

2011

BENNI MINI SERVICE MANUAL

This service manual consists of BENNI MINI repair information



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Maintenance Manual of BENNI-MINI

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Instruction and Operation

About the Manual

Brief Introduction

The compiling format of this manual aims to satisfy the requirements of the maintenance skill men, and this manual provides the general instructions for completing the service and maintenance. The reliability of the work can be enhanced according to the maintenance specified in the manual.

Spare Parts Substitution

The maintenance fittings of Chang'an Automobile Company Limited are manufactured according to the original factory standard. Thus, when the maintenance service is performed, only the original maintenance fittings manufactured by Chang'an Automobile Company Limited can be used.

Special Tools

All the special tools required by the maintenance every time are provided in the Special Tool List before every procedure. Moreover, when necessary, illustrations are additionally provided for the identification of these special tools.

The special tools can be ordered from Chang'an Automobile Company Limited.

Important Safety Instruction

Suitable maintenance methods and correct maintenance procedures are vital for the operation reliability of all vehicles and the safety of the maintenance personnel.

This manual can not foresee all circumstances and provide the relevant warning and suggestions. Anyone who does not follow the instructions in this manual must identify that the selected maintenance method, tool and parts can not endanger the personnel safety and the automobile integrity.

Warning, Caution and Prompting in the Manual



Warning: used for indicating the possible personnel injury if the Manual is not observed.



Caution: used for indicating that the vehicle and the applied maintenance device can be damaged if the operation is not carried out according to the appropriate procedures.

Prompting: used for providing other information for the complete and satisfied maintenance service.

When reading this manual, you may encounter the signs of "Warning", "Cautious" and "Prompting".

The signs of "Warning", "Caution" and "Prompting" are provided at the beginning of each step.

How to Use the Manual

The descriptions in this manual are given in the form of sections, and the sections of the specific system are gathered in the relevant chapters.

Each chapter gives a brief description of a specific part of automobile. This manual is divided into five chapters: Overview, Chassis, Power Steering System, Electricity, Vehicle Body and Coating.

Page numbers of all the chapters and sections are provided in the first page of this manual. Each chapter includes the contents of Overview, Introduction and Operation and Maintenance Adjustment and Check.

If the parts need to be dismantled or disassembled according to instruction or sequence, the splitting procedures with the corresponding diagrammatic drawing and description are provided and are noted in sequence. (Please see Example.)

The left and right sides of vehicle are determined by looking forward from the driver seat position.

The left and right sides of the engine are determined by looking towards the front end belt of camshaft from the flywheel.

Inspection and Identification

This chapter comprises the Visual Inspection Table, Failure Phenomenon Table, other information table (such as Diagnosis Procedures) and Supplemental Testing Procedures and Technical Standards or Specific Testing Procedures which guides the mechanic how to perform.

Failure Phenomenon Table

This table is used for indicating the failure phenomenon, causes and diagnosis procedures under some certain circumstances.

Fixed Point Test

As for the electric failure, the causes of the failure should be gradually identified according to the logical procedures by referring to the Fixed Point Test Table. The Fixed Point Test Table comprises two columns: Inspection Items and Concrete Procedures/ Results/ Measures.

Many diagrams and icons (with or without titles) are shown in the column Inspection Items. The explanatory notes concerning the test procedures or the special handling measures are provided in the Concrete Procedures/ Results/ Measures.

The number marks are used for indicating the serial numbers of inspection items.

Component Testing

When some step is over complicated and therefore can not be arranged in the signal page fixed point test or a plurality of fixed point tests require to measure one identical component, the component testing should be performed.

Instruction and Operation

Illustration Indication

The testing diagram shows the required measurement or test in some certain testing procedure.

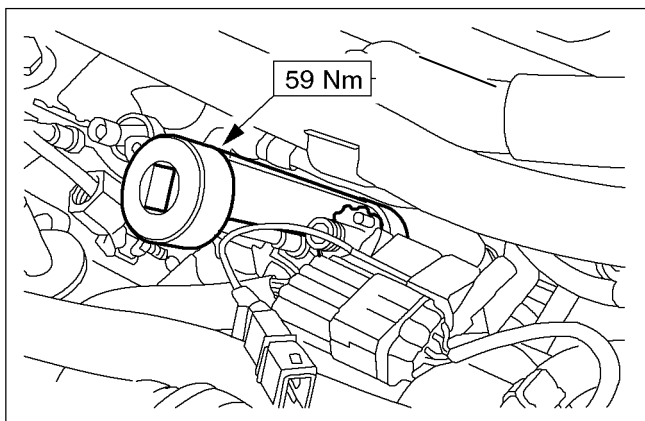
The typical test diagram is suitable for the use of a voltage gauge and an ampere meter.

When a signal diagram shows the multi-step test, the solid line draws the conducting wire until the multi-step measured conducting wire branch points, and the conducting wire of multi-step measuring points after the branch point should adopt the dotted line.

The double circle testing pin is used for indicating the disaster box type instrument. The testing pin should be labeled with pin number.

Examples

When the special tool is required, its figure and use method will be provided, or the tool number will be listed. The preset torque value will be given at the corresponding position in the procedures.



Instruction and Operation

Precautions of Health and of Safety Brief Introduction

Many operations in connection with the service and maintenance of the vehicle will threaten and endanger the human health. Plenty of dangerous operations and its relevant dangerous articles and equipment are listed below in the alphabetical (English) order. Please pay special attention to the following dangerous articles.

Listed contents are not always complete, therefore the safety and health should be always considered first during the practical operation.

Before the use of any product, the safety specification table of the material supplied by the manufacturer or the supplier of the products should be firstly consulted.

Acid and Alkali Metals

See Section Electrolyte.

Such as corrosive soda ash or sulfuric acid.

Electrolyte and cleaning material.

Irritable and corrosive substances to skins, eyes, noses, throats and clothes, inflammable articles and substances which can damage the normal protection clothes.

These substances should be avoided from splitting on skin, eyes and clothes. Suitable protective overall, gloves and glasses should be worn. Never inspire the acid fume.

Eye washing bottles, water taps and soaps are positioned nearby for the use at any time when unexpected accident happens.

Signs of Harmful to Eyes shall be placed.

Safety Air Bag

See Section Inflammable Chemical Substance.

Inflammable and Explosive Substance--observance of the non-smoking regulation.

The safety air bag is installed on the instrument panel before the steering wheel and passenger(s) for protecting the life safety of driver and passengers.

Highly explosive substance is contained in the safety air bag, and when the substance is ignited, gases of high temperature and high pressure (2500°C) will be generated.

The gas generating agent used for the air bag is sodium azide. The sodium azide is sealed in a module and can be fully released when the air bag is extended. Never try to open the air bag by yourself, or the sodium azide will be exploded. If

the gas generator is broken, the complete protective working clothes must be worn during the treatment.

After the air bag is normally extended, the protective gloves and glasses must be worn on site during the treatment.

The used safety air bag should be packed by using the plastic bags according to the local regulations strictly and then discarded at the designated disposal site for chemical waste.

If directly contact with the generated gas, please:

- Use water to thoroughly clean the site (affected area).
- Seek medical assistance if necessary.

Air Bag--operations which shall be performed

- Position the air bag vertically.
- Keep the air bag dry.
- The unsealed face shall be toward the human body when the air bag is carried.
- The sealed side of the air bag should be placed upwards.
- Carefully inspect whether the air bag is damaged.
- Stand at the side face when the air bag is connected.
- Identify that all the testing devices have been correctly calibrated and maintained.
- Clean both hands when the expanded air bag is carried away.

Air Bag--operations which shall be forbidden

- It is forbidden to place the inflammable substance or gas generator together with the air bag.
 - The storage temperature of gas generator can not be more than 80°C.
 - The air bag can not be inversed.
 - It is forbidden to open the housing of gas generator.
 - It is forbidden to place the gas generator near open fire or heat source.
 - It is forbidden to position any object on the air bag.
 - It is forbidden to use the damaged air bag.
 - It is forbidden to contact the air bag and the gas generator after they are burnt in ten minutes.
 - It is forbidden to use the electricity meter probe on the air bag circuit.
-

Description and Operation (Continued)

Air-conditioning Cooling Agent

See Section Chemical Substance.

Inflammable substance—observance of the non-smoking regulation

Frostbite can be caused when the cooling agent is contacted with skin.

The manufacturer's guidance must be strictly observed. The protective gloves and glasses can avoid the strong light exposure.

If the cooling agent is inadvertently contacted with skins or eyes, please wash with water immediately. The suitable cleaning agent should be used to wash if the cooling agent is split into the eyes, never rub your eyes. Seek medical assistance if necessary

Air-conditioning Cooling Agent—forbidden items

- It is forbidden to expose the air-conditioning cooling agent under sunshine or heat the air-conditioning cooling agent.
- When the cooling agent is filled, never position the filling bottle vertically, and the filling opening should be positioned downwards.
- Prevent the frostiness on the air-conditioning cooling agent bottle.
- Prevent the dropping of the air-conditioning cooling agent bottle.
- It is forbidden to vent the air-conditioning cooling agent under any circumstances.
- It is forbidden to use the cooling agent in a mixing way, such as fluorine R12 and R134a.

Sealing Agent and Adhesive Agent

See Chapter Inflammable Chemical Substance.

Inflammable Substance--observance of the non-smoking regulation.

In general, the sealing agent and the adhesive agent should be placed in the non-smoking area and must be preserved cleanly, for example, put the sealing agent and the adhesive agent on the storage rack covered by disposable paper towel, it is advisable that the sealing agent and the adhesive agent are taken out of the package boxes to position them separately; the package boxes include subpackage boxes on which corresponding labels should be applied.

For melting and sealing agents and adhesive agent, see Section Melting Agent

Follow the instruction book of the manufacturer.

Water Soluble Sealing Agent and Adhesive Agent

The water soluble viscose glue based on macromolecule emulsion and latex may contain small amount of volatile toxic substances and chemicals harmful for human body. Avoid making the substances contact with eyes and skins, please make sure good ventilation when the water soluble viscose glue is used.

Hot Melt Viscose

The solid hot melt viscose is safe. Under the molten state, the hot melt viscose can be burnt and will release harmful gases, therefore being harmful to health.

Wear suitable protective working overalls, use a constant temperature heater with self-deenergizing function, and enough air drafting equipments should be provided.

Resin Sealing Agent and Adhesive Agent, such as Epoxide and Formaldehyde Resin

The adhesive agent should be mixed in the places of good ventilation because harmful or toxic volatile substances will be released during mixing.

Dermatitis can be caused when the skin contacts with the tacky resin and hardening agent, some harmful and toxic chemical substances will be absorbed by skin.

The spatters can injure eyes.

Keep good ventilation and avoid contacting with skins and eyes.

Anaerobic Cyan Acrylate Adhesive and Acrylic Acid Adhesive

Most of the adhesive has irritation, causes the irritability or the damage to the skin and the respiratory tract. Some of them have strong irritation to eyes.

Avoid such substances contacting skin and eyes and follow the instruction book of the manufacturer.

Forbid the cyan acrylate adhesive to contact with skin and eyes. If contact for carelessness, please put the clean and wet cloth immediately

Description and Operation (Continued)

or go to hospital. Forbid to touch the wound position by hands. Select the places of well ventilation because the steam will stimulate eyes and nose.

Isocyanate (Polyurethane) Sealing Agent and Adhesive Agent

See Resin Adhesive.

Any person suffering asthma and other respiratory system diseases can not touch or close to such substances.

Excessively exposing such substances will stimulate eyes and the respiratory system. If the concentration is over high, the substances will stimulate the nervous system, and will make the person lose consciousness in the severe situation. Touching such substance for a long time will influence the good health.

Touching with the skin for a long time will stimulate skin, and will cause the dermatitis when the situation is severe. If entering into eyes, the eyes will be hurt.

Any sprinkling action must be performed in the places of well ventilation, and the steam and the sprinkled grains shall be far away from the respiratory area.

Wear the proper the gloves, the glasses and the respirator.

Anti-Freezing Fluid

See Section Combustibles and Melting Agent.

The anti-freezing fluid includes isopropanol, ethylene glycol and methanol.

High inflammable, inflammable and combustible.

Solutions used in the automobile cooling system and the water spraying system of wipers.

The anti-freezing fluid will generate the steam when being heated. Avoid inhale such gas.

The anti-freezing fluid or other harmful materials may enter into the human body through the skin. If the anti-freezing fluid is drunk for carelessness, it may cause the deadliness, and the person must go to hospital immediately.

Forbid to use any of such substances in the cooling or industrial water use system related to the food manufacturing or drinking system.

Electrolyte

Please see Section Acid and Alkali Metal simultaneously.

When the battery cell is charged, the released gas will cause explosion. Forbid to use the open fire or the mars when the battery cell is charged.

Ensure good ventilation.

Braking Fluid

Please see Section Fire Prevention.

If the braking fluid is splashed on skin and eyes, there will have slight stimulus. Possibly avoid the braking fluid touching skin and eyes. Because the steam pressure is lower, the harmful steam can not be inhaled at normal temperature.

Braze Welding

See Section Welding.

Chemical Substances

See the contents of the laws and regulations.

The chemical substance includes melting agent, sealing agent, adhesive, paint, resin foam, electrolyte, anti-freezing agent, braking fluid, fuel, oil and grease. Be careful when use and store the substance. They may be noxious, harmful, and has corrosive irritability and are inflammable and will cause generate some harmful gas and dust.

If the chemical substance is exposed for a long time, the human health will be influenced to different extents.

Chemical Substance--operations which shall be performed:

- The labels on the dangerous article vessel and the corresponding promotion information and instruction book shall be carefully read to obtain the relevant safety information. The safety and health data table of the substance can be obtained from the manufacturer.
- If being polluted by the chemical substance, the skin and clothes shall be cleaned in time. Replace the severely polluted clothes and clean them.
- The operation regulation shall be compiled, and wear the protective clothes to avoid the substance polluting skin and eyes, avoid inhaling the harmful gas, acid mist, dust and

Description and Operation (Continued)

smog, etc. and avoid the combustion and explosion caused by such substance.

- Clean hands immediately after touching the substance.
- The working area shall be kept clean and tidy without leakage.
- The chemical substance shall be managed and stored strictly in accordance to the national and local regulation.
- Avoid the children touching.

Chemical Substance--Forbidden Operations:

- Forbid to mix the chemical substance arbitrarily without following the manufacturer's guiding. Mixing some chemical substances will generate the harmful substance; the noxious and harmful gas will be released or the explosion occurs.
- Forbid to spray the chemical substance in the narrow space, such as in the automobile with persons, especially to spray the melting agent chemicals.
- Forbid to heat or burn the chemical substances arbitrarily without following the manufacturer's guide, some chemical substances are combustible, and some substance will release the noxious or harmful gas when burnt.
- Do not openly put the vessel, the gas emitted in the vessel will cause the poison to the human body or cause the explosion. Some gases lighter than air will accumulate in the small section.
- Do not transport the chemical substances with the vessel without being labeled.
- Forbid to wash hands or clothes with the chemical substances. The chemical substances, especially the melting agent and fuel will make the skin dry, and also stimulate the skin to catch dermatitis, or the hands or clothes will absorb some noxious and harmful gas through the skin.
- Forbid to store other articles with the empty tank which once used to store the chemical substance without the special treatment.
- Do not smell the chemical substance. The sudden gases of high concentration will cause the poisoning or cause the injury.

Clutch Oil

See Section Braking Fluid.

Corrosion Preventing Material

Please see Sections Melting Agent and Fire Prevention simultaneously.

Because the corrosion preventing material belongs to the inflammable substance, please follow the regulation of No Open Flames.

Because the substance has various types, please follow the instruction book of the manufacturer. The melting agent, the resin or the product oil may be contained in the substance. The substance shall be avoided touching skin and eyes. The substance can not be sprayed in the enclosed space and only can be sprayed in the conditions of well ventilation.

Cutting

Please see Section Welding.

Wax Removal

See Section Melting Agent And Fuel (Kerosene).

Dust

The dust may be poisonous and stimulate the human skin. Avoid inhaling the ash of the powder chemical substance or other ashes. Wear the respirator when the air is not smoothly circulated.

The extra fine dust of the inflammable material will cause the explosion. The explosive threshold and ignition source shall be avoided.

Electric Shock

Incorrectly using or using the electrical equipment with defects will cause the electric shock.

The electrical equipment shall be regularly detected and the equipment shall be ensured to be perfect. The equipment with defects shall have the clear label and be removed from the working area.

Ensure that the conducting wire, the cable, the plug and the socket have no abrasion, knotting, cutting, cracking or other damages.

Do not make the electrical equipment and the electric wire contact with water.

Ensure that the electrical equipment is protected by the fuse.

Correctly use the electrical equipment and do not use the device with problems, and violation of this operation will cause the fatal danger.

Description and Operation (Continued)

The electric wire of electric appliance shall be ensured not to be intercepted or damaged when the automobile is hoisted.

Ensure that the electrician be trained in first aid.

If electrically shocked:

- Cut off the power source before touching the electric shocker.
- If the power source can not be cut off, use the dry and non conducting materials to push away the sufferer or draw the sufferer away the power source.
- Perform the cardio-pulmonary resuscitation immediately.
- Seek the medical help.

Engine Oil

Please see Section Lubricating Oil and Grease.

Waste Gas

The waste gas includes the noxious, harmful and smothering chemical materials, such as carbon monoxide, nitrogen monoxide, acetaldehyde, aromatic hydrocarbon and lead containing gas, etc. The engine can only be started after the waste gas is discharged or in the places of air circulation.

Gasoline Engine

The gasoline engine has no symptom before generating the noxious and harmful gas. The harm of the noxious and harmful gas can be immediate and also can be latent.

Acoustic Insulation Fiber

See Section Dust.

The acoustic insulation fiber is used for insulating the sound and the noise.

The cellulose and the cutting scrap will cause the skin stimulation. This is often the physical effect but not the chemical reaction.

The working practice guide must be complied, and the gloves must be worn to avoid the substance contacting with the skin for a long time.

Fire Prevention

See Welding, Foam and Legal Affairs.

Most of the substances related to the automobile maintenance are the inflammable substances. The noxious or harmful gas can be released when some of them are burnt.

