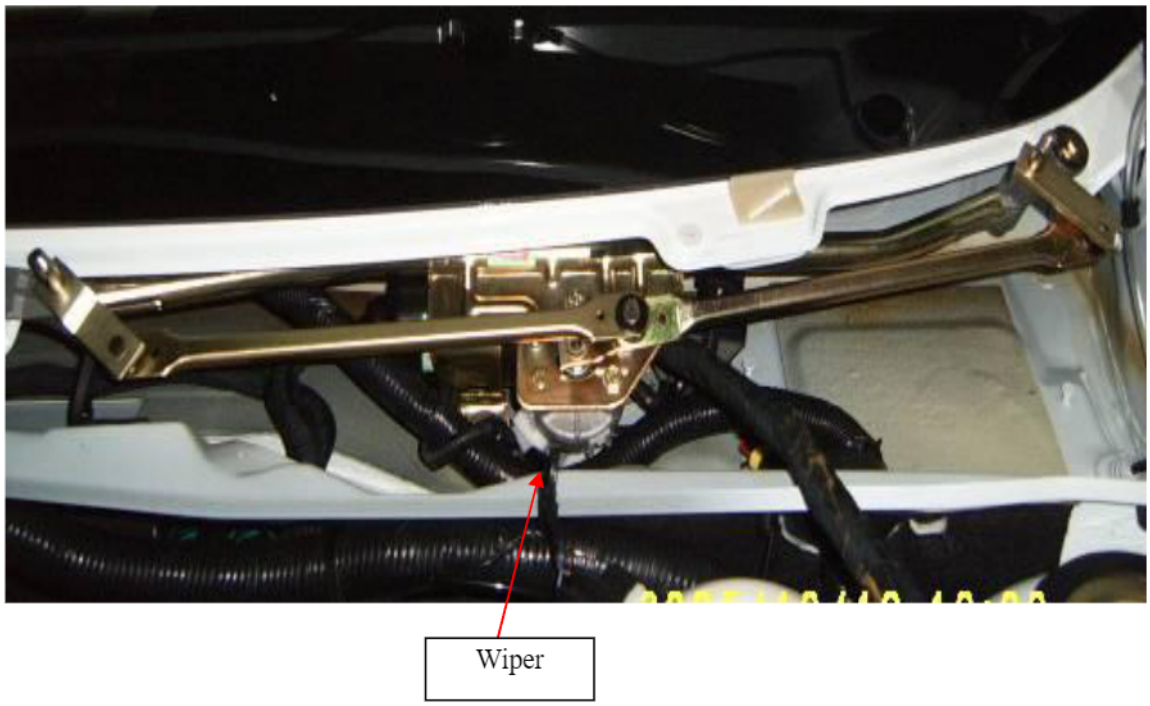


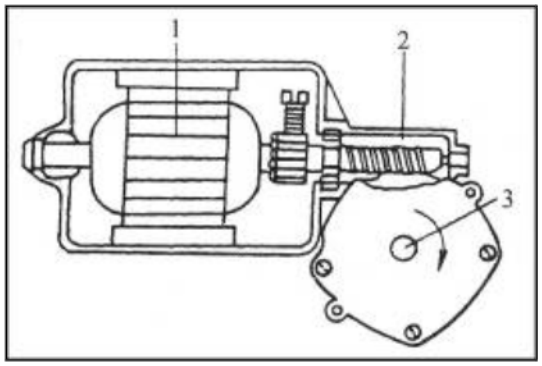
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# ELECTRIC WIPER AND WINDSHIELD WASHER SYSTEM

## SYSTEM DESCRIPTION

The wiper is mainly consisted of the wiper motor assembly, the three-linkage mechanism, and the pendulum rod and wiper blade with the tri-directional flexible ball joint. See figure (wiper-1). The wiper motor is shown in figure (wiper-2).




1. Permanent magnet DC motor
2. Worm-gear speed reducer
3. Wiper motor output shaft

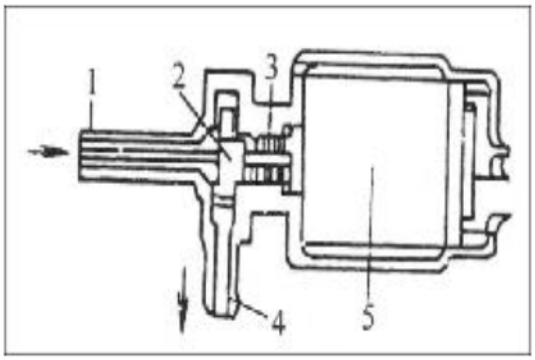
Wiper motor（wiper-2）

The wiper motor is a speed reducer comprised of a mini permanent magnetic DC motor and a worm-gear. In order to ensure that the pendulum rod and wiper blade could be positioned under and parallel with low end of the front window each time after it has stopped. An automatic stop conducting strip is installed on the back of the worm output shaft of the speed reducer and 3 conducting contacts that contact with the conducting strip are installed on the rear cover of the speed reducer. The strip and the contacts jointly perform the automatic stop function together with the contact of the 0 position of wiper switch.



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The washer is consisted of 5 parts which including a mini permanent magnet DC motor, centrifugal water pump, nozzle, liquid storage container and water pipe. The motor and water pump make up the assembly of the washer motor and the water pump as shown in figure (Wiper-3):




1-Water inlet
2-Impeller blade
3-Pump body
4-Water outlet
5-Permanent magnet DC motor

Washer Motor（wiper-3)

As shown in figure (wiper-4), this assembly is installed on the liquid storage container and make up the washer assembly together with the liquid storage container. The washer assembly is installed on the left-hand impeller blade and the capacity of the liquid storage container is 5.1 L.



Washer assembly（wiper-4）

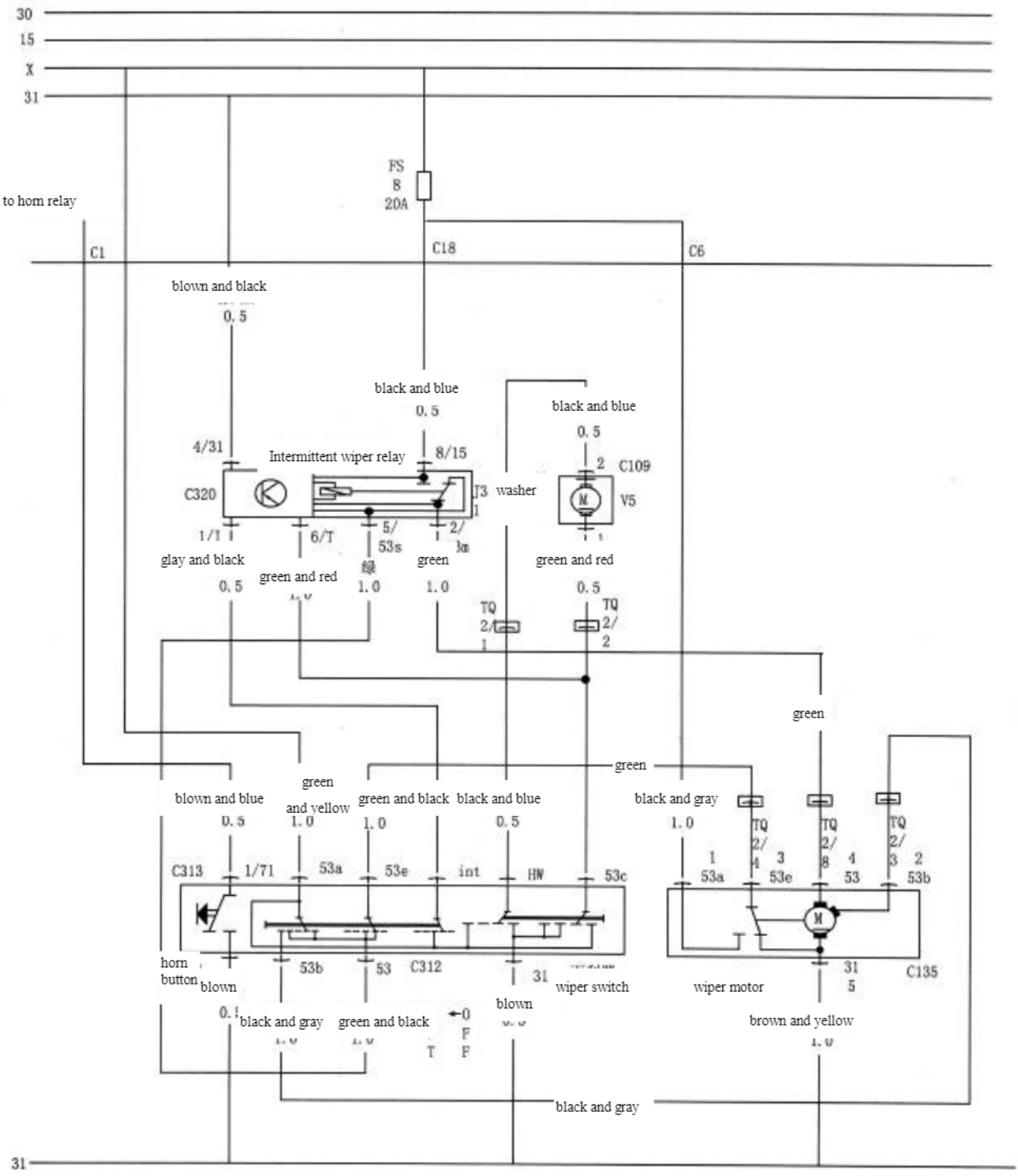


Washer motor



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The circuit schematic diagram of the front window wiper and washer of Chery sedan A15:




The circuit schematic diagram of the front window wiper and washer.



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**The working list of wiper/washer components**

| Gear | Intermittent wiper relay (state of conduction between the pins) | V5 washer (state of conduction between the pins) | Wiper switch (state of conduction between the pins) | Wiper motor (state of conduction between the pins) | Remarks |
|---|---|---|---|---|---|
| Low gear | 5/53s<br>2/53m<br>B+ | | 53e<br>53<br>B+ | 53<br>B+ | B+ (power supply positive grid) |
| High gear | | | 53b<br>53a<br>B+ | 53b<br>B+ | B+ (power supply positive grid) |
| Intermittent gear | 1/J<br>2/53m<br>B+<br>8/15 | | int<br>53a<br>B+ | 53<br>B+ | B+ (power supply positive grid) |
| Reset gear | 5/53s<br>2/53m<br>B+ | | 53<br>53e<br>B+ | 53<br>53e<br>53a<br>B+ | B+ (power supply positive grid) |
| Washing gear | 6/T<br>2/53m<br>8/15<br>B+ | 1<br>B+ | 53a<br>53c<br>B+ | 53<br>B+ | B+ (power supply positive grid) |

## REMOVAL/INSTALLATION OF WIPER WASHER SYSTEM

### 1. INSTALLATION/REMOVAL OF THE WIPER SYSTEM:

- Disconnect the negative grid of the battery;
- Assemble the wiper blade and wiper arm;
- Open the front hood;



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● Place the wiper link-rod inside and concentric the fastening hole with the welded nut of car body;

● Tighten it with 3 bolts and washers, and the tightening torque is 9N·m;

● Install the water channel guard for the front window and other parts (see car body instruction for details);

● According to the arrow printed on the front window, align the wiper blade with the assembling arrow on the window; place the wiper arm into the wiper arm shaft, tighten the fastening nut of the wiper arm and in the mean time press the blade tightly without moving;

● Tighten the wiper arm with 2 nuts with tightening torque of 16～19 Nm, and install the guard plate.

● The installing steps are reverse to those for removal.

**2. INSTALLATION/REMOVAL OF THE WASHER SYSTEM**

● Install 6 fastening clips of the washing liquid tube and 1 guard sleeve;

● Install the nozzle on the front hood;

● Insert one end of the washing liquid tube into the washing liquid container, install the washing liquid tube in the correct direction and insert the connector to the nozzle properly;

● Align the washing liquid container with the stationery jaw of car body, and tighten it with 1 nut and washer.

● The installing steps are reverse to those for removal.

## FAULT DIAGNOSIS AND TROUBLESHOOTING

| Functioning state of the component | Malfunction symptom | Malfunction reasons | Malfunction diagnosis and troubleshooting | Remarks |
|---|---|---|---|---|
| The wiper motor does not function. | When the ignition switch is turned on, turn the wiper switch to (intermittent wiping), (slow wiping), (fast wiping), (short-time wiping) position, the wiper motor always does not function. | (1) The power supply circuit of the wiper motor is open.<br>(2) Poor contact of the ignition switch and the wiper switch.<br>(3) There is an open circuited point in the wiper motor. | (1) Check the circuit of the wiper power to see whether there is any open circuit. If there is, fix it immediately.<br>(2) Test the voltage of each point of the motor winding with multimeter, and verify that the motor circuit is open. If it is open, replace the motor. | |



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| | | | | |
|---|---|---|---|---|
| | | | (3) Verify that the wiper switch and the X-contact off-load relay function normally. Otherwise, replace the corresponding parts. | |
| The intermittent wiping does not function. | When the ignition switch is turned on, turn the wiper switch to (intermittent wiping) position, the wiper motor does not function intermittently. | (1) The circuit of the wiper intermittent controller is open.<br>(2) The internal part of the wiper intermittent controller is damaged. | (1) Verify that the fuse S8 in the relay box and the wiper relay, 8/15-contact off-load relay are normal.<br>(2) If the fuse and the relay are normal, verify that whether the intermittent controller circuit of the wiper is open.<br>The route of the circuit is as follows:<br>Turn on the ignition switch → wiper motor terminal 5F/2 → turn on the intermittent gear -5F/5 → intermittent controller relay 1/J → intermittent controller relay function.<br>Fuse S8 → wiper relay terminal 8/15 → wiper relay terminal 2/53M → the 2# socket of the relay base connector S → green wire → wiper motor terminal 4/53 → wiper motor terminal 5/31 → brown/yellow wire → grounding.<br>(3) If the circuit works properly, it is the malfunction of wiper intermittent controller. | |



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| | | | | |
|---|---|---|---|---|
| The slowly wiping motor does not function. | When the ignition switch is turned on, turn the wiper switch to (slowly wiping) position, the wiper motor does not run. | (1) The slowly wiping circuit of the wiper motor is open.<br>(2) There is malfunction in the 2/53m intermittent controller relay and the wiper switch.<br>(3)The wiper motor slowly wiping winding is open. | (1) Power supply of ignition switch ON.<br>(2) If the power supply of ignition switch ON works properly, check the wiper switch.<br>(3) If the wiper switch works properly, verify that the slowly wiping circuit of the wiper is open.<br>（4) Verify that the green wire of the motor connector has electricity. If it has, it indicates that the slowly wiping winding of the wiper motor is open; If it has not, it indicates that the slowly wiping circuit of the wiper is open. | |
| The fast wiping does not function. | When the ignition switch is turned on, turn the wiper switch to (fast wiping) position, the wiper motor does not run. | (1) The fast wiping circuit of the wiper motor is open.<br>(2) There is malfunction with the wiper switch.<br>(3) The circuit of wiper motor fast wiping winding is open. | (1) Power supply of ignition switch ON.<br>(2) If the power supply of ignition switch “ON” is normal, check the wiper switch.<br>(3) If the wiper switch works properly, verify that the fast wiping circuit of the wiper is open, wiper motor terminal 4/53 → wiper motor terminal 5/31 → brown/yellow wire → grounding. | |
| The short-time wiping of the wiper motor does not function. | When the ignition switch is turned on, turn the wiper switch to (short time wiping) position, | (1)There is malfunction in the wiper switch.<br>(2) The wiper switch fails to | (1)The wiper motor can rotate under slowly and fast wiping, except the short-time wiping. It indicates the switch | |



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| | | | | |
|---|---|---|---|---|
| | the wiper motor does not function. | be reset. | contact of the short-time wiping of the wiper switch has a poor contact. Replace the switch.<br>(2) Improve the flexibility of the wiper switch. When the handle is being released, the switch can automatically reset. | |
| The wiper fails to be reset automatically. | When the wiper motor is working respectively under the intermittently wiping, slowly wiping, fast wiping and short-time wiping position, turn off the wiper switch, and the wiper blade fails to stop at the original position. | (1) There is malfunction in the wiper switch.<br>(2) There is damage in the speed reducer. | (1) Check the 0 position contact of the wiper switch. If it is poor contact, replace it.<br>(2) If the contact works properly, check the automatic stop conducting strip installed on the back of the worm output shaft of the speed reducer, and 3 conducting contacts installed on the cover of the speed reducer. If they are defective, replace them. | |
| The washer motor does not function. | When the ignition switch is turned on, turn the wiper switch to the spray position, the washer motor does not function. | (1) The circuit of the washer motor is open.<br>(2) There is malfunction in the ignition switch. | (1) Ignition switch.<br>(2) If the ignition switch works properly, then verify that the wiper spray switch has a poor contact or is defective. If it has a poor contact or is defective, replace the wiper switch.<br>(3) If the wiper spray switch works properly, verify that the circuit of washer motor power | |



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| | | | | |
|---|---|---|---|---|
| | | | is open.<br>(4) If the circuit of the motor power works properly, replace the washer motor. | |
| The washer functions, but the wiper does not function. | When the ignition switch is turned on, turn the wiper switch to the spraying position, the washer functions, but the wiper does not function. | The intermittent controller of the wiper is defective. | The washer functions, but the wiper does not function, it is mainly because a malfunction in the wiper intermittent controller results a circuit open to the wiper motor, so the wiper cannot function. Replace the wiper intermittent controller. | |

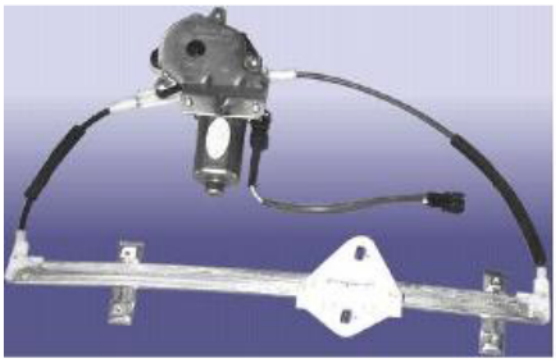


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# ELECTRIC WINDOW REGULATOR SYSTEM

## SYSTEM DESCRIPTION

The Chery sedan A15LHD employs an electric steel wire type window regulator. The structure is shown in figure (window-1).