When the inflammable substances or the melting agents are stored or used, especially when welding or being close to the electrical equipment, the fire safety shall be strictly noted.

Before using the welding device or the heating device is used, ensure that there are no combustibles around, and place the extinguisher nearby.

First Aid

Besides meeting the legal requirements, the maintenance workshop must be equipped with the personnel who have been trained for first aid.

After any substance is sprayed in eyes, the eyes must be washed for at least ten minutes with clean water.

After polluted by the chemical substance, the skin shall be washed with water and the toilet soap.

Wash and cool with cold water immediately after burnt by some substances.

If inhale the dust, go to the places with fresh air immediately. If this method does not take effect, please send to the hospital immediately.

If drink some liquid for carelessness, please go to hospital immediately and say the name and composition of the liquid. Do not try to vomit unless there has special instruction on the label.

Foam - polyurethane

See Section Fire Prevention.

The foam is used for isolating the sound and the noise. There are also foams in the seat and the shock absorber.

Operate by strictly following the instruction book of the manufacturer.

The unreacted components have irritability and will cause damage to skin and eyes. Please wear gloves and the protective glasses.

The person suffering from the chronical respiratory system diseases, asthma and bronchitis or person

Description and Operation (Continued)

with allergic history is not allowed to operate in the unvulcanized material place or nearby.

Some components, steam or spray will have irritability and may have damage.

Do not inhale the steam and the spray. These substances must be used in the places of well ventilation and well take the measures of protecting the respiratory system. After spraying, do not take off the respirator until the spray is completely dispersed.

Burning the unslaked components and the slaking foam will generate the noxious and harmful gas. Forbid to smoke and use the open fire or the electric tool in treating the foam. Any operation for heating and cutting the foam must be performed in the places of air circulation. Please see Vehicle Body and Maintenance Manual.

Cooling Agent

Please see Air-Conditioning Cooling Agent.

Fuel

See Fire, Legal Affairs and Melting Agent.

Avoid the fuel contacting with the skin as best as one can. If touch for carelessness, wash with the clean water and the toilet soap.

Gasoline

Inflammable substance--the regulation on no smoking must be followed.

Swallowing the gasoline for carelessness will stimulate mouth and throat, if the gasoline is absorbed by the stomach, it will cause sleepiness and unconsciousness. A small quantity of gasoline will cause the death of the child. When the inhaled fluid reaches the lung, the severe damage will be caused.

Contacting the gasoline for a long time will make the person's skin dry and have the strong irritability. The gasoline entering in eyes will cause blindness.

A great amount of benzene is contained in the gasoline, inhaling the benzene will make person poison. The gasoline concentration must be very low, the excessively high concentration will stimulate person's eyes, nose and throat and make person vomit, dizziness and dyspnea chest discomfort, even make person lose consciousness.

The gasoline shall be transported or used in the places of air circulation. The damage to human respiratory system due to the gasoline leakage must be strictly avoided.

For the cleaning and maintenance of gasoline storage, there must have special preventive measures. The gasoline can not be used as the cleaning agent and also can not be siphoned with mouth.

Kerosene (Paraffin)

The kerosene can be taken as the heating fuel, the melting agent and the cleaning agent at the same time.

The kerosene belongs to the inflammable articles--the regulation on no smoking must be followed.

Swallowing the kerosene for carelessness will stimulate mouth and throat.

Contacting with such substance for a long time will make the person's skin dry and have the irritability. The kerosene sprayed in eyes will have the slight irritating sensation.

Generally, the harmful team can not be generated due to a small quantity of volatilization. The volatilization due to the high temperature shall be avoided (the acid mist will be generated in the dewaxing process). Avoid touching the skin and eyes as best as one can and ensure the air circulation.

High pressure cylinder

See Section Fire Prevention.

The oxygen, acetylene, argon and propane with air pressure of 138 bar (2000 pa) are generally contained in the high pressure cylinder. Be extremely careful when treating such high pressure gas bottle, the mechanical damage of the high pressure cylinder or the high pressure cylinder switch device shall be avoided. The gases in each high pressure cylinder shall be clearly marked.

The high pressure cylinder shall be stored in the places of well ventilation and avoid the rain and snow or direct solarization. The acetylene and propane gas bottles shall not be put near the oxygen bottle.

The leakage of the high pressure cylinder shall be strictly avoided and the fire sources shall be avoided.

Description and Operation (Continued)

Gas

See Section High Pressure Cylinder.

General Purpose Maintenance Tool / Device

All tools and devices shall be kept in the intact state, and the appropriate safe device shall be used if necessary.

The use of the maintenance tool / device does not exceed the designing scope. The maintenance device, such as the lifting device and the jack can not be overloaded for use. Because the damage to the device caused by the overload generally is not significant, the fatal damage may occur when being used for the next time.

Forbid to use the damaged or defective tool / device, especially the high speed running device, such as the grinding wheel. The damaged grinding wheel will be fragmented in the conditions without any signs and make person severely injured.

The eye protection tool shall be worn when the grinding wheel, the chisel or the sand blasting device is used.

The appropriate protective mask shall be worn when the sand blasting device, the substance containing asbestos or the mist spraying device is used.

Confirm that there are places of well ventilation to control the dust, acid mist and smoke.

High Pressure Air, Lubricating Oil and Oil Testing Device

See Section Lubricating Oil and Lubricating Grease.

Regularly check the high pressure device, especially the connector and keep the device good.

Forbid to face the high pressure pipe orifice, such as the diesel oil filling mouth to the human skin because the oil will penetrate the human subcutaneous tissue and cause the severe disease.

Legal Affairs

The material use and disposal in the maintenance workshop shall conform to the legal articles with regard to safety and health.

To create a safe working environment and avoid the environmental pollution, the personnel in the maintenance workshop must be familiar with the national legal articles with regard to safety and health.

Lubricating Oil and Lubricating Grease

Avoid touching the mineral oil for a long time. All the lubricating oil and lubricating grease have irritability to eyes and skin.

Used oil

Touching the mineral oil for a long time will make the person's skin dry and have the irritability to the person to catch dermatitis. In addition, if one uses the mineral oil containing the toxic and harmful substance, he will suffer from the skin cancer. The appropriate devices for protecting and cleaning skin must be provided.

Forbid to use the used oil as the lubricating oil or in any device which can contact with the skin.

Health Precautions:

- Avoid touching the oil, especially the engine oil for a long time.
- Wear the protective clothes, including the gloves.
- Please do not put the wiping cloth with oil stains in the pocket.
- Avoid the oil polluting the clothes.
- Please do not wear the clothes and shoes seriously stained with oil. The protective clothes shall be regularly cleaned.
- If injured for carelessness, perform the first aid immediately.
- Protect hands with the protective cream before working.
- Please wash with the toilet soap and the clear water.
- Forbid to wash the skin with gasoline, diesel oil, kerosene, diluents and melting agent.
- If the skin is abnormal, please go to hospital immediately.
- Please degrease the oil first if possible.
- If the oil will cause damage to eyes, wear the protective goggles.

Environmental Protection

The depleted engine oil only can be burnt in the approved places. If the places can not be confirmed, please confirm with the local authority.

The depleted engine oil must be treated by the approved waste disposal contractor or the waste oil

Description and Operation (Continued)

recycling dealer in the designated site. Consult with the local authority if have doubts.

Directly dumping the depleted engine oil to the ground, the sewer, the drainage ditch or the water sources is illegal.

Noise

The high noise generated by some operation may damage the hearing, and the ear defender shall be worn at this time.

Acoustic Insulation Material

See Section Foam, Insulation Fiber.

Coating

See Sections Oil and Chemical Substance at the same time.

The paint belongs to the inflammable substances, and the regulation on no smoking must be followed.

Monocomponent

Some toxic and harmful pigment, drying agent and other melting agent may be contained. The coating only can be performed in the places of well ventilation.

Multi-component

Some toxic and harmful and unreacted resin and resin firming agent may be contained. The manufacturer's guide must be followed, please see Section Resin Adhesive Agent.

The coating must be performed in the places of well ventilation and far away from the crowded. The operation personnel shall wear the protective respirator.

Pressure device

See Sections High Pressure Gas, Lubricating Oil and Oil Testing Device.

Solder

The solder is the polymetal mixture, and the melting point of the mixture is lower than the composed metal (generally the lead and tin). Generally, the harmful gases containing lead can

not be generated during the welding process. The oxygen bearing acetylene flame can not be used because the leady smog will be generated due to the high temperature of the oxygen bearing acetylene flame.

Some smog may be generated when the flame is sprayed on the surface with grease, and the smog is avoided inhaling.

Remove the surplus solder with extreme care, and ensure that the fine lead dust is not generated, for example, the lead dust will injure the human body when the human body inhales. The gas mask must be worn.

The leaking material and filings of solder must be collected uniformly and treated rapidly to avoid air being polluted by the lead.

Avoid uptaking the lead or inhaling the dust of solder.

Solvent

Refer to Sections Chemical Materials, Fuels and Fire Prevention.

The common solvent includes: propanone, petroleum solvent oil, methylbenzene, dimethyl benzene, chloroform and the like.

Use the clean dewaxed substance, paint, plastics, resin and diluting agent. Some substances are inflammable articles. The long-term contact with the substances will make the skin dry and have irritability. Some toxical and harmful substances will be absorbed through skin.

If carelessly splashed into the eyes by accident, it will have strong irritability and even lead to blindness.

The steam or smog produced by the solvent of high concentration which is exposed in the air will irritate eyes and throats of people, and make people dizzy and headachy. People will lose consciousness when the circumstances are serious.

The steam or smog produced by the solvent of low concentration which is exposed excessively in the air for a long term will produce severe poison because it is without obvious symptom.

In order to prevent the substances from spattering onto the eyes, skins and clothing, the protective work clothes, the protective gloves and the protective glasses should be worn.

When using the substances, ensure that the ventilation conditions of the field are good, try to prevent the inhalation of the smog, steam and spray, and keep the container sealed. It is prohibited to use in the narrow space.

Description and Operation (Continued)

When spraying the substances with the solvent, such as oil paint, adhesive agent, ensure that the ventilation conditions of the field are good, if the air ventilation is poor, use the gas mask.

The heating and combustion operation are performed only under the manufacturer's special guide.

Suspended Load



Warning: it is prohibited to piece together the hoisting device temporarily.

When the heavy article is raised or suspended, there is dangerous. Never operate under the objects without being supported, suspended or raised, such as the suspended engine.

Ensure the equipment such as the hoisting devices of hoisting jack, lifter, axle stand and assist strap to be intact, and regularly inspect them.

Sealing on Vehicle Base

Refer to the Section Corrosion Preventing Material.

Welding

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

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

Resistance Welding

The spot welding will release plentiful high speed melting metal grains, so pay attention to protect skins and eyes.

Arc Welding

During the arc welding, there has a great amount of ultraviolet radiation, and the ultraviolet radiation will damage the skins and eyes of the operators and the nearby staff. The gas shielded welding is extremely dangerous, so the personal protective clothes should be wore, and the protective screen should be used to protect other people.

The contact glasses wearer is suggested to wear the normal glasses when using the arc welding. The arc light will release microwave which will make the space between the cornea and the glasses of the contact glasses wearer dry, even lead to blindness.

There will be metal splashing during the use of the arc welding, so the correct protection measures for the eye and the skin should be taken.

When the welding core or its protective layer is polluted, the heat quantity of welding arc light will enable the metal melting pond to produce smog and gases during the welding, the gases may have poison, thus avoiding inhaling the gases. The toxic gases within working area must be eliminated, especially when the air circulation is poor and the large quantity of welding is known in advance. The oxygen mask should be worn while welding is performed under the special cases or in the small section.

Gas Welding (Gas Cutting)

The oxuacetylene furnace will be used for cutting during welding and cutting, be cautious to the leakage of the gases, and carelessness will lead to combustion and explosion.

When the gas welding is adopted, the metal splashes will be produced, thus the proper protective measures for the skins and the eyes must be taken.

The welding flame is much glared, so the eyes must be protected. As the ultraviolet light produced by the gas welding is less than that produced by the arc welding, the protective glasses can be used.

When the gas welding is adopted, some harmful gases may be produced, but the harmful gases are produced by the welding coating, especially the cutting damaged parts. Avoid inhaling the gases.

During the braze welding, the metal in the braze welding bars will produce harmful gases, and it is extremely dangerous if the braze welding bars have cadmium. Be extremely cautious to avoid inhaling the harmful gases when the circumstances happen, and ask for help from specialists.

The special preventive measures should be taken before any welding or cutting in the automobile with inflammable materials (such as the fuel which is volatilized or boiled away from the oil tank).

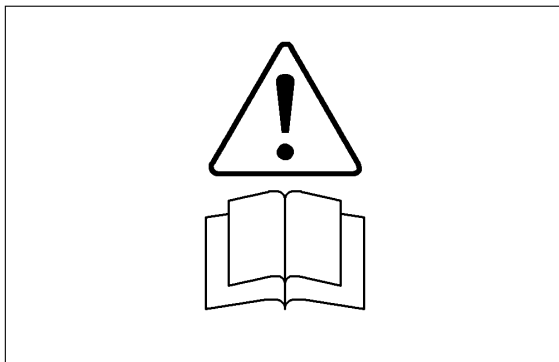
Warning Signs on Vehicle

The warning signs will be seen on the various automobile components.

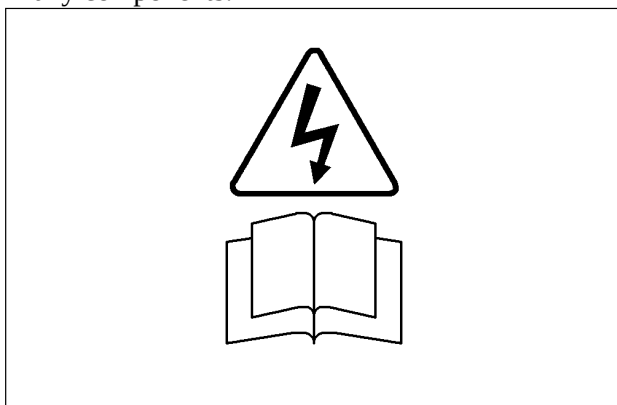
It is prohibited to move these signs. The owner of the vehicle or the maintenance staff should pay attention to the warning signs.

The marks of most commonly seen warnings are as follows and are attached with notes.

Description and Operation (Continued)



1. The above figure shows that the relevant parts of the special instruction manual should be referred while contacting or trying to adjust and maintain any components.



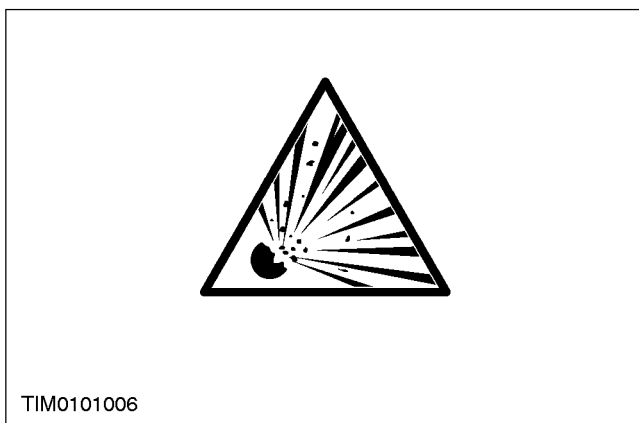
2. The above figure indicates that the internal high voltage should be watched out. It is prohibited to touch the engine or ignition device which is running. Refer to the Section Electric Shock.



3. This mark shows that the corrosive materials in the components should be watched out. Please refer to Section Acid and Alkali Metals.



4. The mark shows that there are inflammable and explosive fluids or steam nearby. It is prohibited to use open fire. Refer to Section Fire Prevention.



5. The mark (usually connected with the above 5 warning signs) shows that there are objects which will explode nearby.



6. The mark shows that kids are not allowed to enter the place without management.

Petroleum Solvent Oil

Refer to the Section Solvent.

Instruction and Operation

Standard Workshop Operating Manual

Automobile in Maintenance Workshop

When the automobile in the maintenance workshop is maintained, the following items shall be ensured:

- Apply parking brake or fix the wheel in order to avoid the automobile moving forward and backward.
- Take off the ignition key during the front operation of the automobile.
- If the automobile engine will be started, ensure that the field ventilation is good, or exhaust the waste gas with the waste gas centralized exhausting pipe.
- Enough space should be needed to hoist the automobile for replacing the tyres if necessary.
- The fender flap pad should be provided during the maintenance in the engine compartment.
- Firstly cut off the power source of battery when the engine is maintained or the maintenance or automobile hoisting is performed at the vehicle base.

 **Warning:** firstly cut off the generator wiring harness when the arc welding of the automobile are performed in order to avoid possible and excessively strong current which may damage the generator internal components.

If the welding device is used in the automobile, the extinguisher should be placed nearby.

Traction Automobile

 **Warnings:** During the traction process of the automobile, the ignition switch of automobile must at the position II. (Open the steering lock and start the indicating lamp), and thus the steering lamp, the loudspeaker and the brake lamp can operate normally; otherwise, the personal injury can be caused.

Notes: The movable towing hook is provided with a left rotating thread, and the left rotating thread must be screwed completely before the traction automobile. When the traction automobile is required, the traction hook shall be adopted. The hook must be fastened firmly through the traction rope, and the traction rope must be connected on the other automobile, to avoid the vehicle body entangled with the rope.

When the automatic speed-changing automobile is dragged, the gear position must be at the N position. The pulling speed of the automatic speed-changing automobile can not exceed 50 km/h or the trailer car distance can not exceed 50 km. If the distance of the traction automobile must be ultra-long, the driving wheels must lift off completely.

The automobile can be transported through the trailer car with the low boarding or the traction automobile.