Electric window regulator (window-1)

The up/down operation of the window can be centrally controlled by the driver through pushing buttons, and also can be controlled individually by the door switch to adjust the door window opening. The mechanism transmission route is as follows: motor → speed reducer → steel wire roller → steel wire → window supporting bracket → window up/down. The control module is installed under the left-hand rear seat, as shown in the figure (window-2).




Electric window control module



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# FAULT DIAGNOSIS AND TROUBLESHOOTING

## 1. THE ELECTRIC WINDOW CAN NOT BE ACTIVATED

When the electric window can not be activated, the followings should be checked:

(1) Whether the voltage of the battery is normal;

(2) The voltage supply of the thermo-sensitive fuses and the control relay;

(3) The window regulator switches and the voltage supply, including the front left, front right, rear left and rear right windows;

(4) The contact switches of each door and motor signals;

(5) The working current of each window regulator motor;

(6) The function of the mechanical linkage device for each window regulator.

## 2. THE ELECTRIC WINDOW REGULATOR DOES NOT FUNCTION

When the electric window regulator does not function, the followings should be checked:

(1) Whether the voltage of battery is normal;

(2) Whether the security switch (installed at the front left armrest) was depressed;

(3) Whether the circuit between the rear window regulator and the security switch is open;

(4) Whether the rear window regulator motor and the mechanical linkage device are jammed;

(5) Whether the security switch and the control push buttons are ineffective.



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# CENTRAL LOCK SYSTEM

## SYSTEM DESCRIPTION

The Chery sedan A15 employs a complete electronic control central lock system. The central lock system is consisted of one 4-wire type controlling module, three supplemental door lock actuating motors and one luggage boot cover actuating motor. The lock and unlock of the interlock mechanism for the central lock system are all controlled by the driver side door lock switch. The central door lock module is installed in the driver side door panel.

## PRINCIPLE OF CENTRAL DOOR LOCK CONTROL

The 4# pin of the central control module provides the normal power supply to the S18 30A fuse, the 2# pin is grounded, and the 1# and 3# pins are linked to the actuating motor respectively. When the driver side door lock switch is turned to "OFF" position, the car is locked; when the driver side door lock switch is turned to "ON" position; the car is unlocked.

## FAULT DIAGNOSIS AND TROUBLESHOOTING

### 1. ALL THE DOOR LOCKS DO NOT FUNCIONT

**Malfunction symptoms:**

1) When the driver side door lock switch is locked, all the doors are not locked.

2) When the driver side door lock switch is unlocked, none of the doors is unlocked.

**Malfunction reasons:**

1) The S18 30A fuse for the normal power supply of 30# terminal is broken;

2) The circuit connecting the central door lock module to the S18 30A fuse is faulty;

3) Poor grounding;

4) The central door lock module is faulty.

**Troubleshooting**

Firstly, verify that the 30# terminal connected to the normal supply S18 30A fuse is open or the 12V power supply. If there is no 12V power supply or the fuse is not open, check the circuit for the malfunction. If there is a 12V power supply, verify that there is a 12V power supply in the circuit from S18 30A fuse to the 4# pin of the central door lock module. If there is no 12V power supply, there is a malfunction in the circuit. If there is a 12V power supply, verify that the 2# pin of the central door lock module is grounded or not. If it is not grounded, there is a malfunction in the circuit. If it is grounded, there is malfunction in the central door lock module, and the central door lock module should be replaced.

### 2. NONE OF THE CENTRAL DOOR LOCKS CAN BE UNLOCKED



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**Malfunction symptom:**

1) None of the central door locks can be unlocked after closing the door.

**Malfunction reasons:**

1) Malfunction in the central door lock module.

**Troubleshooting**

Replace the central door lock module.

**3. NONE OF THE CENTRAL DOOR LOCKS CAN BE LOCKED**

**Malfunction symptom:**

None of the central door locks can be locked after opening the door.

**Malfunction reasons:**

Malfunction in the central door lock module.

**Troubleshooting**

Replace the central door lock module.

**4. THE RATED RESISTANCE FOR THE MOTORS OF ALL THE CENTRAL DOOR LOCKS**

Main central door lock motor (driver side) 315Ω;

Side door motor 20Ω;

Luggage boot cover motor 10Ω;

When the resistance range is exceeded or the resistance value is equals to infinity Ω, please replace the resistor of the central door lock.



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# AIRBAG SYSTEM

## PRINCIPLE OF SRS SYSTEM

When the vehicle collision happens, the collision between the vehicles or between the vehicle and the barrier is called the first collision. After the first collision, the vehicle speed changes rapidly. The driver and the passengers will move forward due to the inertia, and will collide with the steering wheel, windshield or instrument dashboard etc. This collision is called the second collision. The main reason that caused the driver's injury in the accident is the second collision. In order to reduce or avoid the driver's injury in the second collision, the vehicle has installed with the passive protection devices of seat belt and safety airbag. The airbag is an option for the Chery sedan A15 RHD, and the airbag model employed is Dongfangjiule.



Activated airbag system

The purpose of the airbag design is: During the short period between the first and the second collisions (50ms), quickly insert an airbag between the driver and the interior structures of the car, as shown in the Figure:

The driver's head and chest will press on the air filled cushion. The air bag can absorb the kinetic energy aroused by the inertia of the human body by the damping effect of itself so as to protect the personal safety.

The airbag system is a kind of safety device used together with the seat belt.

The airbag can not replace the function of the seat belt.

The driver must put on the seat belt at all time and adjust the seat belt to a proper tension.

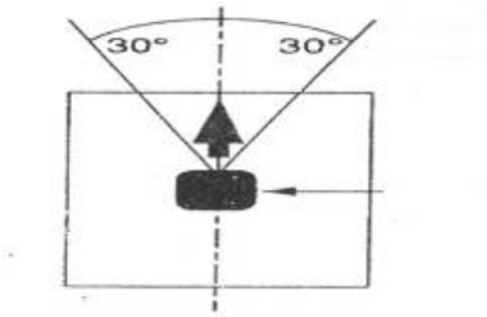


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## OPERATION CONDITIONS

----The airbag system will function under the following conditions:

1) When the vehicle is collided with a stationary object with a speed over 25Km/H, the airbag will be activated.
2) When two vehicles have a head-on collision both with a speed over 25Km/H, the airbags of the two vehicles will be activated.
3) When one vehicle is parked, and anther vehicle is collided with it face to face with a speed over 50Km/H, the airbags of the two vehicles will be activated.
4) Collision within the included angles of 30° from the left and right of the vehicle.

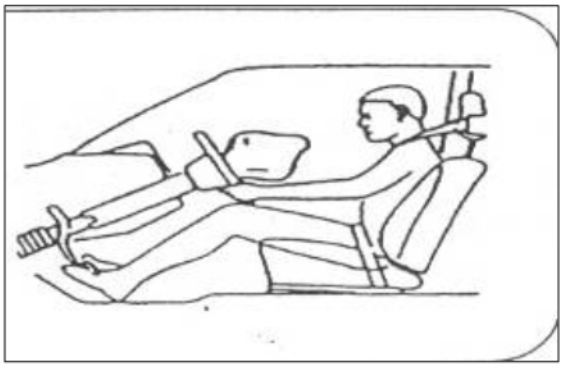



----The purpose of SRS is to protect the driver during a serious head-on collision. If the external force is coming from the included angle within 30 degree of the vehicle centerline, the airbag will be activated.

----Note: The above vehicle speed is referring to the speed measured by the sensor, not the actual speed of the vehicle. The speed measured inspected by the sensor is related with the actual speed, bumper performance results and the crossbeam deformation.

## OPERATION PROCESS

----The activation process of the airbag.





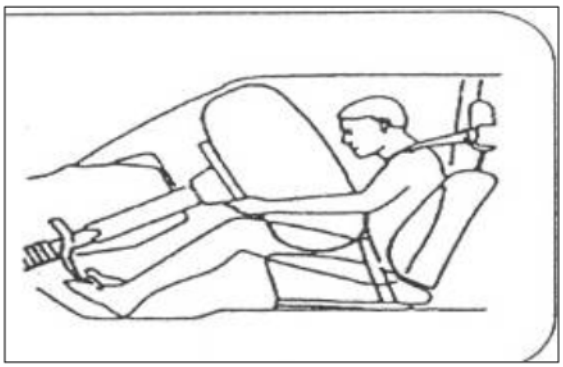
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----- -The accident happens;

Sensing;

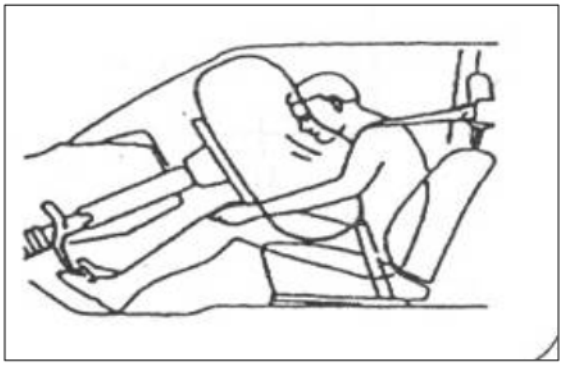
Triggering;

The airbag is activated and inflated;



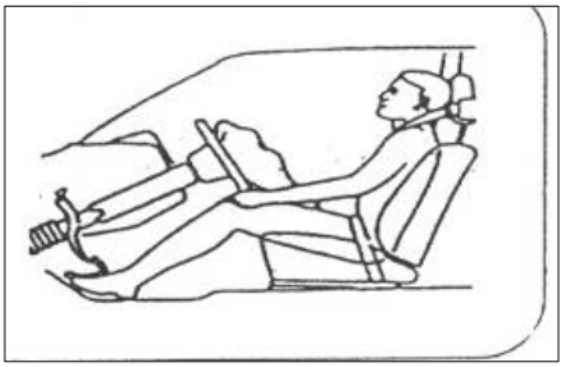
----The airbag inflates completely;

The driver moves forward;



----The driver's head and upper body bump into the airbag;

The air is discharged through the rear end of the airbag.