Connect the auxiliary battery through the jumper wire

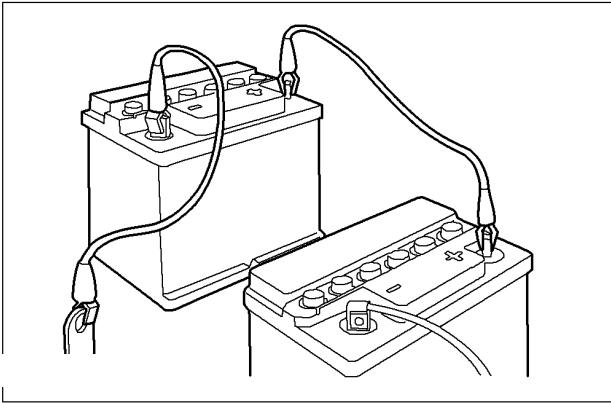
Warnings: If the auxiliary battery has been charged and processed with gas, during connecting with the jumper wire, the upper ventilator of the plug or the wet clothing cover shall be adopted, thus the explosive hazard caused by the ignition of the electrical arc is reduced during connecting with the jumper wire. If the operation is not achieved according to the procedures, the personal injury can be caused.

 **Warnings:** The battery can be discharged due to the current short circuit, and if the electric discharge phenomenon exists, the energized circuit still exists in the automobile after the normal circuit is cut off. When the jumper wire is connected, the casing of the battery can be distorted.

 **Warnings:** When the vehicle is not required to jump and start, it can be considered as the only feasible method to start the vehicle if necessary. On this condition, the discharged battery must be charged immediately again after jumping and starting, to avoid the permanent damage.

- Check whether the jumper wire can bear load, and use the heavy-load conducting wire.
- Ensure that the auxiliary battery shall have the identical voltage with the vehicle battery. Two batteries must be connected.
- Before the jumper wire is connected, check whether the circuit of available switch control is cut off. Thus, when the final connection is performed, the danger of electrical arc generated can be reduced.

Instruction and Operation (Continued)



⚠ Warnings: When the conducting wire is connected onto the battery, check whether the terminals of jumper wire are not contacted mutually or connected with the ground through the vehicle body. If the battery charged completely can charge by over 1000 A current and generate strong electrical arc during the short circuit through the jumper wire. The fast heating of jumper wire and binding post even can make the battery explode. If the operator does not conform to the rules, the personal injury can be caused.

Connect the jumper wire according to the following sequence:

- Firstly connect the anode of the auxiliary battery, and then connect the anode of the automobile battery.
- Connect the cathode of the auxiliary battery, and then the other end is connected at the ground terminal at least 12 inches (300 mm) away from the automobile battery terminal, such as on the engine hoisting ear.

Before the jumper wire is disconnected, the engine speed shall be reduced.

Before the jumper wire is removed from the automobile of the battery without being fully charged, open the air heater or the wind blower of the rear bumper glass, to reduce the high voltage generated during disconnecting the jumper wire.

Disconnect the jumper wire according to the sequence opposite to the connection and the short circuit can be avoided by all means at the rear end of the jumper wire.

The electric quantity of battery can be restored by the engine, because if the engine is used to charge, the engine must work continuously for over 8 hours when the battery is without any other loads.

Component Cleaning

In order to avoid dirtying the entry, the dirt accumulation, grease, the decomposing component or the assembly shall be eliminated before disconnecting the jumper wire.

During the reassembly, the components shall be cleaned carefully and then checked and assembled.

Cleaning Method:

- Dry cleaning
- Eliminate accumulated dirt with the soft brush.
- Raze dirt with the sheet metal or the batten.
- Wipe with the cleaning cloth.

⚠ Warnings: The water content of compressed air is high sometimes, so pay more attention when the compressed air is particularly used in the hydraulic system.

- Clean dirt with the compressed air. (When being in this method, a pair of protective glasses shall be worn.)
- Clean dry dust with the cleaner. The method is usually used to clean dust of the friction disc.
- Steam cleaning method.

⚠ Warnings: Most of melting agents are harmful for the human body, thus the processing shall be performed cautiously. See “Safety and Health Precautions” and Safety Protection Instructions of the Manufacturer. If the operation is performed without conforming to the specification, the injury will be brought for the human body.

There is abundant melting agent suitable for cleaning the components. Some components are listed such as the braking hydraulic pressure element, the electric assembly, etc, and the cleaning is performed with the electric assembly. Please see “Melting Agent, Sealing Agent and Adhesive Agent” and relevant manuals.

Calibration of the important measuring equipment

⚠ Warnings: If the operation is performed without conforming to the following suggestion, the personal injury or the damage of the components can be caused.

Some important equipment are important properly, such as the torque spanner, the universal meter, the waste gas analyzer and the check line, etc, and the equipment must be calibrated regularly according to the guiding of the manufacturer.

Instruction and Operation (Continued)

Melting Agent, Sealing agent, Sealing Agent, Adhesive Agent and Adhesive Agent

Brief Introduction

 **Warnings:** The operator shall be cautious fairly when all the melting agents, the sealing agent and the adhesive agent are adopted. Some chemicals or volatile gas spray are harmful to the human health. Please follow the manufacturer's instructions strictly, and strictly prohibit to use any material with question of safety!

 **Warnings:** If the applicability of any melting agent or sealing agent for the special purpose is with question, please contact with the manufacturer for the storage, processing and operating of the material.

“Safety and Health Precautions” introduces some generally used chemicals and dangerous articles and the operation method and the corresponding safety measures shall be taken section by section.

Instruction and Operation

Road Test or Rolling Testing Platform Test

In many cases, the road test or rolling testing platform test is required to for the automobile. The detailed instructions of checking procedures before relevant test are illustrated as follows, from the engine starting and stopping, the check before driving, the check during the test to the final check after testing.

After only when the tests of all performances are completed, the road test of the automobile can be performed. However, the selective testing is performed for the checked items in connection with the system.

Check before Testing



Warnings: If the pressure of the braking system is lower, the stroke of the braking pedal is too large or the leakage exists in the hydraulic system, the road test is prohibited. After the problems are found and rectified, the road test can be performed.

It is suggested that before the road test is performed, the test be performed at first before the inspection. The functional test is performed for those influencing the automobile safety driving system/circuit, such as the brake, the vehicle lamp and steering, etc.

- The fluid level of engine oil.
- The fluid level of engine coolant.
- Check whether the tyre air pressure is qualified, the mode and the pattern are applicable and the abrasion limitation is exceeded.
- Check whether the sufficient fuel used for road testing exists in the fuel tank.
- Check whether the oil leakage (the engine oil, hydraulic oil and fuel) and water leakage exist around the engine and the transmission gear and at the bottom of the vehicle. Write down the possible leakage positions and the vicinal area is wiped cleanly, and thus the leaking degree can be easily checked after the test is finished.

Start the engine

Notes: Within the time of the initial starting of the cold engine or the initial 1.5 km, before the automobile driving speed reaches 25 km/h, the accelerator pedal does not exceed half of the stroke. Do not operate the engine at the high speed during the refrigerator car, or the accelerator pedal is stepped to the last.

Close the ignition system and Check:

- Apply the parking braking.
- Check whether the transmission lever is at the neutral position
- Check whether the pointers of all the instruments (except the fuel gauge) point to Zero.

Turn on the ignition switch and confirm:

- Confirm whether the indicating lamp of the ignition switch is bright.
- Confirm whether the engine temperature pointer has the correct reading.
- Confirm whether the reading of the fuel pointer conforms to the fluid level of the fuel tank.
- Display the manual brake caution lamp and the fluid level caution lamp.
- **During the Road Test or the Rolling Testing Platform, inspect:**



Warnings: During the road test, the braking system shall be checked when the driving speed of the automobile is slow. If the brake derivation or other problems exist, please find out the problems and modify them, and before the problems are solved, prohibit the vehicle to be started.

- Step on the clutch pedal easily.
- The low gear meshing and the clutch connection are stable.
- The manual brake operation is flexible, and the releasing of the manual brake is rapid and thorough.

Instruction and Operation

If the running is steady during loosening the clutch, the automobile will not skid or tremble.

- The transmission shift is steady, thus the abnormal noise or the vibration does not occur in the gear box.
- The output power of the engine is normal, the production output is normal, the acceleration is steady, the accelerator pedal operation is flexible and the engine idle-speed is restored to the normal state.
- The no excessive or abnormal smog is discharged from the engine in the normal driving, over loading or over driving.
- The steering operation includes whether the power steering is normal, steady and accurate, and whether the steering wheel is too heavy or too light and the direction of the automobile waggles. The steering wheel returns to the original position after turning.
- The pointer reading of the odometer, the caution lamp with oil pressure, the coolant temperature pointer and the tachometer are correct or they work normally.
- The switch and the controlling system work normally, the caution lamp (indicating lamp) works normally and the engine extinguishes automatically after the steering wheel returns to the original position.
- The heating and ventilation system works normally.
- The braking system works normally.

Instruction and Operation

Braking Test



Warnings: During checking the brake, the smog released by hot braking can be avoided. See Safety and Health Precautions.

Avoid the check of the brake on the road with many vehicles, as that may cause inconvenience or danger for others.



Warnings: The braking test including the heavy-trodden braking shall be not performed on new brake shoe plate/brake disc or the friction disc/brake drum, unless the components have been worn in, because the new braking friction components can not perform the complete functions before being worn in.

Slightly step or heavily step on the braking pedal under the condition of various vehicle speeds of normal operation at each gear position, so as to check the brake.

Slide the vehicle and pay attention to the tendency of vehicle derivation or the phenomenon of viscous braking.

After the vehicle (stop of non-emergency braking) is stopped, check the braking temperature carefully. If the brake disc is extremely hot or the brake disc is hotter than other brake discs, it is indicated that the phenomenon of viscous braking exists.

After the test is finished, check:

- Check whether the leakage of engine oil, coolant, hydraulic pressure, air and fuel exists.
- The abnormal high temperature of any rotating components or assemblies, such as wheel hubs, speed change gear, axle, etc. may show excessively tight assembly or deficient lubrication.

Chapter 100-01 **Lifting**

Vehicle applied: Changan • Benni MINI

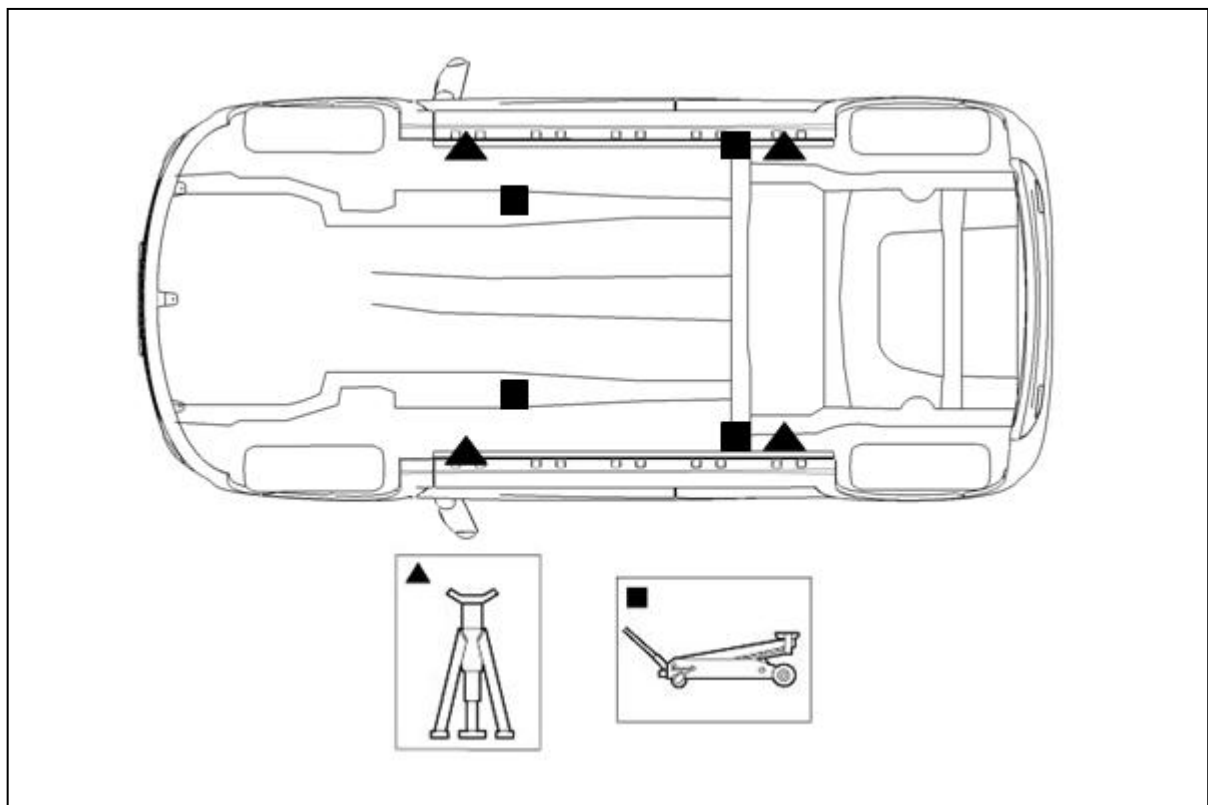
Contents	Page
Description and operation	
Support.....	100-01-2
Lifting.....	100-01-3

Description and operation

Support

 **Warning:** Be sure that the vehicle is parked on the hard ground. If the vehicle is on soft ground, things should be put under the jack in order to detract power. Be sure to put blocks in front of the wheel diagonally opposite direction. Failure to follow these instructions may cause personal injury.

When the jack is needed during the maintenance of vehicles, the comprehensive understanding of the following guidelines is essential. Must confirm the right support and the support points should usually on an open area between the front and rear wheels. When using the jack, the application of a protective liner is necessary to prove the paint from being damaged.

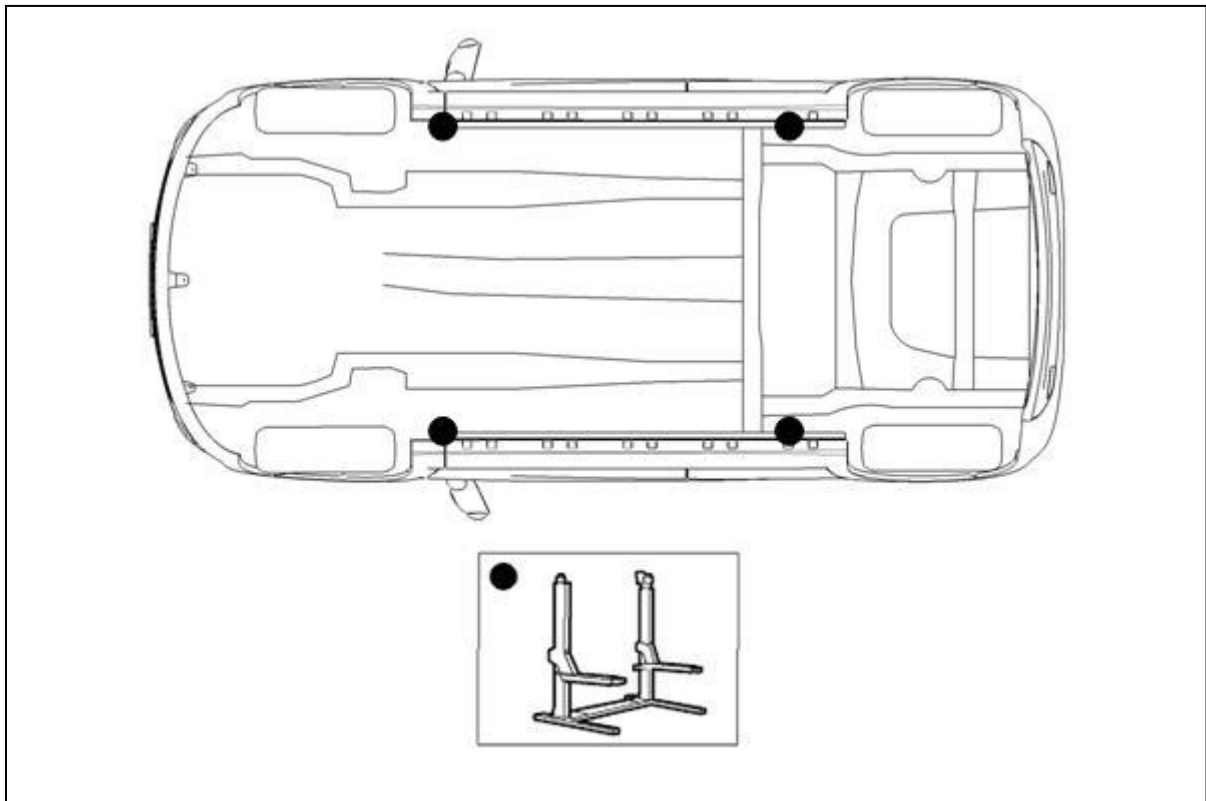


Description and operation

Lifting

Note: When using the two-column lift to lift vehicle, pads must be used at the location

Use the correct lifting and support position is very important



Section 201-00 Suspension System - General

Applicable Vehicle Model: Benni Mini

Contents	Pages
Specification	
Specification	201-00-2
Instruction and Operation	
Suspension System	201-00-2
Inspection and Confirmation	201-00-4
Failure Table	201-00-6
Fixed Point Inspection	201-00-9
Common Procedures	
Toe-in Adjustment	201-00-21
Inspection of the Wheel Bearing	201-00-219

Specification

Front Wheel Alignment (Kerb Mass) - Kingpin Caster Angle and Camber Angle

Model	Kingpin Caster Angle	Kingpin Caster Angle	Camber Angle	Camber Angle
Vehicle Model	Standard Value	Tolerance Scope	Standard Value	Tolerance Scope
	2.8° or 2°48'	2.3° to 3.3° or 2°06' to 4°06'	0.5° or 0°30'	0° to 1°

Front Wheel Alignment (Kerb Mass) - Total Toe-in

Vehicle Model	Tolerance Scope	Adjust If Necessary
	0° to 0.34°	0.17°±0.17°
	0°00' to 0°20'	0°10' ±0°10'
	0 mm to 6.2mm	3.1mm±3.1 mm

Rear Wheel Alignment (Kerb Mass) - Camber Angle

Vehicle Model	Standard Value	Tolerance Scope
4 doors	0°	-0°33' to 0.33° or -0.20° to 20°

Maximum variation value – Right and left - Camber angle 1°15' (1.25°)

Rear Wheel Alignment (Kerb Mass) - Total Toe-in

Vehicle Model	Standard Value	Tolerance Scope
4 doors	0.33°	-0°33' (positive toe-in) to 0°33' (negative toe-in)
4 doors	0°	-0.20° to 0.20°
4 doors	0mm	-6.2mm (positive toe-in) to 6.2 mm (negative toe-in)

Torque Specification

Specification	Nm	lb-ft	lb-in
Locking nuts of the tie rod	43		-
Wheel nuts	65		-

Suspension System



Warning: Before and after the inspection, make sure the tyre air pressure is accurate.