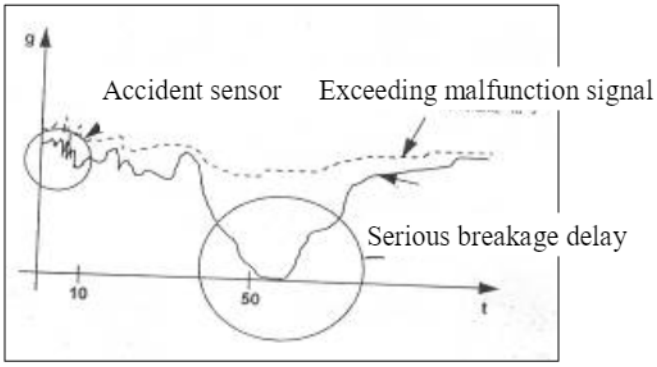
----The air is totally discharged from the safety airbag.

The operation process is as follows:

The electronic accelerometer can continuously measure the acceleration and deceleration of the vehicle and then transmit the signals to microprocessor.

The perfect collision signals process in the microprocessor determines whether and when to activate the airbag.

If it is necessary to activate the airbag, the






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microprocessor will activate the ignition circuit.

If the electric safety sensor is turned off at the same time, the ignition current will induce the igniter, and activate the safety airbag.

## THE ASSEMBLY PARTS OF AIRBAG AND WORKING PRINCIPLE

**SRS (airbag system) includes:**

Steering wheel airbag components;

Airbag control module;

Steering column hairspring;

Wiring harness;

SRS malfunction warning lamp.

### 1. COLLISION SENSOR (IN THE BCM)

The collision sensor or the accelerometer employs an electronic instrument to display the acceleration or deceleration of the vehicle during the head-on collision. In the display of electronic instrument, the electronic signals equally reflect the acceleration or deceleration of the vehicle. (Acceleration of gravity)

The computer will determine the severity degree of the collision according to the strengths of electronic signals. If the electronic signals exceed the pre-set value, the airbag computer will send the ignition demand to the igniter to activate the ignition agent, and heat and decompose the inflating agent to generate the required air for inflation of the airbag.

### 2. SAFETY SENSOR (IN THE BCM)

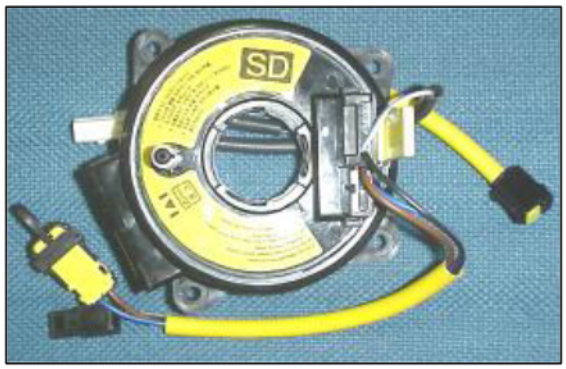
Most of the vehicles employ a short circuit plate structure for the linkage of the airbag computer and the igniter to prevent the false ignition of airbag. The safety sensor installed in this vehicle is a kind of safety device consists of a dual contactor and an electric switch.

It acts independently with the electronic components. During normal driving, the ignition circuit of airbag maintains at the “standby”. This will ignite the airbag under the required conditions. (More than 6.4 acceleration of gravity)



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### 3. HAIRSPRING




In order to ensure that the steering wheel has a sufficient turning angle other than damages the connection wiring harness of the airbag assembly, the spiral wiring harness is adopted between the steering wheel and the steering column. Install the wiring harness into the spiral spring first, and then install the spiral spring into the spring housing, which is called as hairspring. Normally, the wiring harness of the horn is also installed in the spiral spring.

**Specification:**

External diameter：Φ96m

Number of cycles: maximum cycles of 6.

Storage temperature : -40～85

Operation temperature: -35℃～85℃

Operation voltage: DC 9～16V

Working current (airbag configuration): 16A，40V－6ms max.

Current carry capacity: Carrying up to 5S maximum under a load current of 5A

Voltage carry capacity: Carrying up to 100ms maximum under a voltage of DC 20V

Operation torque: 0.15ms max.

**Hairspring**

It is installed on the steering column.

It is also a part of the horn circuit.

**Attention: The hairspring will be damaged if the steering wheel is turned by more than 4.5 cycles.**

Turn the steering wheel:

Rotate the steering wheel to one direction will tighten the coil.

Rotate the steering wheel to the other direction will loosen the coil.

The hairspring will be damaged if the steering wheel is turned by more than 4.5 cycles.(The total rotation range: 9 cycles)

**Warning: Removal of the hairspring will cause injury and vehicle damage. Do not remove the hairspring. If the airbag has already been inflated, the hairspring must be replaced. Please remove the airbag components, hairspring and**



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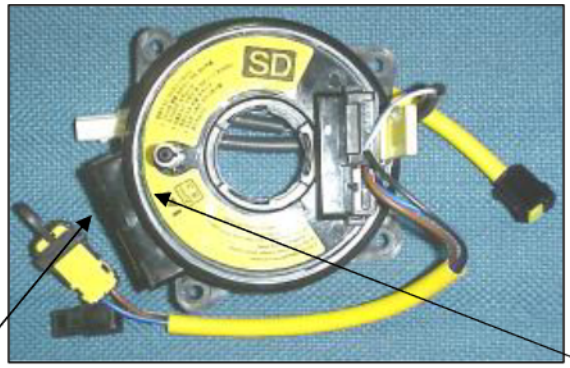
**safety memory unit before handling with the steering system. In order to remove or install the airbag components, please disconnect the negative grid of the battery and wait for at least 1 minute.**

**Removal/Installation**

The hairspring is installed between the steering wheel and the steering column. When installing the hairspring, pay attention to the installing position and direction, otherwise it would cause insufficient turning angle or heavy rotation of the steering wheel.

In order to remove and install the hairspring, it is necessary to check the hairspring clearance during rotating.

Warning: In order to check the clearance, turn the hairspring carefully until we can feel the resistance. After that turn back for about 4 cycles and align it with the clearance marking.




Fastening mark

Turning mark

Scheme of the hairspring installation

**4. AIRBAG COMPONENTS**

(1) Airbag components

The airbag components consist of the airbag decoration cover, airbag and inflating components. The airbag is made of nylon fabric. The internal layer was treated with synthetic glue for sealing air. When the airbag is not open, it is folded like a bag of the unopened parachute and installed between the upper part of air inflator and the airbag cover. There is a impression line for tearing on the surface of the airbag decoration cover so that the decoration cover can be torn off easily during the inflation of the airbag and reduce its resistance to let the airbag passes through.

When the vehicle is collided, normally the airbag will start to inflate within 10ms after the first collision, and the total inflation time from the starting of inflation through the entirely activation of the airbag is about 30mS. When the airbag is activated, it spreads out along the steering column to the direction of the windshield and thus prevents the driver's face to collide with the windshield, and his chest to collide with the steering wheel.