Excessive wear of the tyre, sunken tyre or unbalanced tyre can result in automobile vibration, shaking or steady running.

Uneven or fluctuant road can also result in the above-mentioned circumstances. If such circumstances occur when the automobile is on this type of road, please try different types of road to confirm the cause.

When finding the cause of automobile vibration, do not immediately doubt the tyre, for the following circumstances can also lead to automobile vibration:

Diagnosis and Test (Continued)

- Loosened or worn front wheel bearings.
- Loosened or worn suspension or steering components.
- Excessive run-out of the front brake disc.
- Loosened engine or driving axle bracket.
- Engine accessories.

This section covers vibration related to suspension, tyre, etc.

Excessive automobile noise is generally the noise generated through friction between the abraded position of the tyre and the ground. The sound of varoom made by the tyre is different from that made by the driving axle, since the sound of the latter can vary with different load or speed. However, the tyre noise remains the same within a certain speed scope.

In order to confirm that noise generated from tyres is not related to automobile vibration, tyres can be excessively aerated to inspect whether the abnormal sound of tyres is variable. The bumpy degree of the automobile and noise can change with the tyre air pressure.

Inspect vibration of other types. See Section 100-01 for relevant information.

Diagnosis and Test (Continued)

Inspection and Confirmation

Vibration diagnosis procedures usually begin with road test. The road test and the interview with clients (if possible) can provide a great deal of information for confirming failure cause.

During the road test, the automobile should be running on a smooth road without slopes. If obvious fluttering occurs, please record the following contents:

- The speed when the automobile flutters.
- The type of automobile vibration occurring within a certain speed scope.
- The impact on vibration when the engine torque, the automobile speed and the engine rotating speed change.
- The type of vibration sensitivity - torque sensitivity, automobile speed sensitivity or sensitivity of the engine rotating speed.

If the road test shows that the automobile vibration is related to the automobile tyre, please use tyre wear status table to inspect the failure cause at a fixed point. If the road test indicates that abnormal sound of the tyre occurs but the automobile is vibrationless; abnormal sound of the tyre is caused by contact of the tyre and the ground.

Utilize the following contents to find out the vibration cause:

Torque Sensitivity

This indicates that noise can be weakened or increasingly vibrate with speedup, slowdown, skidding or keeping uniform speed of the vehicle.

Automobile Speed Sensitivity

This indicates that automobile speed sensitivity always occurs within a fixed vehicle speed scope, and cannot be affected by the automobile torque, the engine rotating speed or the transmission case.

Sensitivity of the Engine Rotating Speed

This indicates that fluttering can be caused when different gears of the transmission case are chosen, the engine rotating speed is constant, and the automobile is at different speeds. Fluttering can also be caused by speeding up or slowing down when the transmission case of the automobile is at the position of neutral gear or the four wheels hang up and the neutral gear is put

into. If the situation is related to the engine rotating speed, the vibration cause has nothing to do with tyres.

Ball Head of the Tie Rod

Note: Before the inspection or positioning of the front suspension, inspect the ball head of the tie rod for abrasion at first.

1. Inspect air pressure of four tyres.
2. Hoist the automobile. See Section 100-02 for relevant information. Inspect whether the ball head and the bracket of the front suspension are loose, abraded or damaged. See the section of Ball Head of the Lower Cross Arm for relevant information. Tighten all the loose nuts according to torque specifications. When parts are required to be replaced, see Section 201-01.
3. Inspect whether connection between the steering mechanism and the tie rod is loose. Tighten them according to the torque specifications. If the ball head of the tie rod is abraded or broken, replace it. See Section 211-02 for relevant information.
4. Disassemble the front tyres. Inspect run-out amount of the tyre and single-edge abrasion. Perform dynamic balancing of the tyre.
5. Inspect the suspension device and the working situation of the accessories. See the section of Inspection of the Suspension Assembly. Jamming of the suspension assembly would cause that the automobile cannot achieve the normal position, and thereby would impact on front wheel alignment.

Inspection of the Ball Head of the Lower Cross Arm

1. Hoist the automobile. See Section 100-01 for relevant information.
2. Tightly grip the outer end of the lower cross arm, and try to move vertically to observe if there is movement. Free movement is generally followed by the sound of click, which shows that the ball head of the lower cross arm has been damaged.
3. If free movement occurs, replace the ball head. See Section 201-01 for relevant information.
4. After the ball head is replaced, front wheel alignment shall be performed. See the section of Common Procedures for relevant information.

Inspection of the Suspension Device

All the automobiles are equipped with low pressure gas-hydraulic suspension devices which can not be adjusted or refilled.

Diagnosis and Test (Continued)

1. Oil leakage. A layer of oil film is allowed to be (exuded) attached on front and rear shock absorbing devices, which is normal. Oil penetration refers to a situation that a layer of thick oil film accumulates outside the shock absorbing housing, and generally is easy to be noted owing to a mass of absorbed dust. The phenomenon of oil penetration during shock absorption is a manifestation of the normal function of the automobile, thus the shock absorber is not required to be replaced. Leaking phenomenon refers to a situation that the suspension of the whole shock absorbing device is covered with the leaked oil, and simultaneously the oil fluid can drop off onto the ground from the suspension.

If case of such circumstances:

- Check that the observed oil film is just from the shock absorbing device.
 - If worn or damaged, the shock absorbing device should be replaced.
2. Decline of the vehicle body: The problem of automobile decline is solved commonly through replacing front and rear damping springs, because the designed shock absorbing device belongs to a hydraulic type damping device. Unlike a suspension spring, the designed shock absorbing device can not be used for loading and bearing weight. Therefore, the problem of automobile decline cannot be solved through the method of replacing the suspension device.
 3. Note: When a suspension device is damaged, pair replacement is not needed.

Replace a pair of new shock absorber. In the past, we would recommend that if a shock absorber is damaged, a pair of shock absorber can be replaced. Now that new technology and enhancing management are adopted during manufacture and the sealing technology is improved, the working reliability of the shock absorber is remarkably improved.

Automobile Inspection

1. Inspect air pressure of all tyres.
2. Inspect tyres to confirm positioning of the ball head of the tie rod, dynamic balancing of the tyre and whether tyres are cracked or abnormally bulged.
3. Inspect optional suspension equipment of the automobile, such as suspension of the heavy-duty towing trailer. The suspension is firmer than the standard suspension in the running process.
4. Inspect whether the automobile is overloaded or not. Inspect whether the luggage carrier contains heavy object.
5. After the above procedures are finished, perform road test to confirm the failure mentioned by clients.

Inspection through Automobile Hoisting

1. Noise: Loosening of the suspension or accessories of the suspension assembly would cause noise. Inspect and tighten the suspension assembly and the accessories thereof. If the lining sleeve of the lower bracket is damaged, replace it. Inspect whether front and rear suspension assemblies are externally damaged or not.
2. Bottom / rebound: Inspect the travel for the rubber shock absorbing sleeve. If damaged or lost, install a new shock absorbing sleeve. Inspect whether the shock absorbing sleeve is overloaded or not. If the shock absorbing sleeve is overloaded, replace it.
3. If abrasion of the shock absorber is found, only the damaged shock absorber is to be replaced.

Working Rack Test

The inner part of the shock absorber is fully filled with compressed gas, and the shock absorber should be completely stretched when there is not limit. If the shock absorber is found not to be completely stretched, this means that it has been damaged. Replace a new shock absorber. Inspect the total length of the shock absorbing device, if the shock absorbing device does not meet the requirements of the total length, which means that a certain part among parts does not meet the requirements, replace the shock absorbing device.

When the suspension device is at the vertical position, compress the suspension assembly and allow it to stretch three times, through which the intake gas through the pressure chamber in the treatment process is cleared.

Diagnosis and Test (Continued)

Warning: When disassembling the dust shield / limit block, over pushdown of the pushing rod of the shock absorber should be avoided in the compression process, so as not to cause damage of internal components.

The shock absorber should be vertically placed on a vice. Use a possibly-quick large travel compression shock absorber. The compression motion of each time must be steady and consistent. The phenomenon that extending resistance is greater than compression resistance is normal.

The following situations are abnormal:

- If lagging or skipping occurs during return after the shock absorber is installed in place and in the installation process.
- Locked.
- Apart from the slight sound of swish, noise, such as the sound of click occurring during quick return.
- Leakage.
- The pushing rod of the shock absorber is completely stretched, and the piston rod of the shock absorber swings corresponding to the housing of the shock absorber.

If the shock absorber is still unstable after air purification, please replace a new shock absorber. See Section 201-01 (Front Shock Absorbing Devices) and Section 201-02 (Rear Shock Absorber).

Rear Shock Absorber

Conduct the following inspections periodically to the rear shock absorber:

1. Inspect whether the rear shock absorber has oil leakage. (A layer of oil film is allowed, provided that the leakage is not from other positions).
2. Inspect the working state of the rear shock absorber.
3. Inspect the working state of the upper and the lower axle linings.

Diagnosis and Testing

Failure Table

Phenomena	Possible Reasons	Measures
• Swing / Derivation / Excursion	• Excessive difference of the kingpin caster angle or camber angle of the left and right wheels	• Perform tyre positioning. See the section of Common Procedures for relevant information.
	• Toe-in value exceeds the regulated scope.	• Perform tyre positioning. See the section of Common Procedures for relevant information.
	• Abnormal automobile running height (Front or rear, high or low)	• Inspect overload, loosened shock absorbing spring or non-standard spring.
	• The steering mechanism or the ball head of the tie rod is abraded.	• Inspect the steering system. See Section 204-00 for relevant information.
	• Tyres are abraded or defective.	• Inspect the tyres. See Section 201-03 for relevant information.
• Heavy steering	• Excessive kingpin caster angle	• Perform tyre positioning. See the section of Common Procedures for relevant information.
	• Incorrect vehicle height (Front or rear, high or low)	• Inspect overload, loosened shock absorbing spring or non-standard spring.
	• The steering mechanism or the ball head of the tie rod is abraded.	• Inspect the steering system. See Section 204-00 for relevant information.
	• The ball head of the lower cross arm is abraded.	• See the section of Maintenance Procedures for relevant information.
	• Tyres are abraded or unblanced	• Inspect tyres. See Section 201-03 for relevant information.
	• Lacking power steering force	• Inspect the steering system. See Section 204-01 for relevant information.
• Braking lagging	• Different tyre pressure	• Fill gas into tyres at the precise pressure. See Section 201-04 for relevant information.
	• Braking system failure	• Check the brake. See Section 203-00 for relevant information.
• Automobile Fluttering	• Unbalance and excessive wear of the tyres	• Check the tyres. See Section 201-03 for relevant information.
	• Abrasion of the driving axle of the front wheels	• Check the driving axle of the front wheels. See Section 202-01 for relevant information.
	• Abrasion of the steering system	• Check the steering system. See Section 204-00 for relevant information.

Diagnosis and Testing (Continued)

	•Loosening and abrasion of the suspension device assembly	•Check the suspension device assembly. See this section for relevant information.
	•Loosening of the bracket for the suspension device assembly	•Fasten according to the torque requirements. See Sections 201-01 (former) and 201-02 (latter) for relevant information.
	• Abrasion of the ball head of the lower cross arm	• Replace the ball head of the front lower cross arm. See Section 201-01 for relevant information.
	•Abrasion and loosening of the bush of the lower cross arm of the front suspension	•Replace the axle bushing of the lower cross arm of the front suspension. See Section 201-01 for relevant information.
	•Abrasion of the axle bushing of the direction stabilizing rod (if equipped)	•Replace the axle bushing or connecting rod of the direction stabilizing rod. See sections 201-01 (former) and 201-02 (latter) for relevant information.
	•Abrasion or loosening of the rear suspension and the axle bushing	•Replace the rear suspension and the axle bushing if necessary. (Section 201-02)
	•Abrasion of the wheel bearing	•Replace the wheel bearing. See Sections 203-01 (former) and 203-02 (latter) for relevant information.
•Derivation	•Damage of the rear suspension	•Repair or replace the parts of the rear suspension if necessary. See Section 201-02 for relevant information.
	•The kingpin caster angle is not in the regulated scope.	•Perform tyre positioning. See this section for relevant information.
Impact Derivation	•Loosening or abrasion of the installation supporting frame and the bearings of the steering mechanism	• Repair or replace the installation bracket and the axle bushing if necessary. See Section 204-02 for relevant information.
	•Loosening and abrasion of the front suspension assembly	•Repair or replace the front suspension assembly if necessary. See Section 201-01 for relevant information.
•Noise of the Front and Rear Suspension	•Loosening or abrasion of the suspension assembly bracket	•Repair or replace the bracket if necessary. See Sections 201-01 (former) and 201-02 (latter) for relevant information.
	•Abrasion of the wheel bearing	• Check the wheel bearing. See Sections 203-01 (former) and 203-02 (latter) for relevant information.

Diagnosis and Testing (Continued)

• Swaying of the Vehicle Body	• Abrasion of the connecting rod or bearing of the front direction stabilizing rod (if equipped)	• Replace the connecting rod or axle bushing of the front direction stabilizing rod. See Section 201-01 for relevant information.
	• Loosening or abrasion of the lower cross arm of the front suspension	• Repair or replace the axle bushing of the lower cross arm of the front suspension. See Section 201-01 for relevant information.
	• Loosening or abrasion of the suspension assembly	• Check the suspension assembly. See Sections 201-01 (former) and 201-02 (latter) for relevant information.
• Incline of the Vehicle Body	• Softening or damage of the front or rear damping springs	• Check the shock absorbing springs. See Sections 201-01 (former) and 201-02 (latter) for relevant information.
	• Inappropriate tyre air pressure	• Adjust the tyre air pressure.
• Poor Running Comfort	• Softening of the front or rear damping springs	• Check the shock absorbing springs. See Sections 201-01 (former) and 201-02 (latter) for relevant information.
	• Abrasion of the front or rear suspension assembly	• Check the suspension assembly. See Sections 201-01 (former) and 201-02 (latter) for relevant information.
• Unsteady Direction	• Unbalance and damage or excessive run-out amount of the tyres	• Check the tyres. See Section 201-03 for relevant information.
	• The front toe-in value is out of the regulated scope.	• Perform the wheel alignment. See this section for relevant information.
	• Abrasion of the steering system	• Check the steering system. See Section 204-00 for relevant information.
	• Damage of the ball head of the lower cross arm of the front suspension	• Replace the ball head of the lower cross arm of the front suspension. See Section 201-01 for relevant information.
	• Softening of the front or rear damping springs	• Check the shock absorbing springs. See sections 201-01 (former) and 201-02 (latter) for relevant information.
	• Abrasion of the front or rear suspension assembly	• Check the suspension assembly. See sections 201-01 (former) and 201-02 (latter) for relevant information.

Diagnosis and Testing (Continued)

	• Loosening and abrasion of the rear suspension, axle bushing or bolts.	• Check the rear suspension. See Section 201-02 for relevant information.
	• Abrasion of the axle bushing or connecting rod of the direction stabilizing rod	• Replace the axle bushing or connecting rod of the direction stabilizing rod. See Section 201-01 for relevant information.
• Abnormal Return of the Steering Wheel	• Abnormal wheel alignment	• Perform the wheel alignment. See this section for relevant information.
	• Abrasion of the steering system	• Check the steering system. See Section 204-00 for relevant information.
	• Abrasion of the ball head of the lower cross arm of the front suspension	• Replace the ball head of the lower cross arm of the front suspension. See Section 201-01 for relevant information.
• The Derivation to One Side of the Steering Wheel	• Unbalance and damage or excessive run-out amount of the tyres	• Check the tyres. See Section 201-03 for relevant information.
	• Abrasion of the braking system	• Check the braking system. See Section 203-00 for relevant information.
	• Abrasion of the steering system	• Check the steering system. See Section 204-00 for relevant information.
	• Incorrect wheel alignment	• Perform the wheel alignment. See this section for relevant information.
	• Damage or jamming of the ball head of the lower cross arm of the front suspension.	• Replace the ball head of the lower cross arm of the front suspension. See Section 201-01 for relevant information.
	• Softening of the front shock absorbing spring	• Check the front shock absorbing spring. See Section 201-01 for relevant information.
	• Damage or loosening of the axle bushing of the lower cross arm of the front suspension	• Repair or replace the axle bushing of the lower cross arm of the front suspension. See Section 201-01 for relevant information.
• Abnormal Noise of the Suspension System	• Damage or jamming of the ball head of the lower cross arm of the front suspension.	• Replace the ball head of the lower cross arm of the front suspension. See Section 201-01 for relevant information.
	• The loosening and abrasion of the front direction stabilizing rod (if equipped)	• Repair or replace the direction stabilizing rod. See Section 201-01 for relevant information.

Diagnosis and Testing (Continued)

	• Loosening of the front or rear suspension components	• Repair or replace the suspension components. See Section 201-01 for relevant information.
	• Loosening or abrasion of the axle bushing of the lower cross arm of the front suspension	• Repair or replace the axle bushing of the lower cross arm of the front suspension. See Section 201-01 for relevant information.
	• Loosening or abrasion of the suspension assembly	• Check the suspension assembly. See sections 201-01 (former) and 201-02 (latter) for relevant information.