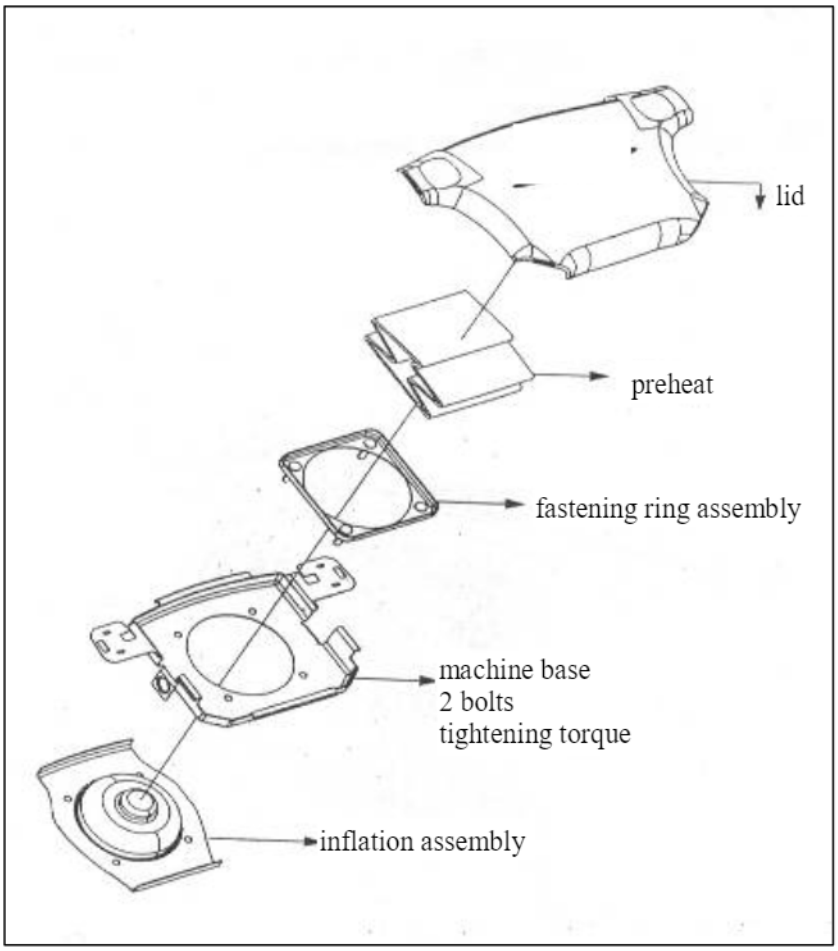
There is an air discharging hole at the back of airbag (opposite to the driver). When the driver



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presses on the airbag due to the effect of inertia, the airbag is pressed and the air will be discharged from the discharging hole, so that the kinetic energy resulted by the collision between the driver and the airbag can be absorbed, which preventing the driver from injuring.

The function of the inflator components is such that when the igniter activates the ignition agent, generating air and inflating the airbag, causing the airbag to spread out. When the computer sends the ignition instruction, the heating element circuit turns on, which is heated quickly and activates the ignition agent, the activated ignition agent explodes immediately and generates heat, and then the inflating agent is heated up and decomposed to generate the air into the airbag.




(2) BCM (airbag control module)

Irreparable component. It is the component of the monitoring system during operation and sends the instructions when the airbag function.

Record any detected malfunction.

Turn on the warning lamp to warn the driver that there is a malfunction.

Diagnose malfunction code can only be detected by the diagnostic tester.

The BCM controls the inflation and spreading of the airbag through the following



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components:

- Safety sensor
- Capacitor
- Collision sensor or accelerometer

(4) Capacitor

The capacitor provides the backup power.

(5) Bulb

When the operation voltage is increased to the BCM point, the BCM will trigger the warning lamp and we can now check the bulb. The BCM turns on the warning lamp for 4 seconds and then turn it off during the bulb inspection.

**Malfunction Display**

The airbag control module records the malfunctions of the system in two forms.

1. Current malfunction.

2. Historic malfunction detected before.

(6) Warning lamp

- When any malfunction appears, the malfunction warning lamp will be turned on.
- It is kept "on".

(7) Wiring harness

Most of the wiring harness linkers adopted in the airbag system are yellow.

## FAULT DIAGOSIS, INSPECTION AND OPERATION

### 1. INSPECTION OF SRS DIAGNOSIS SYSTEM

When the supplementary restriction system (SRS) is turned on, the airbag controlling module (BCM) will turn on the airbag warning lamp and start system self-diagnosis. The warning lamp will flash for 6 seconds with frequency of 1Hz during the system diagnosis. If BCM diagnoses any malfunction, it will turn on the airbag warning lamp and record the malfunction into the BCM memory. The BCM will diagnose the SRS system malfunction automatically once it is turned on.

If 5 consecutive malfunctions are diagnosed during the self-checking, the SDM will mark the malfunction. A malfunction diagnosis test cycle is 400 milliseconds, so that the SDM will confirm the malfunction within 2 seconds (400 milliseconds x 5 times). If the malfunction is marked and maintained as the malfunction state, the warning lamp will be "ON" continuously. This state is called the "existing malfunction". Once the malfunction is marked, and if this malfunction does not appear again after 25 continuous fault diagnosis test cycles (400



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milliseconds X25=10 second), the malfunction mark will be cancelled. The warning lamp will be turned off under this condition, and it is called the "historical malfunction".

### 2. DIAGNOSIS OF THE DIAGOSTIC TESTER

The diagnostic tester can read data from the BCM memorizer to carry on the continuous data exchanging. The diagnostic tester is used for reading and storing the malfunction codes, and clears part of the stored data after the maintenance. But it can not clear the interior malfunctions, such as the accident records and the arithmetic data malfunctions.

The proper usage of the diagnostic tester: firstly, turn off the ignition switch, connect the diagnostic tester to the OBDII connector, and then turn on the ignition switch. See the diagnostic tester manual for the follow-up procedure.

## SRS SYSTEM MAINTENANCE AND OPERATION

If it is required to inspect the vehicle protection supplementary system or inspect the accident vehicle, the procedures below should be followed. If any malfunction is found, the corresponding parts should be replaced by new ones.

### 1. MAINTENANCE OF SRS SYSTEM

Warning: When the ignition is turned off and at the same time the fuse is taken out, the sensor and the diagnostic module (BCM) can provide the sufficient voltage for 1 minute to activate the airbag. If the airbag is not disconnected, then do not start the maintenance work within 1 minute after turning off the power supply to BCM. If the airbag has been disconnected, then the maintenance work can be carried out immediately without waiting for the 1 minute electrical discharging time. The failure of shutting off the SRS system temporarily during the maintenance will result in false ignition, physical injury and SRS system discarded.

#### (1) Turn off the airbag system

Adjust the steering wheel to the center position, turn the ignition switch to "Lock" position and remove the key, remove the airbag fuse from the fuse box and wait for more than 1 minute for BCM capacitor discharging.

#### (2) Turn on the airbag system

Insert the airbag fuse into fuse box, turn the ignition switch to "ON" position, and inspect whether the airbag indicator lamp is off after being on for 6 seconds. If the indicator lamp does not function in this way, please refer to the "Diagnosis and inspection of SRS system" of this manual.

Warning: When the ignition switch is turned on, keep away from the airbag as far as possible, otherwise it may cause physical injury.

#### (3) Operation, installation and diagnosis

The airbag should be placed in an environment with the temperature not higher than 65℃(149℉). If the airbag drop from a height of more than 0.9 meter (3 feet), the airbag and



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BCM should not be used any more.

When replacing the BCM, the arrow on the BCM must point to the direction right ahead of the vehicle.

The BCM must be horizontally installed onto the installation plane, and parallel with the coordinate axis of the vehicle body.

In order to avoid the occurrence of malfunction codes during the diagnosis, do not connect the power supply to the airbag system or turn on the power supply according to the special requirements listed in the diagnosis table before all the system components are connected properly.

The SRS diagnosis system inspection must be the starting point of any SRS system diagnosis. The SRS diagnosis system inspection can check whether the indicator function is proper, and direct the accurate method of diagnosing any SRS malfunctions. Omitting these procedures may result in longer diagnostic time or inaccurate replacement of components.

**(4) Maintenance and inspection after the accident**

Warning: Any maintenance of the vehicle structure must ensure to restore the vehicle to its original state. The activated airbag needs to replace the BCM control module and airbag, and inspect the dimension of the steering column.

All the SRS components must be replaced after been defective. If the installation point for the SRS component is damaged, it must also be replaced.

Never use SRS spare parts from other vehicles (not including the new type SRS components from the same model vehicle).

Do not try to repair the hairspring spring, airbag and seat belt. If there is any defect, these components must be replaced.

Check the part number or part marking of the SRS components after replacement. The airbag air generators that are alike in the appearance may have different internal structure.

**(5) Replacement of activated airbag components after accident**

All the SRS components must be replaced immediately after airbag had been activated in the accident. After the airbag is activated, there may be powder like leftover on the airbag surface. These leftover mainly includes the amylum and chemical reaction product (for lubricating the airbag during the inflation).

Airbag

Airbag control module

SRS wiring harness

**(6) Inspection of inactivated airbag components after the accident**

Irrespective of whether the airbag has been activated or not, a specific inspection must be carried out after any collision accidents.



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A dimension measurement for the steering column must be carried out.

Check whether there is any crack or other damage on the instrument panel and steering column guard.

Check whether there is any deformation, bending, crack or other damage on the instrument panel support

Check the seat belt and installation fastening point.

**(7) Activation and spreading of the airbag (in the vehicle)**

The airbag must be activated and spread before the vehicle is discarded. If the vehicle is discarded and disassembled, the airbag may be activated in the vehicle.

**(8) Disposal of activated airbag**

Warning: In order to prevent any injury in case the airbag is activated in the vehicle, please follow the preventive measures as follows:

Before spreading the airbag, remove all the removable objects or loose components within the spreading range.

The airbag shall be activated and spread after closing the vehicle doors and opening side windows.

Spread the airbag only in the prepared airbag spreading area. The servicemen have to participate in should stay at least 10 meters away in front of the vehicle.

Do not apply any voltage before completing all the preparation works.

Cool down the airbag for at least 30 minutes before handling with the activated airbag.

Please wear suitable gloves and protective goggles during the discard process.

If the activation and spreading of the airbag fails, cut off the voltage and waiting for at least 5 minutes before approaching the vehicle.

**(9) Process of activation and spreading**

Warning: When the ignition is turned off and at the same time the fuse is taken out, the airbag control module (BCM) can provide the sufficient voltage for 1 minute to activate the airbag. If the airbag is not disconnected, do not start the maintenance work within 1 minute after disconnecting the power supply to BCM. If the airbag has been disconnected, the maintenance work can be carried out immediately without waiting for the discharge of 1 minute. The failure of shutting off the SRS system temporarily during the maintenance will result in false ignition, physical injury and SRS system discarded.

Disconnect the two grids of the battery and place the battery 10 meters away from the vehicle. Remove the lower panel of the driver side instrument panel from the steering column; disconnect the two SRS wiring harnesses that connect to the clock spring under the steering column. Peel off the 13 mm insulated outer layer of the wiring harness end that connects to the clock spring. Connect the airbag and the battery used to activate the airbag with 2 extra



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wiring harnesses of at least 10 meters long each. Peel off the 13 mm insulated outer layer of the 2 extra wiring harness ends, and tie the two ends of the wiring harnesses together. Place the tied ends beside the battery use to activate the airbag, but do not connect it to the battery at this moment. Connect the other two loose ends of the extra wiring harnesses separately to join up with the wiring harnesses connecting the airbag, and insulate the connection point with insulated tape. That means each end of the two extra wiring harnesses should be connected to the two wiring harnesses of the airbag separately, and the other end of the extra wiring harnesses should be tied together and place beside the battery. Clear the site.

Loosen the wiring harness end beside the airbag activation purpose battery, connect one wire to the negative grid of the battery, and the other to the positive grid of the battery, and the airbag is immediately activated.

Dispose the activated airbag according to the proper preventive measures. Please refer to the "Disposal of activated airbag" of this manual.

**(10) Activation and spreading of airbag (outside of the vehicle)**

If the vehicle is within the guarantee period, please contact with the region maintenance manager for the approval and other specifications before activating and spreading the airbag.

**Please activate the airbag under the following conditions:**

The vehicle will be disassembled. Please refer to the "Airbag Spreading" of this manual.

The airbag is damaged during shipment, storage or maintenance.

Warning: In order to prevent any injury when the airbag is activated outside of the vehicle, please take the preventive measures as follow:

Spread the airbag only in the preserved airbag spreading area. The servicemen have to participate in should stay at least 10 meters away in front of the vehicle.

Do not apply any voltage before completion of all the preparation works.

Cool down the airbag for at least 30 minutes before disposal of activated airbag.

Please wear the gloves and protective goggles during the discard process.

If the activation and spreading of airbag fails, approach the vehicle at least 5 minutes after shutting off the voltage.

Face the front side of the airbag upwards and place it horizontally on the outdoor flat ground for at least 10 meters away from the people or barriers.

Place the vehicle battery 10 meters away from the airbag.

Activate and spread the airbag:

If there is no airbag spreading tool, please follow the specifications below:

Disconnect the yellow wiring harness connect to the airbag;

Peel off the 13 mm insulated outer layer of the wiring harness end that connect to the airbag;



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Connect the airbag and the airbag activation purpose battery with two extra wiring harnesses of at least 10 meters long each;

Peel off the 13 mm insulated outer layer of the two extra wiring harness ends;

Tie the two ends of the two extra wiring harnesses where its insulated outer layers have been peeled off;

Place the tied ends beside the airbag activation purpose battery, but remember not to connect to the battery at this moment;

Connect the other two loose ends separately to join the wiring harnesses connecting the airbag;

Bind the joint point with insulated tape;

Each end of the two extra wiring harnesses should be connected to the two wiring harnesses of the airbag separately, and the other end of the extra wiring harnesses should be tied together and place beside the airbag activation purpose battery. Clear the site.

Loosen the tied end beside the airbag activation purpose battery;

Connect one wire to the negative grid of the battery, connect the other wire to the positive grid of the battery, and the airbag is immediately activated.

Dispose the activated airbag according to the proper preventive measures. Please refer to the "Disposal of activated airbag" of this manual.

**(11) Activating the airbag before discarding**

This specification is applicable for all kinds of vehicles to be discarded and disassembled. If the vehicle is within the guarantee period, please contact the region maintenance manager for the approval and other specifications before activating and spreading the airbag. Besides the extra steps listed below, the activated and spread airbag should be treated with the same measures of other components to be discarded and disassembled.

Place the activated airbag into a tough plastic bag;

Ensure to seal the plastic bag properly;

Wash both hands carefully after disposal of the activated airbag.

**(12) Maintenance of SRS system wiring harness**

Warning: Before carrying out any maintenance, the SRS system must be disconnected. Please refer to "Disconnection of airbag system" of this manual.

The connectors used in the SRS system are made of special material to ensure the good conductivity of the low power circuit. The airbag wiring harness assembly must be replaced if the plug is damaged. Do not try to use any other type of connectors to replace the connector of this connector.



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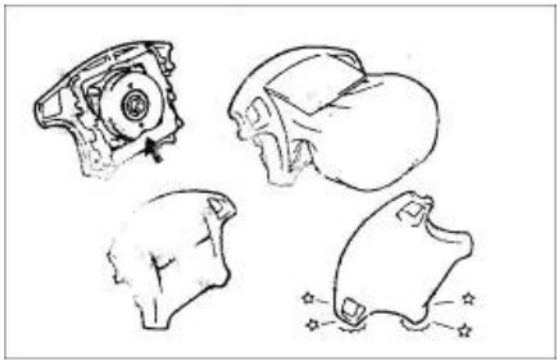
## REMOVAL/INSTALLATION OF AIRBAG SYSTEM

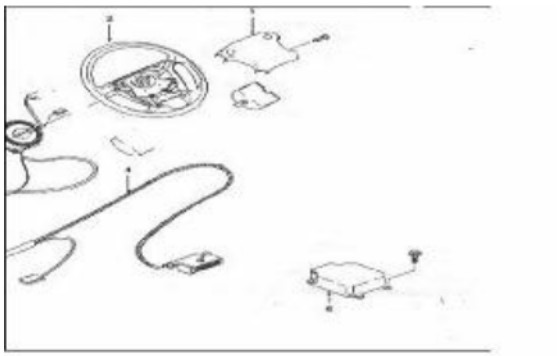
### 1. REMOVAL/INSTALLATION OF AIRBAG

**Removal:**

**----Disconnect the negative cable of the battery (—)**

**Warning: When the ignition is turned off and at the same time the fuse is taken out, the airbag control module (BCM) can provide the sufficient voltage for 1 minute to activate the airbag. If the airbag is not disconnected, do not start the maintenance work within 1 minute after turning off the power supply to the BCM. If the airbag has been disconnected, the maintenance work can be carried out immediately without waiting for the discharging of 1 minute. The failure of shutting off the SRS system temporarily during the maintenance work will result in false ignition, physical injury and SRS system discarded.**





**----Place the steering wheel at the center**

**Warning: When dealing with the airbag, please face the front side of the module upwards so as to provide sufficient spreading space in case of false activation. The airbag may fly to the people or objects resulting in injury or vehicle damage due to the lack of spreading space.**

Remove the two airbag bolts on the steering wheel.

Pull out the horn and the airbag wiring harness plug from the airbag. Remove the airbag.



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**Installation:**

----Connect wiring harness plug of the horn and airbag to the airbag socket.

Install the airbag

Install the airbag bolt

Use a tightening torque of 13~17N.m to tighten the airbag bolt

Connect it to the negative grid of the battery

## 2. AIRBAG CONTROL MODULE (BCM)

Warning: Dealing with the BCM carefully during maintenance. Do not knock or shake the BCM. Do not switch on the SRS circuit before installing the BCM on the vehicle. All the BCM bolts must be tightened carefully. In order to ensure a proper functioning of the SRS, the arrow on the BCM must point at the direction right ahead of the vehicle. Though the BCM can function when the SRS circuit is switched on before installing the BCM on the vehicle, it may cause a potential false activation and consequential injury.

Notes: If there is water entering into the vehicle due to leakage, passing through deep water, flood or other reasons, the BCM and BCM connector may need to be replaced. Turn the ignition switch to the "OFF" position; check the BCM area including the carpet etc. If there is any obvious dipping or dipped mark, the leakage or dipped parts must be cleared, and at the same time replace the BCM and BCM connector. The SRS system must be disconnected before carrying out the operations above. Please refer to "Disconnection of the airbag system" of this manual.

**Removal procedure**

Disconnect the SRS. Please refer to "Disconnection of the airbag system" of this manual.

Remove the decoration panel on the left and right sides of instrument panel.

Loosen the safety interlock of the BCM wiring harness connector.

Remove the BCM wiring harness connector.

Remove the BCM fastening bolts.

Remove the BCM.

**Installation procedure**

Install the BCM according to the arrow on the BCM, which points at the direction right ahead of the vehicle.

Install the BCM fastening bolts.

Fasten the bolts with a torque of 8--12Nm.

Connect the BCM wiring harness connector.



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Move the safety interlock head of the connector to “Lock” position.

Install the decoration panel on the left and right of the instrument panel.

Connect the SRS system. Please refer to the “Connection of the airbag system” of this manual.