Fixed Point Inspection

Fixed Point Inspection A: Left and Right Derivation

Phenomena	Concrete Procedures/Results/Measures
A1: Check the left and right derivation	
 Warning: In order to avoid the bodily injuries caused by uncontrolled operation, inspection shall be carried out by two operators to maintain safe driving status. The appropriate control to the steering wheel shall be maintained. Failing to comply with these instructions may cause bodily injuries.	
Notes: Following conditions must be met when automobiles are evaluated.	
	1 Check the tyre air pressure - Drive the automobile at the speed of 88 km/h (55 mph) on smooth road. - Confirm that there is no crosswind or gale when driving - Run back and forth for two times. - If the trace of the automobile deviates 12 feet within 7 seconds, the automobile deviates. • Does the automobile deviate? . Yes Switch to A2 . No Switch to fixed point inspection B.
A2: Check the steering connection rod	
	1 Hoist the automobile. See Section 100-01 for relevant information. - Check whether the steering connection rod is excessively worn. • Is the steering connection rod excessively worn? . Yes Replace or repair the damaged component. Test and operate the system to determine whether it is in the normal condition. . No Switch to A3
A3: Check the wheel alignment	
	1 Check the wheel alignment

Diagnosis and Testing (Continued)

Phenomena	Concrete Procedures/Results/Measures
	• Is the steering wheel in central position and the wheel alignment data in regulated scope? . Yes Switch to A4 . No Perform the wheel alignment if necessary. Test and operate the system to determine whether it is in the normal condition.
A4: Check the tyres	
	1 Check the excessive wear of the tyres • Are the tyres excessively worn? . Yes Replace the tyres. Test and operate the system to determine whether it is in the normal condition. . No Switch to A5
A5: Rotate wheels	
	1 Hoist the automobile. See Section 100-01 for relevant information. - Rotate wheels in a cross way. • Does the automobile deviate? . Yes Check the abrasion of the suspension parts. Replace or repair the damaged parts if necessary. See Section 201-01 for relevant information. Test and operate the system to determine whether it is in the normal condition. . No Replace the tyres. Test and operate the system to determine whether it is in the normal condition.

Fixed Point Inspection B: the steering wheel deviates from the central position

Phenomena	Concrete Procedures/Results/Measures
B1: Check the steering components	
	1 Hoist the automobile. See Section 100-01 for relevant information. - Check whether the steering components are excessively worn. • Are the steering components excessively worn? . Yes Replace or repair the abraded components. See Section 204-00 for relevant information. . No Switch to B2
B2: Check the wheel alignment	
	1 Check the wheel alignment. • Is the steering wheel in the central position and the wheel alignment data in regulated scope? . Yes

Diagnosis and Testing (Continued)

Phenomena	Concrete Procedures/Results/Measures
	Switch to fixed point inspection C. . No Perform the Wheel alignment if necessary. Test and operate the system to determine whether it is in the normal condition.

Fixed Point Inspection C: Abnormal Running Trace

Phenomena	Concrete Procedures/Results/Measures
C1: Check the kingpin caster angle	
	1 Check the kingpin caster angle. • Is the kingpin caster angle in regulated scope? . Yes Switch to C2 . No Check the wear of the suspension components. Replace or repair the abraded components if necessary. See Sections 201-01 (former) and 201-02 (latter) for relevant information. Test and operate the system to determine whether it is in the normal condition.
C2: Check the rear suspension	
	1 Measure the distance between the left and right wheels of the automobile - Compare the measured value • Are the data the same? . Yes Switch to fixed point inspection D. . No Check the wear of the rear suspension parts. Replace or repair the abraded components if necessary. See Section 201-02 for relevant information. Test and operate the system to determine whether it is in the normal condition.

Fixed Point Inspection D: Poor Running Comfort

Phenomenon	Concrete Procedures/Results/Measures
D1: Check the suspension assembly	
	1 Check the tyre air pressure. - Automobile hoisting. See Section 100-01 for relevant information. - Check the leaked or damaged suspension components. • Are the suspension components leaked or damaged? . Yes Replace the suspension components if necessary. See Sections 201-01 (former) and 201-02 (latter) for relevant information. Test and operate the system to determine whether it is in the normal condition. . No

Diagnosis and Testing (Continued)

Phenomenon	Concrete Procedures/Results/Measures
	Confirm the failures described by the customer.

Fixed Point Inspection E: Excessive Noises

Phenomena	Concrete Procedures/Results/Measures
E1: Check the suspension	
	1 Hoist the automobile . See Section 100-01 for relevant information. - Check the installation bolts of the suspension components • Are the bolts loose or broken? Yes Tightly fix or change the bolts. See sections 201-01 (former) and 201-02 (latter) for relevant information. Test and operate the system to see whether it is in normal condition. No Switch to E2

E2: Check shock absorbing spring	
	1 Check if the shock absorbing spring is damaged. • Is the shock absorbing spring damaged? Yes Replace the shock absorbing spring. See Section 201-01 (former) and Section 201-02 (latter) for relevant information. Test and run the system to determine if it is normal. No Switch to E3

E3: Check the lower cross arm of the front suspension	
	1 Check excessive wear or damage of the axle bushing of the lower cross arm of the front suspension. • Is the bush of the lower cross arm of the front suspension abraded? Yes Replace the axle bushing of the lower cross arm of the front suspension. See Section 201-01 for relevant information. Test and run the system to determine if it is normal. No Switch to E4

E4: Check the ball head	
	1 Hoist the automobile. See Section 100-01 for relevant information. - Firmly hold the outer end of the lower cross arm of the front suspension and move up and down, in order to check if there has free movement. Note that the free movement is not allowed.

Diagnosis and Testing (Continued)

	Does there have free movement? Yes Replace the ball head. See Section 201-01 for relevant information. Test and run the system to determine if it works normally. No Switch to E5
E5: Check the front wheel bearings	
	1 Check the front wheel bearings - Hold the bottom and top of wheel and sway forcefully. Check if bearings excessively loosen. - Rotate the front wheel, and check the working status. - Does bearing loosen or have sound? Yes If necessary, replace the front wheel bearings. See Section 203-02 for relevant information. Test and run the system to determine if it is normal. No Switch to E6
E6: Check the tyre	
	1 Check the wear unevenness of the tyre. Is tyre wear uneven? Yes Replace the tyre. Perform wheel alignment. Test and run the system to determine if it is normal. No Confirm the failure customer described.

Diagnosis and Testing (Continued)**Fixed Point Inspection F: Check Tyre Wire**

Phenomena	Concrete Procedures/Results/Measures
F1: Check tyres	
	1 Hoist the automobile. See Section 100-02 for relevant information. - Check the unbalanced abrasion of inner edge and outer edge abrasion of the tyre or sawtooth abrasion. Does tyre have unbalanced abrasion? Yes Replace the excessively abraded tyre. Check wheel alignment. Test and run the system to determine if it is normal. No Switch to F2
F2: Check sunken tyres	
	1 Check the sunken tyres. • Is tyre sunken? Yes Replace the tyre. The tyre is dynamically balanced See Section 201-03 for relevant information. Test and run the system to determine if it is normal. No Confirm the failure customer described.

Diagnosis and Testing (Continued)

Fixed Point Inspection G: Vibration

Phenomena	Concrete Procedures/Results/Measures
G1: Check the tyre	
	1 Hoist the automobile. See Section 100-02 for relevant information. - Check the damage or excessive wear of the tyre. Is the tyre damaged or excessively worn? Yes Replace tyre. Test and run the system to determine if it is normal. No Switch to G2
G2: Check front wheel bearings	
	1 Check the front wheel bearings. - Hold the bottom and top of wheel and sway forcefully. Check if bearings excessively loosen. - Rotate the front wheels. Check the working status of the front wheels. Do bearings loosen or have sound? Yes Switch to G3 No Switch to G4
G3: Measure the axial clearance of the front wheel bearing	
	1 Disassemble the wheels, the brake calipers and the brake disc. - Install the dial gauge with the installing bracket, and ensure it to abut against wheel hub of the front wheel. - Axially push and pull the wheel hub, and check the axial clearance of the wheel hub and the front wheel bearing. • Is axial clearance of the front wheel bearing in the specification value? Yes

Diagnosis and Testing (Continued)

Phenomena	Concrete Procedures/Results/Measures
	See component test part in this Section. Check the ball head. Switch to G4 No If necessary, replace the wheel hub and bearings assembly. Test and run the system to determine if it is normal.
G4: Check the rear wheel bearing	
	1 Check the rear wheel bearing. - Hold the bottom and top of the wheel and sway forcefully. Check if bearings excessively loosen. - Rotate the rear wheel. Check working status of the rear wheel. Does bearing loosen or have sound? Yes Switch to G5 No Switch to G6
G5: Measure the axial clearance of the rear wheel bearing	
	1 Disassemble the rear wheel - Install the dial gauge with the installing bracket, and ensure it to abut against the rear brake drum. - Axially push and pull the wheel hub, and check the axial clearance of the rear wheel bearing. Is axial clearance maintained in the specification value? Yes Switch to G6 No If necessary, replace the rear wheel bearing. See Section 201-02 for relevant information. Test and run the system to determine if it is normal.
G6: Check the wheel/tyre run-out value in the automobile	
	1 Use the radial run-out table and measure radial run-out of the wheel and the tyre in the automobile, and the transverse and radial run-out amount of the assembly is smaller than 1.14 mm. • The measured value is in regulated scope. Yes Switch to G12 No Switch to G7

Diagnosis and Testing (Continued)

G7: Measure the wheel/tyre run-out value under the automobile	
	1 Measure the wheel that the radial run-out or the transverse run-out exceeds 1.14 mm. The positions of the tyre bolts and the relevant bolt holes should be marked before the wheel is disassembled so that the wheel can be installed at the original position. Disassemble the wheel and install the wheel on the tyre balancing apparatus, and measure the run-out value. The radial and transverse run-out of the wheel and tyre assembly must be less than 1.14 mm. • The measured value is in the regulated scope. Yes. Switch to G7 No Switch to G8
G8: Match the installation position	
	1 Mark the highest run-out positions of the tyre and the wheel. Blow off the air in the tyre and rotate the tyre by 180 degrees. Aerate the tyre and measure the run-out value of the tyre. • Are the run-out positions of the wheel and the tyre coincident? Yes Perform dynamic balancing of the tyre. Reinstall the tyre on the automobile. Test and run the system to determine whether it is normal. No If the highest points during the two tests are beyond 101.6 mm, replace the tyre. If the highest points are within 101.6 mm, switch to G9.
G9: Measure wheel run-out	
	1 Dismount the tyre casing of the wheel, and install the wheel on the tyre balancing machine. Measure the run-out of the inner and outer edges of the wheel. The radial and transverse run-out should be less than 1.14 mm. • Is the run-out normal? Yes Find and mark the lowest point of the run-out of the wheel. Install the tyre, to be matched with the highest point of the run-out of the wheel. Balance the tyre. Test and run the system to determine whether it is normal. No

Diagnosis and Testing (Continued)

	Replace the tyre. Check the run-out of the new wheel. If the new wheel is in the regulated scope, search and mark the lowest point of the wheel run-out. Install the wheels, to make the highest point of the wheel run-out coordinate with the lowest point of the wheel run-out. Make them balanced. Test and run the system to determine if it is normal.
G10: Radial run-out of the rear wheel hub and the wheel bolts	
	1 Measure the run-out of the flange surface of the wheel hub (larger than 0.254 mm) and the circumferential run-out of the wheel bolt (larger than 0.08 mm) • Is the measured value in the normal range? Yes Switch to G11 No Replace the rear wheel hub. See Section 204-2 for relevant information. Test and run the system to determine if it is normal.
G11: Circumferential run-out of the front wheel hubs and the tyre bolts	
	1 Dismount the front wheels. - Dismount the brake disc. - Measure the circumferential radial run-out of the tyre bolts (larger than 0.06mm) • Is measured value in the normal scope? Yes Check the run-out of the brake disc. See Section 203-00 for relevant information. Test and run the system to determine if it is normal. No Replace the wheel hub. See Section 201-01 for relevant information. Test and run the system to determine if it is normal.
G12: Wheel balancing	
	1 Perform the wheel balancing. Perform the road test. • Can automobile vibration be felt? Yes See Section 100-04 for relevant information. No Confirm the failure customer described.

GENERAL PROCEDURES

Toe-in adjustment (14 117 0)

General Tool

Wheel Alignment Ruler

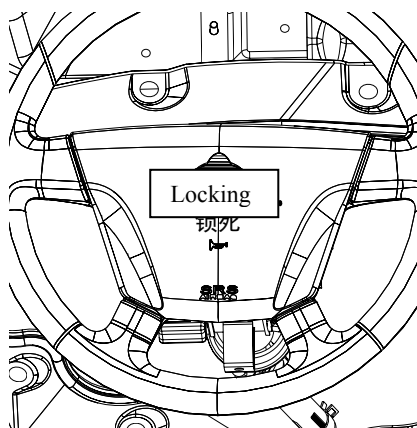
Inspection

1. Operate toe-in adjustment with a wheel alignment ruler on a flat ground according to the instruction.

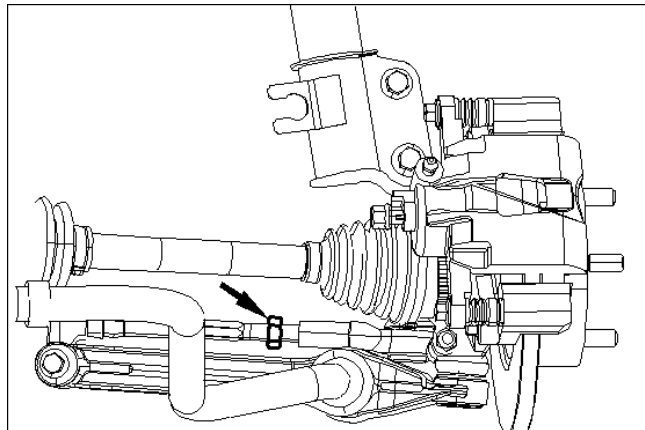
- Check suspension and steering components, to confirm that there is no wear.
- Check and adjust the tyre air pressure if necessary.
- Ensure that the automobile is in the kerb mass. The standby tyre, the lifting jack and the driver's tool are all in the right place. Get out other tools or goods.
- Press the automobile up and down, to make the vehicle suspension system in the normal position.

Adjustment

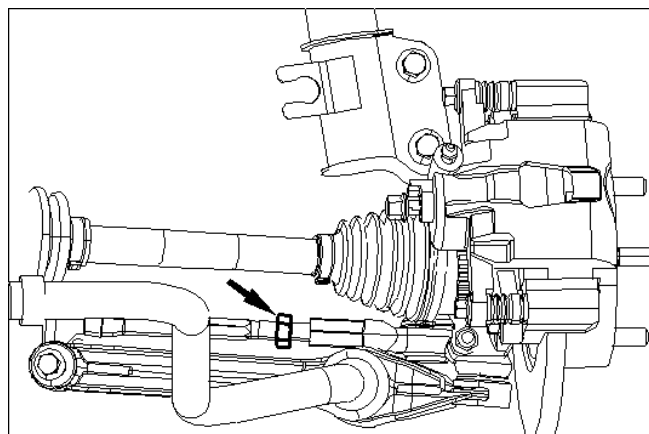
1. Turn the steering wheel to the central position and lock it.



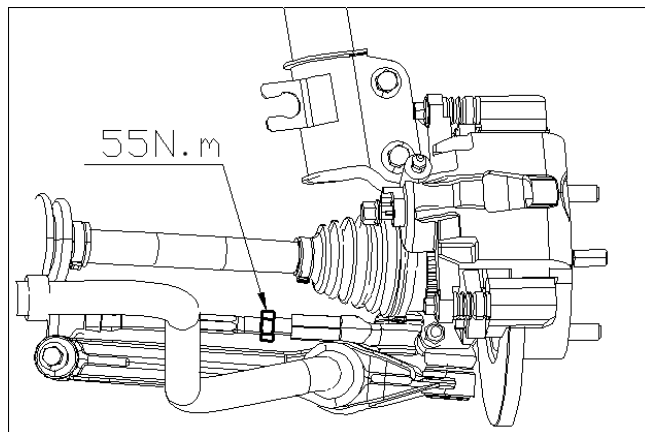
2. Loosen the locking nuts of the ball head of the tie rod.



3. Rotate the locking nuts of the ball head of the tie rod clockwise or counterclockwise to adjust the toe-in.

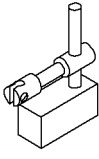


4. Lock the locking nuts of the ball head of the tie rod.



5. Check the toe-in.

Inspection of the Wheel Bearing

Special Tool	
 15008	Fixing Supporting Seat of the Dial Gauge 205-044 (15-008)

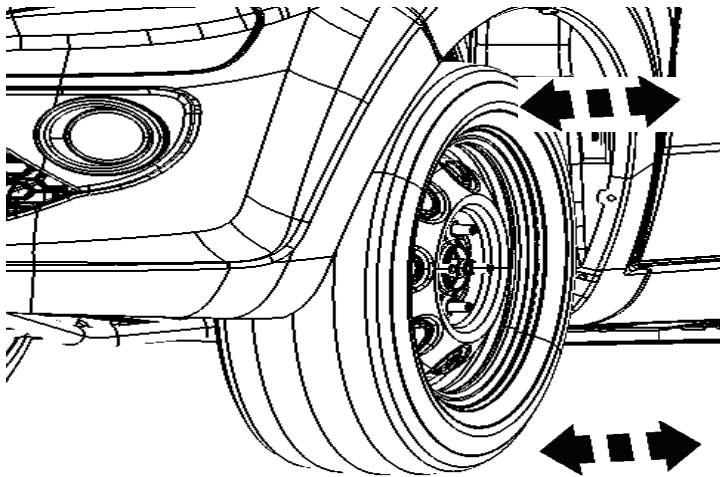
General Tool
Dial Gauge

Inspection

1. **Notes** : Do not confuse the loosening of the lower cross arm ball head with the loosening of the bearing.

Hoist the fore part of the automobile. See Section 100-01 for relevant information.

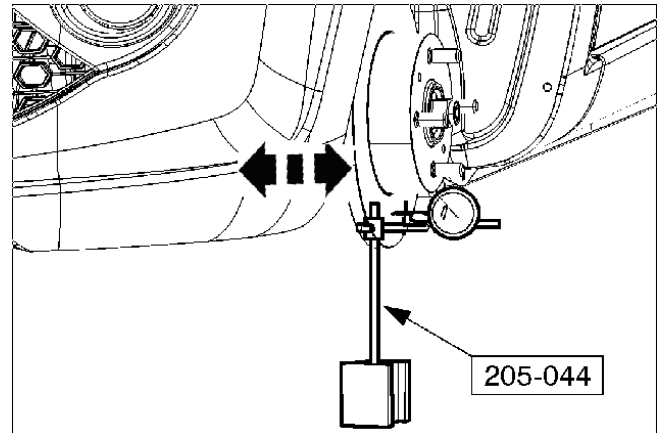
2. Shake the wheels. Check if the front wheel bearings is loosened.



3. Fast rotate the wheels, to confirm that the wheels rotate smoothly and quietly.

4. Dismount the front brake calipers and the supporting plate. See Section 203-01 for relevant information.

5. Install an appropriate fixer of the dial gauge or similar devices on the wheel hub and then push and pull the wheel hub. Measure the axial clearance between the wheel hub and the wheel bearing assembly. There should not have any axial clearance, if there has any axial clearance, replace the front wheel bearings.



6. Install the front brake calipers. See Section 203-01 for relevant information

Item I Section 201-01 Front Suspension

Applicable Vehicle Model: Benni Mini

Contents	Pages
Specification	
Specification	201-01-2
Instruction and Operation	
Front Suspension	201-01-2
Diagnosis and Test	
Front Suspension	201-01-3
Disassembly and Installation	
Front oscillating arm	201-01-4
Front supporting column	201-01-7
Front stabilizing rod	201-01-09
Disintegration and Assembly	
Shock Absorbing Supporting Column and Absorbing Supporting Spring Assembly	201-01-11

Instruction and Operation

(i) Torque Specification

Description	Nm	lb-ft	lb-in
Locking nuts between the ball head of the tie rod	30-55		-
Connecting bolts between the bracket of the front stabilizing rod and the front oscillating arm	89-95		-
Connecting nuts between the low bracket of the front longibeam and the low crossbeam of radiator	65-79 65-79		-
Connecting bolts and nuts between the low bracket of the front longibeam and the low plate of the front cabin			
Connecting bolts between the ball head pin of the front oscillating arm and the steering knuckle	45-55		
Connecting bolts between the front oscillating arm and the front oscillating arm mounting plate	65-79		-
Wheel nuts	75-95		-
Fixing nuts of the wheel hub	250-300		
Connecting nuts between the front supporting column and the vehicle body	33-40		
Connecting bolts and nuts between the front supporting column and the steering knuckle	80-95		-
			-

Front Suspension

The front suspension is composed of accessories of two front supporting column assemblies (including shock absorbing springs), an oscillating arm, transverse stabilizing rod, etc.

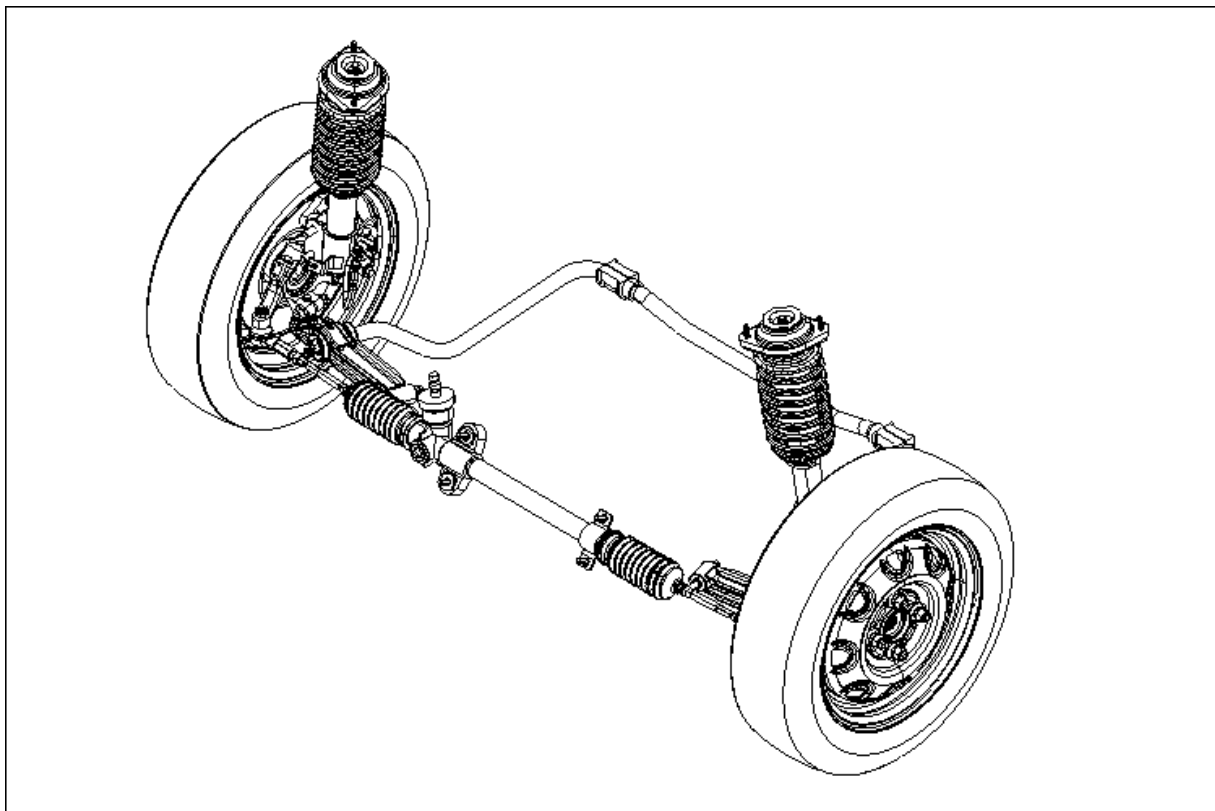
The oscillating arm is formed through welding after a steel plate is stamped. Each piece is connected through a way that one bolt and the oscillating arm mounting plate. The transverse stabilizing rod penetrate through the piece and tighten by a bolt.

The oscillating arm is connected with the steering knuckle through a ball head.

The wheel steering knuckle is connected with the suspension assembly and the ball head of the tie rod.

The suspension device is supported at the upper installing position by using the gum cover installed on the supporting seat of the top of the supporting column. The spiral spring is installed between two springs of the suspension device. The piston rod is provided with a dust shield, to prevent dirt or influent water. In order to protect the suspension device at the full compression state, an anti-impact rubber cushion is also installed.

Disassembly and Installation



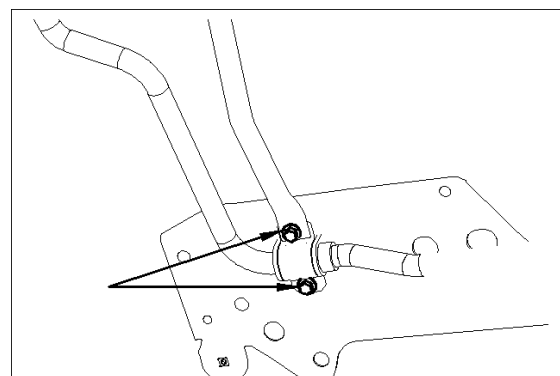
(a) Front Suspension

See Section 201-00.

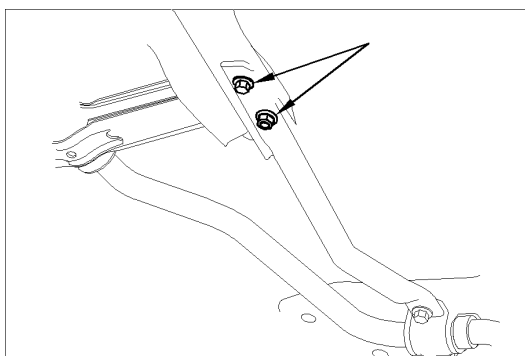
Front oscillating arm

Disassembly

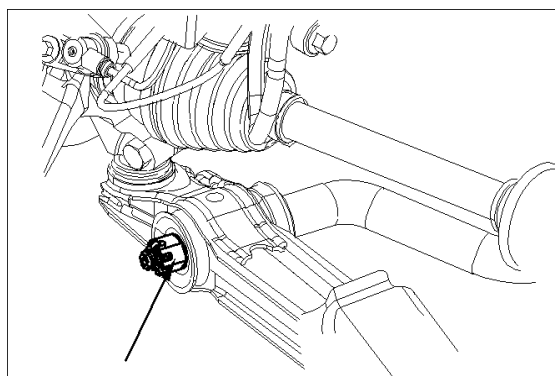
1. Unscrew the tyre nuts.
2. Hoist the automobile. See Section 100-01 for relevant information.
3. Disassemble the wheel.
4. Disassemble the connecting nuts and bolts between the low bracket of the front longibeam and the low plate of the front cabin.



6. Disassemble the locking nuts and locking pin of the tie rod

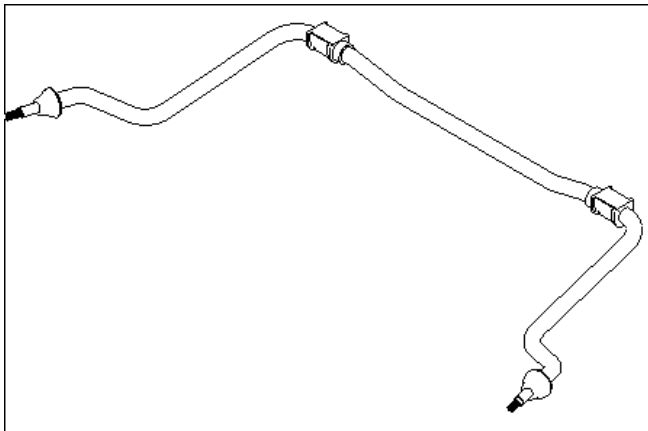


5. Disassemble the Connecting nuts between the low bracket of the front longibeam and the low crossbeam of radiator

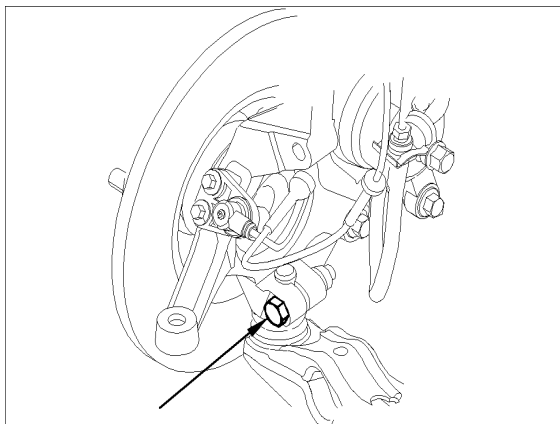


Disassembly and Installation (Continued)

7. Disassemble the tie rod

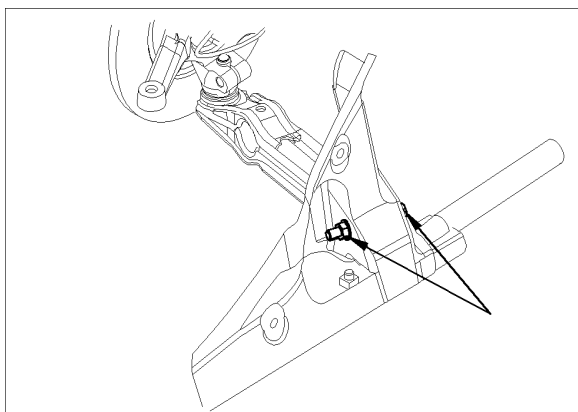


8. Disassemble the connecting bolts between the ball head pin of the front oscillating arm and the steering knuckle

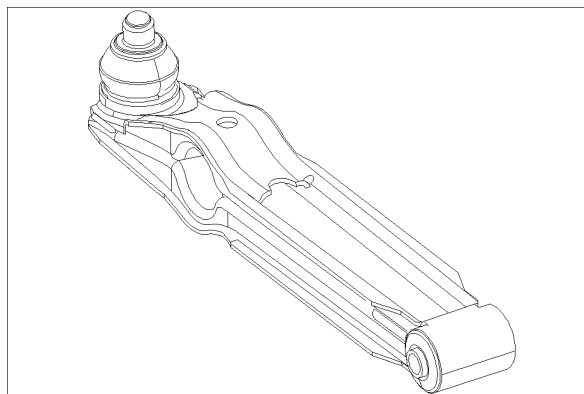


Warning: Use cotton cloth to protect the ball head from being damaged.

9. Disassemble the bolts of the front oscillating arm and the front oscillating arm mounting plate.



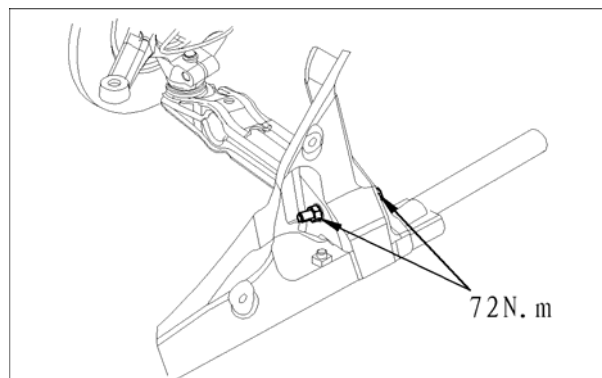
10. Disassemble front oscillating arm



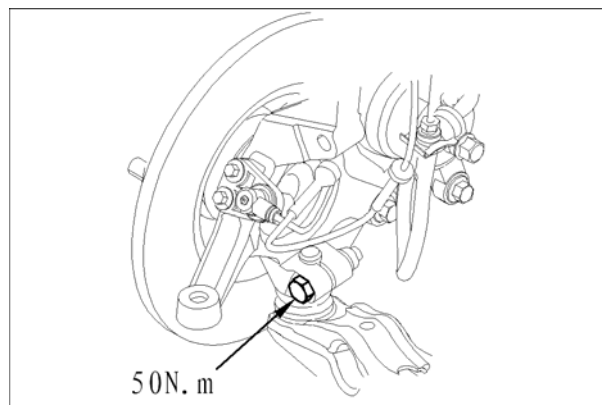
Installation

Reverse the disassembly process for installation.

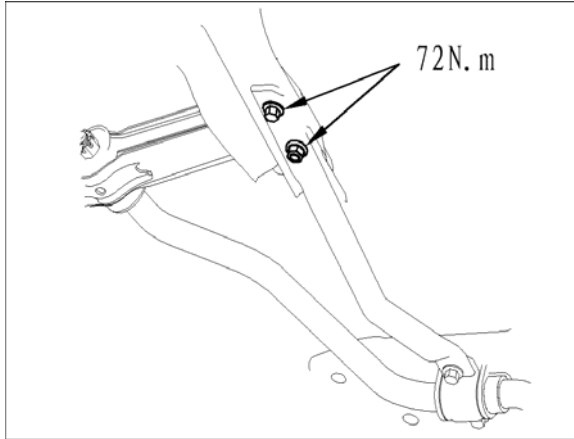
1. Install the bolts of the front oscillating arm and the front oscillating arm mounting plate.



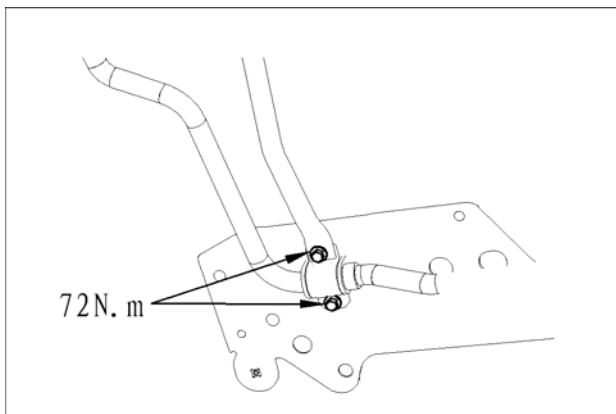
2. Install the connecting bolts between the ball head pin of the front oscillating arm and the steering knuckle



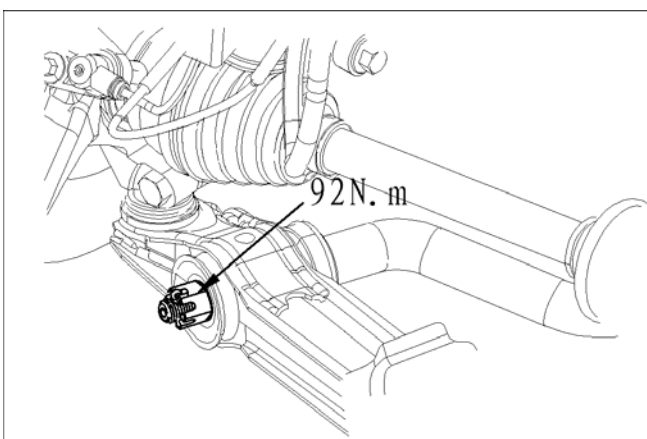
3. Install the connecting nuts and bolts between the low bracket of the front longibeam and the low plate of the front cabin.