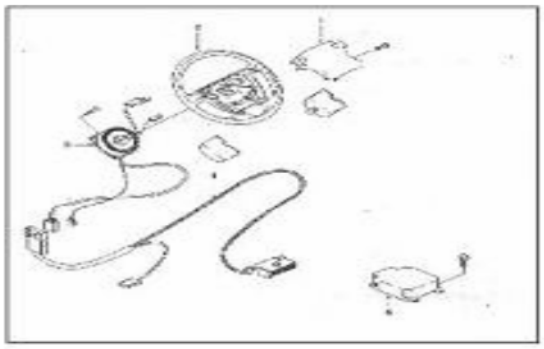
Warning: All the BCM bolts must be tightened carefully. In order to ensure a proper functioning of the SRS, the arrow on the BCM must point at the direction right ahead of the vehicle. Though the BCM can function when the SRS circuit is switched on before installing the BCM on the vehicle properly, it may cause a potential false activation and consequential injury.



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### 3. WIRING AND CONNECTOR

Note: The wirings assembly of the SRS protective supplementary system and that of COWL are joined together. All the wirings of this system are installed in a yellow corrugated conduit, and all the connectors is normal yellow.



The wiring or the wiring connectors are to be replaced under the following conditions:

(a) There are signs of damage found on the wiring or wiring connectors of the SRS protective supplementary system during troubleshooting.

(b) There are signs of damage found on the wiring or wiring connectors of the SRS protective supplementary system during inspection.

Note: If there is any damage found on the wiring of the SRS protective supplementary system, the whole wiring assembly should be replaced.

### 4. SPIRAL CABLE




The spiral cable (see the figure) is used for the circuit linking the vehicle body and the steering wheel. The steering wheel must be properly installed on the steering column when the spiral cable is located in the middle, otherwise the spiral cable may come loose or cause other malfunctions. Please refer to the instruction for proper installation of steering wheel in this manual.



### 5. STEERING WHEEL LINER

----The SRS airbag is installed in the steering wheel. The airbag includes the activator, igniter and air generator etc. When the airbag sensor assembly sends out the



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signal, the airbag will be activated and inflated.



Incorrect placement

----When removing the liner of the steering wheel or installing the new one, the upper surface of the liner should face upward. At this moment, place the lock rod of the double-lock connector at the locking state and place it carefully to prevent it from damaging the connector. When storing, do not place one liner on top of another liner. (If the metal surface of the liner is placed to face upward, it may result in serious accident when the airbag is activated accidentally.)

----Do not measure the resistance of the activation device of airbag. (This will cause accidental activation of the airbag. It is extremely dangerous.)



Correct placement

----Do not apply any grease on the liner of steering wheel, and do not wash it with any kinds of detergents.

----Store the liner of steering wheel at the place where the environmental temperature is lower than 93℃（200℉）and the humidity is lower than 40%, and away from electrical noises.

----Disconnect the airbag connector before carrying out any welding work.

----When discarding the vehicle or the liner of the steering wheel separately, the airbag should firstly be activated with special maintenance tools.





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## 6. BCM（AIRBAG CONTROL MODULE）

----The BCM (airbag control module) (See figure) is installed on the floor under the heat exchanging radiator. The BCM (Airbag control module) includes airbag sensor, safety sensor, diagnosis circuit, ignition controlling and driving circuit. It receives the signal from airbag sensor and determines whether to trigger the SRS system.

----In case any collision accident happens and causes the airbag to activate, do not use the airbag computer again.

----The maintenance work (even if it is only loosening the fastening bolts of the central sensor assembly of the airbag) must be carried out at least 5 minutes after turning the ignition switch to "LOCK" position and disconnecting the battery negative cable.

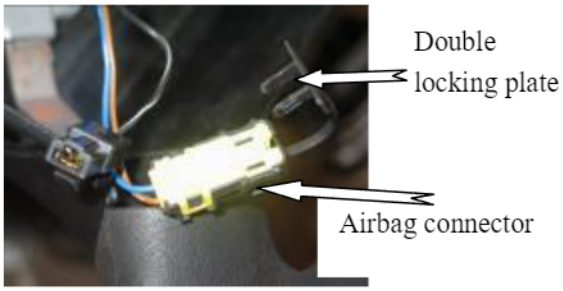
## 7. WIRING AND CONNECTOR

The wirings of SRS system are all installed in a yellow corrugated conduit, and the connectors are all normal yellow. If by any accident, the wiring has been loosened or the connector damage, they must be repaired or replaced according to related instruction.

## 8. SRS CONNECTOR

The connectors of SRS system are all yellow in order to be identified from other connectors.

The connectors of SRS system are facilitated with special functions and specific designed features to ensure high reliability. These terminals are using durable gold-plated terminals. The double locking plate locks the electronic connection terminal mechanism, which can prevent the terminal from sliding out. As shown in the figure:






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**NOTES ON SAFETY OPERATION**

During the maintenance, if the proper procedures are not followed, the airbag system may activate unexpectedly resulting in serious accident. The fault arising during the maintenance work may cause the inability of the activation of airbag when it is required to function. Therefore before carrying out any maintenance (including removing, installing, testing or changing for the components), the maintaining personnel must read all the instructions below carefully, and carry out the maintenance according to the following proper procedures specified by the maintenance manual.

(1) Sometimes the malfunction of SRS (supplementary protective system) is difficult to ascertain, therefore the malfunction codes become the most important information resource of troubleshooting. When diagnosing the supplementary protective system, check the malfunction codes firstly at all time, and then disconnect the battery.

(2) The maintenance work must be carried out at least 5 minutes after turning the ignition switch to "LOCK" position and disconnecting the battery negative cable, because the supplementary protective system has its own backup power supply.

(3) Even if the SRS is not activated after a slight collision, the airbag assembly and the airbag sensor assembly must be inspected also.

(4) Do not use the SRS components from other vehicle. Only new components are allowed for replacement if necessary.

(5) Do not repair the steering wheel airbag assembly and the airbag sensor assembly for the purpose of reusing.

(6) Do not allow the steering wheel liner to shake, or come close to some magnets. Do not allow the steering wheel liner and the airbag sensor assembly to expose in the hot air or flame directly.

(7) If the steering wheel liner and the airbag sensor assembly have already been dropped down, or there are cracks, dents or other defects on the housing, support or connectors, they should be replaced with new ones. If there is any liquid such as grease, detergent, engine oil or water on the steering wheel liner, clean it with a dry cloth immediately.

(8) Store the steering wheel liner in a flat and stable place, and face the top side upwards after the removal. Never place anything on top of it.

(9) The airbag must be disposed firstly when discarding the vehicle or the steering wheel liner.

(10) The inflating device in the steering wheel liner will become very hot after the airbag is spread. Discard it only after it has been naturally cooled down.

(11) High resistance (at least 10kΩ/V) type volt-ohm meter should be used for diagnosing the malfunctions in the electrical circuit.

(12) The "notes" indicated on the tag at the peripheral of SRS components must be strictly



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followed.

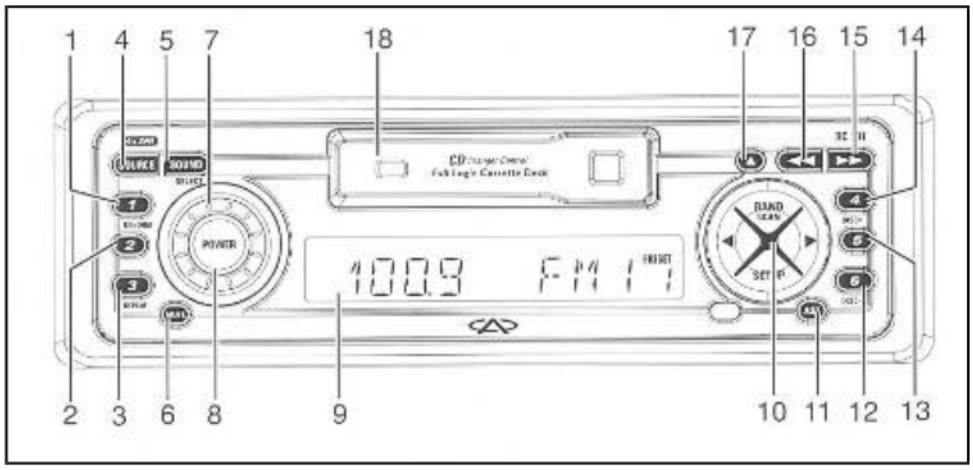
(13) After finishing the maintenance work for the supplementary protective system, the status of SRS warning lamp should be inspected.



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# SOUND SYSTEM

## VDO INTERFACE FUNCTION




1. Preset key 1

   RANDOM Start/stop of CD

2. Preset key 2

3. Preset key 3

   REPEAT CD player repeat start/stop

4. SOURCE Sound source

5. SOUND Short press: sound effect mode

   Long press: sound setup mode

6. MUTE

7. Volume adjustment

8. POWER: Power switch

9. Display

15. Fast forward

17. Tape eject

Short press: Tape reverse

Long press: Tape eject

10. BAND

    Radio frequency scan/ CD songs list scan

    High end/low end search (radio)

    Forward/backward songs list (CD)

    Music searching system

    SETUP Enter setup mode

11. AST Auto storage

12. Preset button 6

    DISC- Select forward

13. Preset button 5

14. Preset button 5

    DISC+ Backward selection

16. Fast backward

18. Tape exit



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## OPERATION INSTRUCTION

### Tape playing

1. Press POWER button to switch on the power, and rotate to the right to increase the volume.

2. Face the tape open side to the right. Push it into the cassette door No.18 to lock position, and the player begins to work. At this moment, the display No.9 shows the tape is playing.