4. Install the Connecting nuts between the low bracket of the front longibeam and the low crossbeam of radiator



5. Install the locking nuts and locking pin of the tie rod

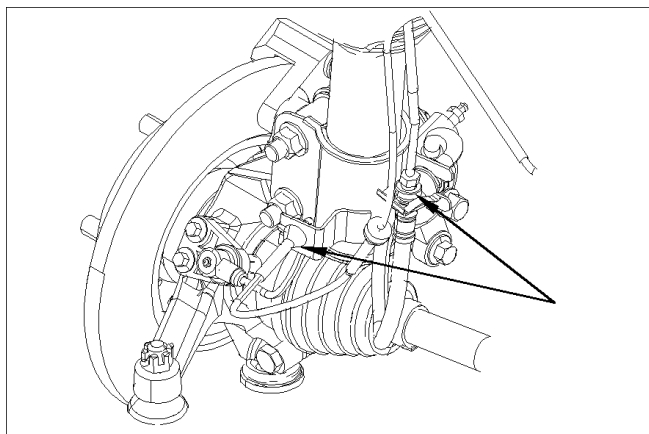


Disassembly and Installation

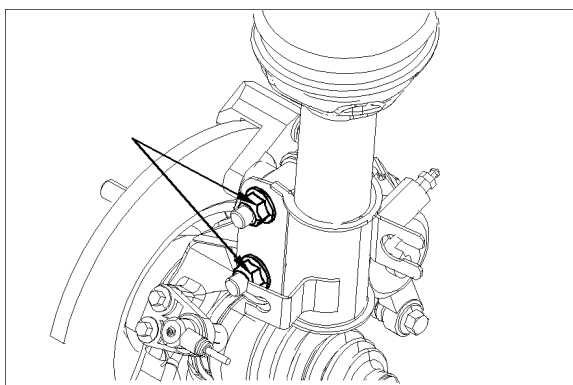
(b) Front supporting column assembly

Disassembly

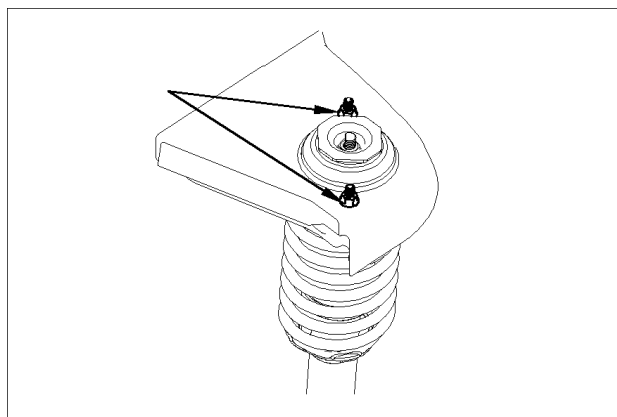
1. Loosen the tyre bolts.
2. Hoist the automobile. See Section 100-02 for relevant information.
3. Disassemble the wheel.
4. Remove the rotating speed sensors of the front wheels and brake fuel pipe from the front supporting column.



5. Disassemble the bolts of the front supporting column and the steering knuckle.

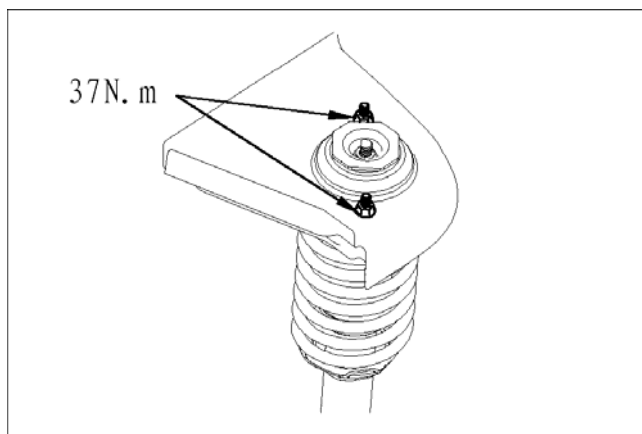


6. Release the fixed nuts on the front supporting column and remove the front supporting column assembly.

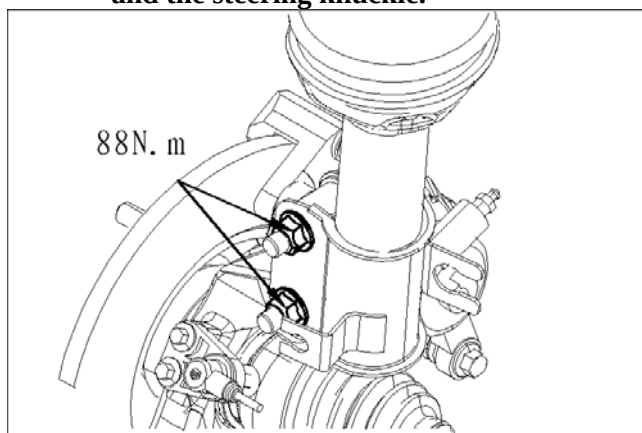


Installation

1. Install the front supporting column and the fixed nuts

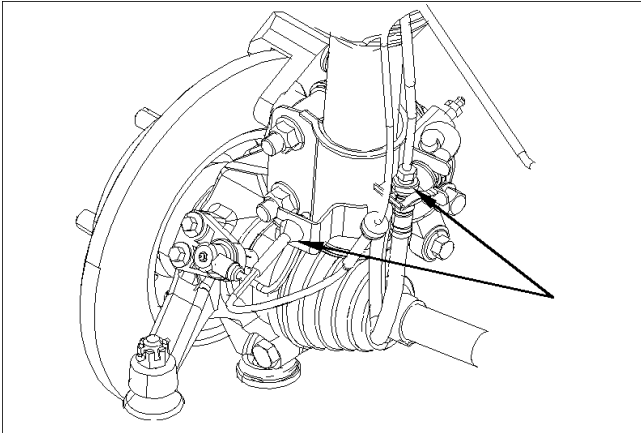


2. Install the bolts of the front supporting column and the steering knuckle.



Disassembly and Installation (Continued)

3. Install the rotating speed sensors of the front wheels and brake fuel pipe to the front supporting column.



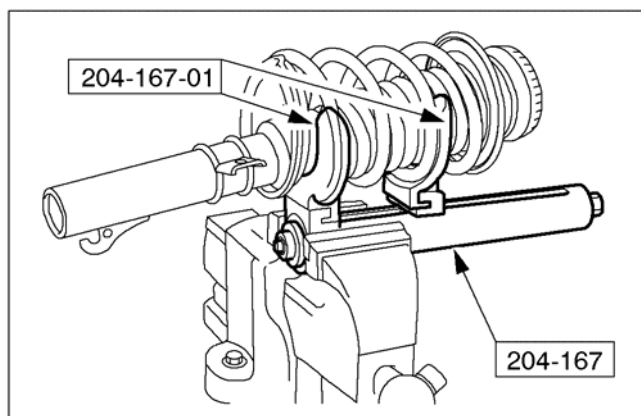
Disintegration and Assembly

(d) Shock absorbing supporting column and absorbing supporting spring assembly (14 783 4)

Disintegration

1. Disassemble the suspension assembly. See this section for relevant information.
2.  **Warning:** Always be careful to avoid injury as the spiral spring is at the extreme strained state.

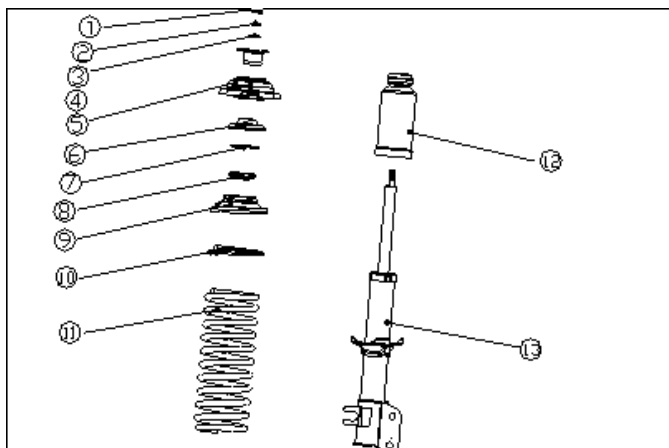
Compress the spiral spring partially.



3. Disintegrate the front shock absorbing devices and the spiral springs.

1. Disassemble the nuts
2. Disassemble the washers
3. Disassemble the elastic washers
4. Disassemble the sub assembly of the inner connecting sleeve.
5. Disassemble the sub assembly of the outer connecting sleeve.
6. Disassemble the washers
7. Disassemble the bearing pad.
8. Disassemble the bearings.
9. Disassemble the mounting
10. Disassemble the cushion of the spring.
11. Disassemble the spiral spring.
12. Disassemble the collision mat.

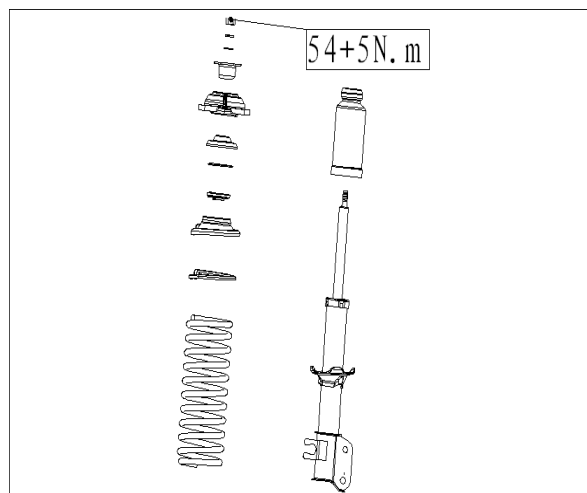
13. Disassemble the absorbing assembly



Assembly

1. **Note:** Place the end of the spring on the spring seat correctly.

Reverse the disassembly process for installation.



Section 204-02 Rear Suspension

Applicable Vehicle Model: Benni Mini

Contents	Pages
Specification	201-02-2
Specification	
Instruction and Operation	201-02-3
Rear Suspension	
Diagnosis and Test	201-02-4
Rear Suspension	
Disassembly and Installation	201-02-5
The connecting rubber cushion of the tie rod	
The tie rod	
The upper seat of the spiral spring	
The collision mat	
The rear spiral spring	
Shock Absorbing Supporting Column and Absorbing Supporting Spring Assembly	
The longibeam oscillating arm	
The rear axle	

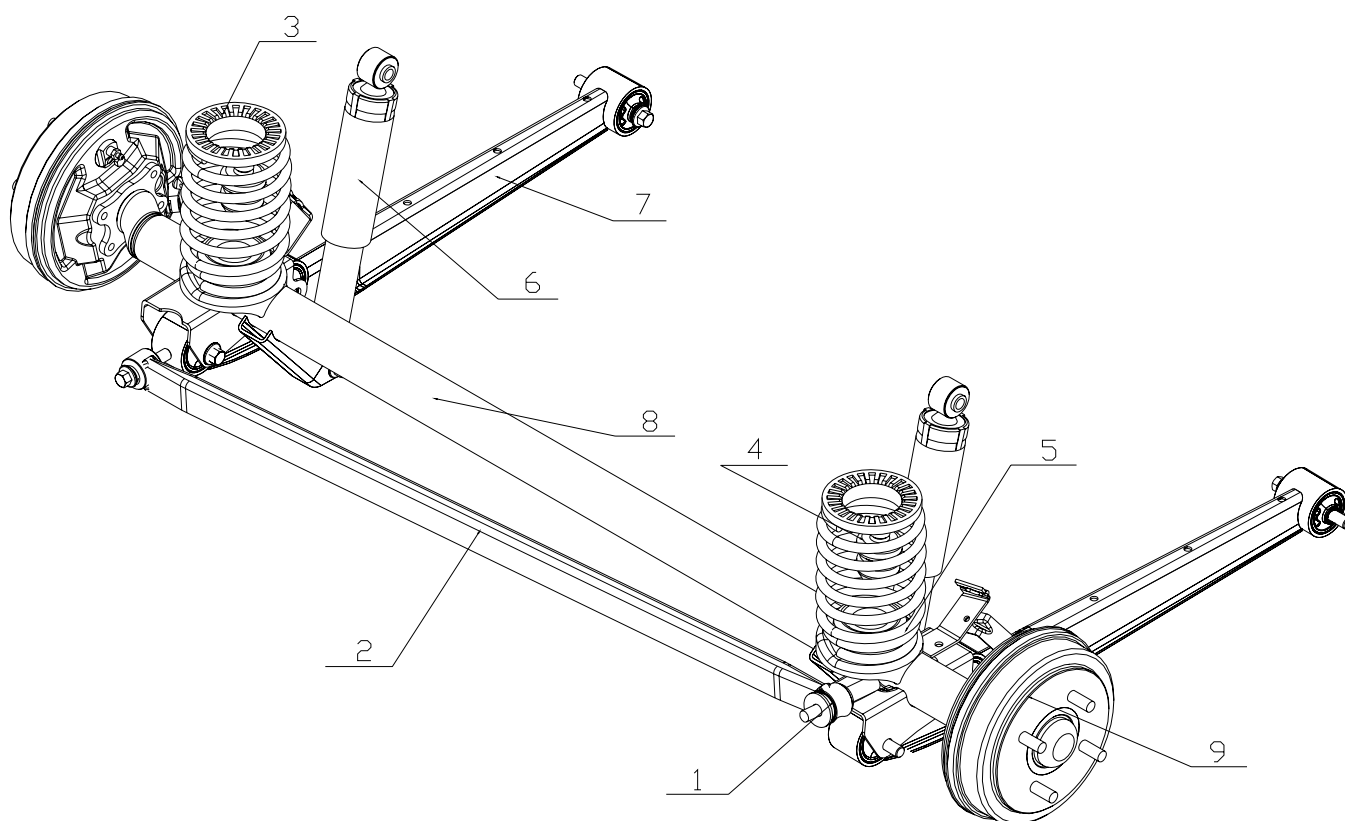
Specification

Torque Specification

Instructions	Nm	lb-ft	lb-in
Connecting bolts between rear shock absorber and the vehicle body	80~95		-
Connecting bolts between the rear shock absorber and the rear axle	80~95		-
Connecting bolts between the rear axle and the vehicle body	80~95		-
Connector of the parking hose	16±2		-
Wheel nuts	85±10		-
Fixing bolts of the wheel axle	170~220		-
Connecting bolts between the longibeam oscillating arm and rear axle	80~95		
Connecting bolts between the longibeam oscillating arm and the vehicle body	80~95		
Connecting bolts between the tie rod and the vehicle body	80~95		
Connecting bolts between the tie rod and the rear axle	40~50		
Connecting bolts between the rear brake assembly and the rear axle	40~45		
The head of rear rotating speed sensor (ABS) and the rear axle flange	8~10		
Connecting bolts M10 of braking fuel pipe	14~18		
Connecting bolts M12 of braking fuel pipe	16~20		

Instruction and Operation

Rear Suspension



Serial Number	Parts Number	Name
1	2916012-K01	The connecting rubber cushion of the tie rod
2	2916010-K01	the tie rod
3	2912002-C01	The upper seat of the spiral spring
4	2912012-K01	The collision mat
5	2912011-K01	The rear spiral spring
6	2915010-K01	The rear Shock absorber assembly
7	2917010-K01	The longibeam oscillating arm
8	3300100-K01	The rear axle
9	2502200-K01	Wheel hub and brake drum assembly

The rear suspension is composed of a rear axle assembly, spiral springs and a shock absorber assembly. The wheels are connected to the rear suspension through the brakes.

Diagnosis and Test

Rear Suspension

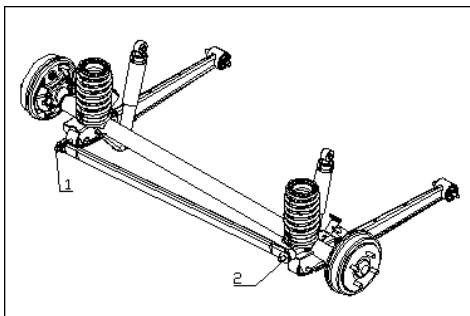
See this section for relevant information.

Disassembly and Installation

The tie rod and the connecting rubber cushion

Disassembly

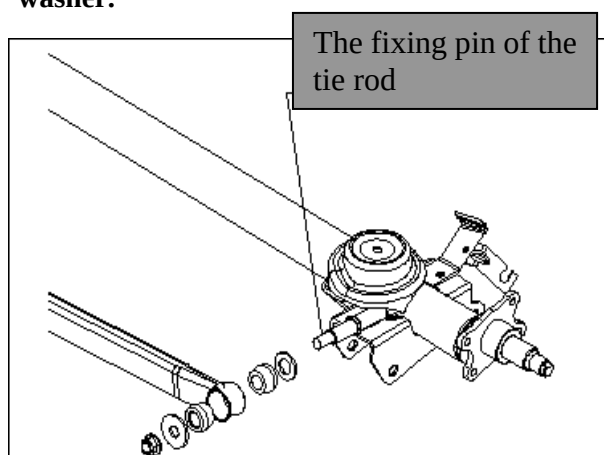
1. Hoist the vehicle. See the section 100-01 for relevant information
2. Loosen the fixing nuts and bolts of the tie rod.
 1. Loosen the bolts and nuts between the tie rod and the vehicle body.
 2. Disassemble the fixing nuts and washers between the tie rod and the rear axle



3. Remove the outer connecting rubber cushion of the tie rod
4. Remove the tie rod and the connecting rubber cushion and washers of the fixing pin

Installation

1. As the following picture shows, to install the washer, the connecting rubber cushion, the tie rod, the connecting rubber cushion and the washer.



 **.Don't fastening the nuts.**

2. Install the tie rod to the vehicle body.

3. Lower the vehicle.

4. Tighten the two nuts on the tie rod according to the stated torque.



The spareparts of the rear suspension must be last fastening when the vehicle is lowered completely and unloaded.

Disassembly and Installation

Rear shock absorber assembly

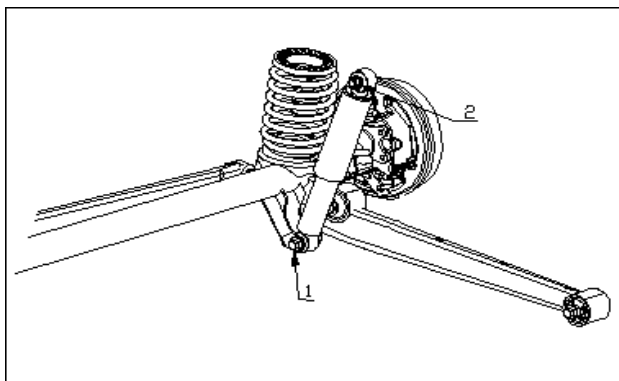
Disassembly

1. Hoist the automobile. See section 100-01 for relevant information.

2. Use a jack to support the rear axle.

3. Disassembly the fixing bolts of the rear shock absorber assembly.

1. Disassembly the lower nuts
2. Disassembly the upper nuts.



4. Remove the rear shock absorber assembly.

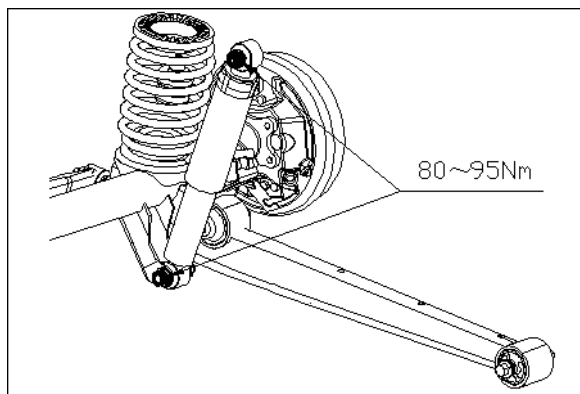
2. Remove the jack from the rear axle.