3. If there is already a tape in the cassette player, press the SOURCE button selecting the tape as the source, and start to play the tape.

4. The tape will automatically reverse and continuously to play when it comes to the end, or you can press button No.17 to manually reverse it.

5. In order to quickly select the song that you want, press fast forward button ⑦ or fast backward button ⑥ for quick play forward or backward, and then press another fast backward button or fast forward button slightly, the tape will enter into the play mode.

6. If you want to stop the play or change the tape, press the tape eject button No.17, the tape will eject from the cassette player.

### Radio

1. Power switch, volume control, tone adjustment and playback mode.

2. Press BAND button to select the desired band. The display No.9 will show the band to receive. You can select the one of following bands as you wish: FM1, FM2, FM3, FM AST, MW (AM) AST, MW (AM) 2, and MW (AM) 1.

Note: You can cancel the MW (AM) band if you do not want to listen to it.

If you do not want to listen to the excessively preset FM or MW (AM) stations, you can cancel some of them correspondingly.

3. Manual and automatic tuning (selecting stations):

(1) If you want to enter manual tuning mode, please press the SETUP button to enter into the set mode and select "TUN" item, after that set it in "MAN" Mode. The radio will maintain the manual tuning mode.

(2) Press the tuning button ◄ continuously to tune to the lower frequency end station, or press the tuning button ◄ to the high frequency end station.

(3) Press the button continuously ◄ or ◄ for more than 0.5 second, the player will complete its automatic tuning till the broadcasting station is received. Repeat step〈1〉or〈2〉, you will receive the broadcasting program that you want.

4. Automatic scanning:

If you press the SCAN button for 2 seconds, you can initiate the start/stop automatic scan function of the player. The player will automatically scan the stations from low to high end



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starting from the initial frequency point. When one station is locked in, the player will pause the scanning. The frequency of the station will flash for 10 seconds while broadcasting the program of the tuned station. After that it will continue to scan the higher frequency end till it reaches the highest end and return automatically. It will then scan from the lowest to the higher end again.

If you want to listen to any program of a particular station, you just need to press the SCAN button when the frequency of the station is flashing, the scanning will stop at the position of the station immediately. If you press the SCAN button again, it will go back to the automatic scanning mode.

**Memory of the station frequency**

You can store up to 6 station frequencies in advance with 1 to 6 preset buttons under each mode of FM1, FM2, FM3 and AM.

1. Manual storing

When you want to use automatic searching mode to search for a particular station, press anyone of the 1-6 preset buttons for more than 2 seconds, and after hearing the voice from strong to weak and from weak to strong again, it means that this station frequency has been stored in the preset button that you have pressed.

When storing the stations of FM, the related RDS information and AF mode (on/off) are also been stored together.

2. Automatic storing

You can automatically store 6 strongest FM stations in the FM AST band or 6 stations in the MW（AM）AST band.

Press button AST to enter into the automatic storing mode, the player will make a voice of "hua", and then becomes mute.

After storing, you will hear the voice of "hua" again, and you start to listen to the station of the preset button 1.

**CD player**

1. This player can be connected to VDO CD player, -CDC 401 A or CDC 601 A or CDC 603 A or CDC1001 A.
2. Press button SOURCE selecting CD player as voice source.
3. Press button DISC+ or DISC- to select the disc you want. After finishing one disc, the player will automatically turn to the next one to continue playing. If the empty disc is encountered, it will skip automatically.

4. Press button ◄ or ◄ to select the song that you want, and start to play from the selected song.



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## OTHER FUNCTIONS

### Sound setting

1. Press the SOUND button for at least 2 seconds to enter into the SOUND setting mode.
2. Press the SOUND button to select the desired sound effect mode.

   -BASS (bass, under the BASS-TREB mode)

   -TREBLE (treble, under the BASS-TREB mode)

   -BALANCE: The left and right volume balancing

   -FADER: Front and back speaker control

   -LOUDNESS (off, bass, mediant, treble, under the BASS-TREB mode)
3. The sound effect mode which could be selected by rotating the volume button. After 5 seconds, the display will return to the last operation mode automatically.

### Sound effect setting

Short press the SOUND button to select a sound effect preset by the manufacturer.

-BASS-TREB: You may set the bass or treble of the player by yourself.

-JAZZ: Jazz music

-VOCAL: Voice

-POP: Pop music

-CLASSIC: Classic music

-ROCK: Rock and roll

### Clock setting (manual)

1. Short press the SETUP button to enter into the SETUP menu.
2. Press button ◄ turning to the “TIME” item.
3. Press the SETUP button to select the “12H” or “24H”.
4. Press button ◄ to select the hour position.
5. Press the SETUP button to adjust the hour position.
6. Press button ◄ to select the minute position, and the minute position will start to flash.
7. Press the SETUP button to adjust the minute. The time will start from the setting time.
8. Press the SETUP button for at least 2 seconds to exit the SETUP menu.

   - If the clock mode has been activated, the display will show the time after operating any button for 10 seconds.



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## REMOVAL/INSTALLATION OF SOUND SYSTEM

The sound system includes sound source, speaker and antenna. The sound source includes recorder assembly, optional CD player assembly and VCD player assembly. The CD player assembly and VCD player assembly includes the host, power signal line and disks exchanger.

### 1. INSTALLATION OF THE RECORDER ASSEMBLY

- Disconnect the negative grid of the battery.
- Install the hardware frame into the sub-instrument frame, and using a flat screwdriver to open the top, bottom, left and right locking plates of the frame;
- Connect the power supply wire, control wires, signal and antenna wires at the back portion properly;
- Push the playing machine into the mounting frame evenly with your thumbs and forefingers resting on the left and right of the control panel, till you hear the sound of the locking plates from both sides of the player.

### 2. INSTALLATION OF ANTENNA

- Disconnect the negative grid of the battery.
- Install the antenna on the installation hole and align it with the vehicle body;
- Fasten it with washers and non-standard nuts, and connect the conducting wires properly;
- Place the front end of the antenna wiring harness until it reaches the rear of the recorder, and plug the rear end of the antenna wiring harness into the socket of the antenna;
- Bind the antenna wiring harness along the interior left-hand wiring harness.

### 3. INATALLATION OF FRONT SPEAKER

- Disconnect the negative grid of the battery.
- Connect the connectors of the wiring harness.
- Place the wiring connection of speaker into installation hole towards the left and fasten it by turning it towards the right side (note: the connection terminals must face the indoor after placing the speaker, so as to prevent the panel beating from short circuit. The speaker should face towards the driver seat);
- Align it at the correct direction and press the speaker cover into it.

### 4. INSTALLATION OF FRONT DOOR SPEAKER

- Connect the wiring harness properly, and place the speaker plugs upside down into the speaker mounting position of the door protection guard. After that, mount the speaker properly;
- Fasten 4 self-tapping screws;



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● Align it at the correct direction and press the speaker cover into it.

## 5. INSTALLATION OF CD EXCHANGER

● **Disconnect the negative grid of the battery.**

● Install the bracket of the CD exchanger onto the two sides of the exchanger with washers and screws.

● Fasten the base onto the flat surface of the trunk with the self-tapping screws.

● Ensure the wires between instrument panel and trunk are connected properly.

● Ensure the front of the CD box upwards, and install the CD exchanger vertically on the base bracket.

The installing steps are reverse to those for removal.



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## TROUBLESHOOTING

| Malfunction | Reasons/Troubleshooting |
|---|---|
| No power supply | Connection malfunction. Please check the connection. |
| The player fails to function and display. | Check the fuse (player and vehicle) and the connector. |
| The player functions but without sound or with poor sound effect. | Adjust the volume of the player.<br>Check the sound balancing function. |
| | Check the antenna and its connection. |
| The player fails to receive the signal of desired station. | Verify that the antenna is sufficiently spread out and the connection is proper.<br>Verify that the negative grid is grounded.<br>The signal of desired station is too poor. |
| Displaying "NO DISC" when searching disc | The disc is incorrectly placed. Insert the disc again correctly.<br>There is water vapor or dirt on the disc.<br>Remove the vapor or dirt away from the disc. |
| Noise, jumping of music | The disc is too dirty. Please clean it.<br>The disc is twisted or seriously damaged. Compare it with other discs.<br>If the disc is defective, please discard it. |
| Lack of treble sound or lose tracks when the tape is playing | Clean the magnetic head. |
| Tape is loosened. | Check and ensure that the loosened tape has been tightened properly before inserting it into the recorder again. |
| The disc ejects when it is inserted into the player. | The disc has been inserted incorrectly. Insert it correctly again. |

Note: The sound system in the maintenance manual may be different with the actual situation of the user. We request our staff of the service stations to notify the vehicle owners that there is a user's manual for sound system delivered together with all the instruction material of the vehicle. Thank you!



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