3. Lower the vehicle.

4. Tighten the nuts and the lower bolts on the rear shock absorber assembly to the stated torque.



The spareparts of the rear suspension must be last fastening when the vehicle is lowered completely and unloaded.



Installation

1. Install it according to the procedures adverse to the disassembly sequence.



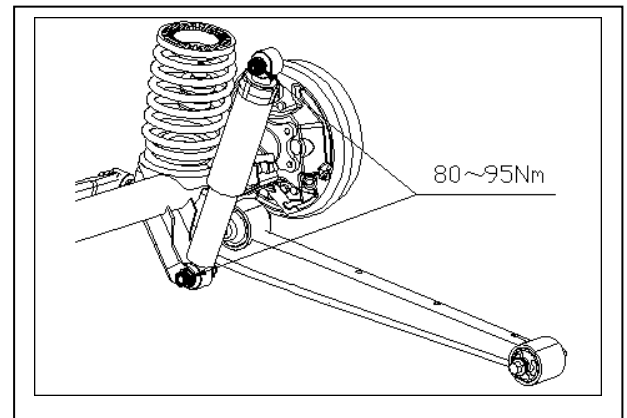
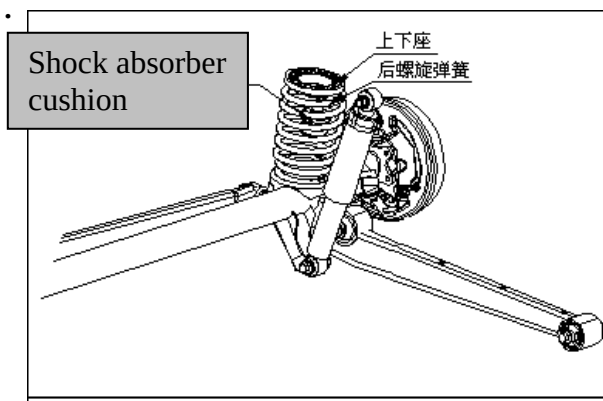
Don't fastening the nuts and the bolts.

Disassembly and Installation

The rear spiral spring and the upper and the lower seats of the rear spiral spring and shock absorber cushion

Disassembly

1. Hoist the automobile. See this section for relevant information.
2. Use a jack to support the rear axle.
3. Disassemble the nuts and bolts between the tie rod and the vehicle body.
4. Disassemble the lower bolts of the rear shock absorber assembly.
5. Disassembly of the rear spiral spring, as well as the upper and the lower seats of the rear spiral spring and the shock absorber cushion.



Installation

1. Install it according to procedures adverse to the disassembly sequence.

 Don't tighten the nuts and the bolts.

2. Remove the jack from the rear axle.
3. Lower the vehicle.
4. Tighten the nuts and the lower bolts on the rear shock absorber assembly to the stated torque.

 The spareparts of the rear suspension must be last fastening when the vehicle is lowered completely and unloaded.

Disassembly and Installation

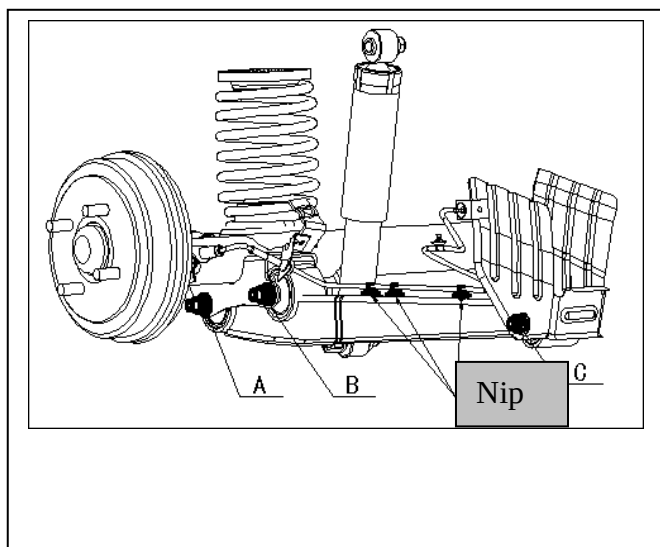
The longibeam oscillating arm

Disassembly

1. Hoist the automobile. See Section 100-01 for relevant information.
2. Use a jack to support the rear axle.
3. For the vehicle with ABS, Disassemble the nip of the wiring harness of the wheel speed sensor from the longibeam oscillating arm.
4. Disassembly the bolts and nuts of the longibeam oscillating arm
 1. disassembly the bolts and nuts A 、 B between the longibeam oscillating arm and rear axle .
 2. disassembly the bolts and nuts C between the longibeam oscillating arm and vehicle body
5. Remove the longibeam oscillating arm .



The spareparts of the rear suspension must be last fastening when the vehicle is lowered completely and unloaded.



Installation

1. Install it according to procedures adverse to the disassembly sequence.
2. Remove the jack from the rear axle.
3. Lower the vehicle.
4. Tighten the bolts between the the longibeam oscillating arm and the rear axle and vehicle body to the stated torque.



Don't tighten the nuts and the bolts.

Disassembly and Installation

Rear Axle

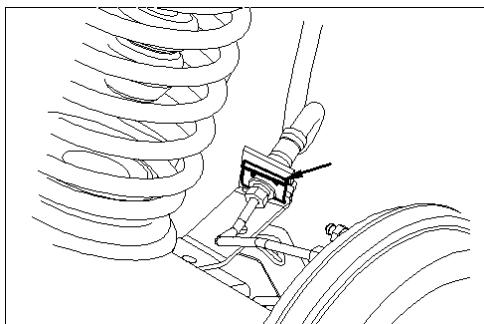
Disassembly

1. Loosen the parking braking dragline. hoist the automobile. See this section for relevant information.
2. Loosen the tyre nuts, remove the tyre.
3. Disassemble the nip of the wiring harness of the wheel speed sensor from the rear axle ,according to the process of disassembly the wheel speed sensor.

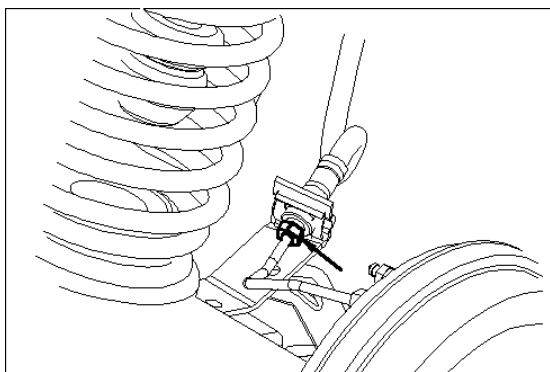
See this section 203-06 for relevant information.

4. Disconnect the braking hose

1. Disassemble the E shake fixing clip of the connector.



3. Disassemble the connector of the parking hose

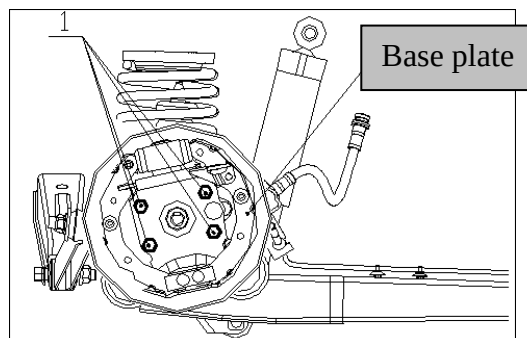


Warning: it is not allowed that the brake fluid flow to the paint surface.

5. Disassemble the brake drum assembly.

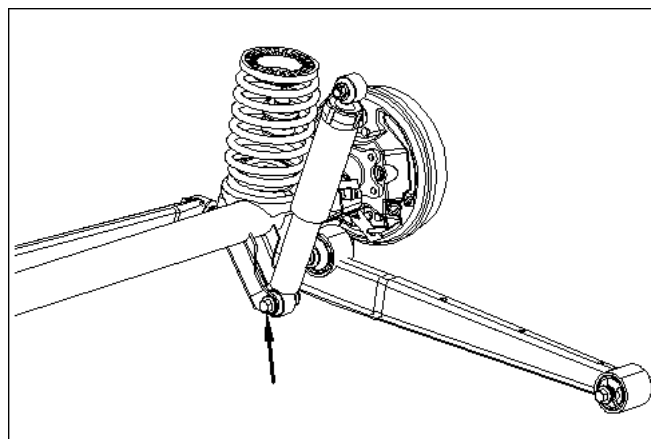
6 Disassemble the brake base plate.

1. disassemble the fixing bolts of the brake base plate.
- 2.remove the base plate from the rear axle.

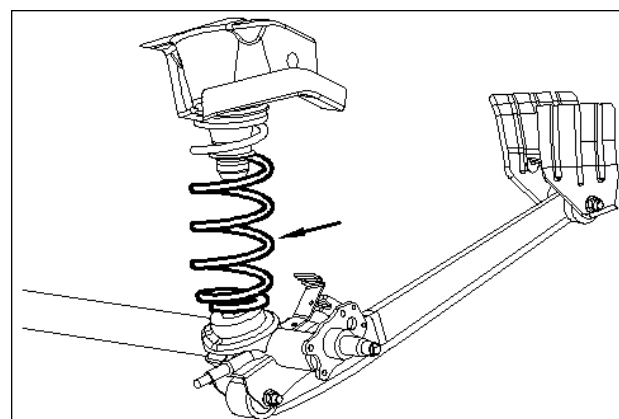


Warning: Do not damage the brake hose.

7. Disassemble the tie rod and the connecting rubber cushion of the tie rod.
8. Use a jack to support the rear axle.
9. Disassemble the lower bolts of the rear shock absorber assembly.



10. Lower the rear axle by adjusting the jack, for that to disassemble the spiral spring .



Disassembly and Installation (Continued)

11. Disassemble the spiral spring .

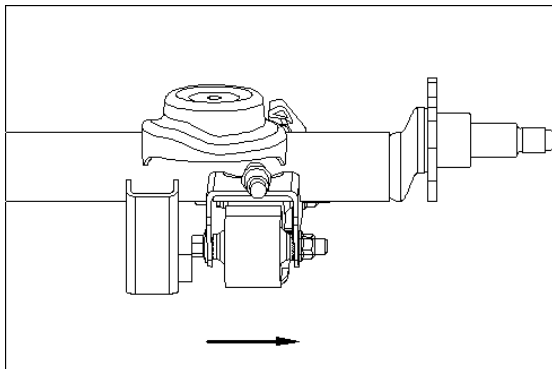
12. Disassemble the connecting nuts between the longibeam oscillating arm and rear axle, but do not disassemble the bolts.

13. Use a jack to support the rear axle, disassemble the connecting bolts between the longibeam oscillating arm and rear axle.

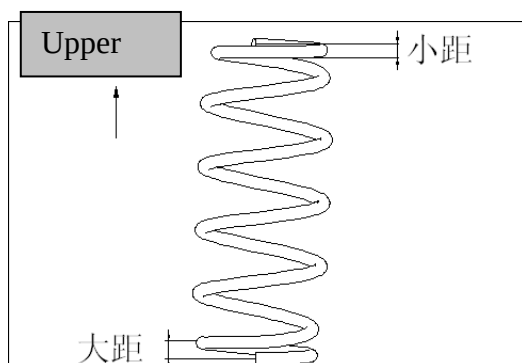
14. Disassemble the rear axle.

Installation

1. Put the rear axle on the jack, assemble the connecting bolts between the oscillating arm and rear axle according to as the following picture shows, assemble the nuts but do not fastening.

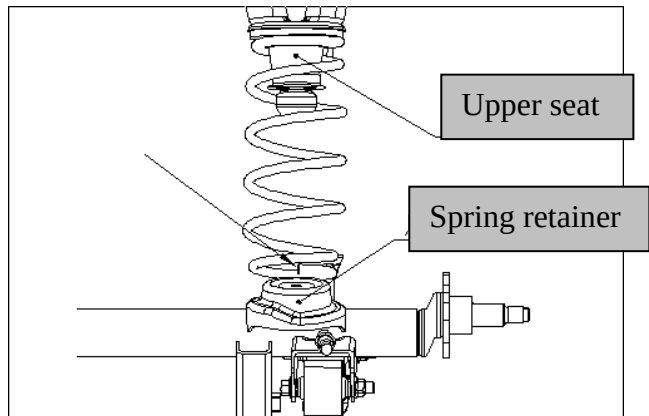


2. Install the spiral spring to the upper seat of the spiral spring, as the following picture shows:



Note:

1. when assembling the spiral spring, make the end of the spiral spring fix to the spring retainer.



2. Make your finger not to be hurt by the spiral spring when ascending the rear axle .

3. Keep ascending the rear axle until lower bolts installing hole of the rear axle shock absorber is higher or equal to the lower bolts of the shock absorber fixing hose.

4. Install the lower bolts of the shock absorber.

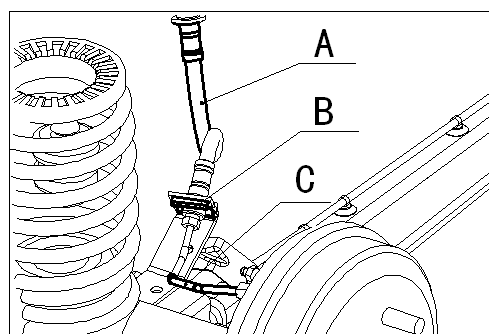
5. Remove the jack form the rear axle .

6. Install the tie rod and the connecting rubber cushion of the tie rod

7. Install the brake base plate and last fastening to the stated torque.

8. Install the brake drum, please see the section of brake drum for relevant information .

9. Connecting the brake hose to the bracket of rear axle , tighten the connector C and A of the brake hose to the the stated torque, and use a E shake clip to fix it.



Disassembly and Installation (Continued)

10. Connect the wheel speed sensor and braking hose nips (if equipped).
11. Full the brake fluid and exhaust the braking system. See Section 203-00 for relevant information
12. Install the wheel, tighten the tyre nuts to the stated torque.
13. After the work as hereinbefore, step on the brake pedal 3 to 5 times, loaded with 30kg (66lbs) ,for that to make the clearance between wheel drum and brake shoe properly.
14. Tighten the bolts of the parking braking handle cover.
- 15 . Lower the vehicle
16. Tighten the bolts between the the longibeam oscillating arm and the shock absorber, tighten the nuts of the tie rod to the stated torque.



The spareparts of the rear suspension must be last fastening when the vehicle is lowered completely and unloaded.

17. Make sure that the brake drum is not block and brake force is properly.
- 18.Perform the brake test.(Including the parking brake and foot brake).

Section 201-03 Wheel and Tyre

Applicable Vehicle Model: Benni Mini

Contents	Pages
Specification	
Specification	201-03-2
Instruction and Operation	
Safety Warning	201-03-3
Diagnosis and Test	
Wheel and Tyre	201-03-4
Inspection and Verification	201-03-4
Failure Phenomenon Table	201-03-5
Disassembling and Installation	
Wheel and Tyre	201-03-8

Specification**Torque Specifications**

Description	Nm	lb-ft	lb-in
Wheel Bolt	85±10	-	-

Instruction and Operation

Safety Warning

-  **Warning:** Tyres of various types, such as radial tyre, diagonal tyre or diagonal textile cord tyre, are prohibited to be mounted in one vehicle in a mixing way.
-  **Warning:** Prohibit starting vehicle when tire replacement is performed. When wheels are on ground, vehicle may be caused to move.
-  **Warning:** Tyre sealant in market belongs to inflammable substance. Such kind of substance is prohibited to be served as a reminder.
-  **Warning:** Wear safety protective glasses or mask when wheel and tyre assembly are repaired.
-  **Warning:** Wheel bolt should be re-tighten when the vehicle drives for 800 Km (500 miles) after the replacement of wheel or the losing of wheel bolt.
-  **Warning:** If the wheel bolt is not tightened within the regulated mileage, wheels deviating from vehicle body may be caused during automobile running process.
-  **Warning:** Wheel and tyre have their own maximum load, so don't exceed weight limit.
-  **Warning:** Prohibit using steel wool grinding and cleaning agent to clean aluminum alloy wheel.
-  **Warning:** Before dismounting tyre valve core, pressing of the valve core piston is used for reducing tyre air pressure.

Bodily injury may be caused for noncompliance with the above guidance.

Diagnosis and Test

Wheel and Tyre

Inspection and Verification

In order to play the maximum efficiency of the tyre, inspection should be performed to make sure whether the tyre pressure and the tyre are abnormal, if such as an indicator appear, the need for dynamic balancing, diagonal adjusting or front wheel alignment is displayed. Inspection should be regularly performed to make sure whether nick, scraping, wear abrasion, bubbling, and substance embedded in the tread exist. If a rapid rising of the tyre temperature occurs, or when clastics are dispersed because of rough road surface, tyre inspection should be performed frequently.

That tyre wire indicating line is marked at the bottom part of the tread to be serviced as a more direction inspection of the tyre status. The exposure of the indication line of the tyre wear indicates the need for replacement of the tyre.

Tyre Wear Diagnosis

When indication line of the tyre wear is exposed, or the tire shoulder is severely abraded, the tyre should be replaced. Wear of the tyre shoulder is usually caused by an overlarge camber angle of the radial tyre or an overlarge toe in.

Sometimes, incorrect rear wheel toe-in setting wheels or supporting column damage can lead to serious “sunken” or “fan-shaped” tyre wear of the non-driving tyre.

Seriously incorrect toe-in of the rear wheel can also lead to other abnormal wear.

Road Test

Tyre vibration diagnosis procedure is started from road test. Road test and face to face taking with customers (if possible) can provides much more information required by the vibration source.

Road test should be performed on smooth road without fluctuation. If vibration occurs, pay attention to and record the followings:

- Vehicle speed when vibration occurs.
- Types of vibration happed in each speed scope.
 - Mechanical or audible.
- When the following conditions are changed, what influence is affected in vibration?

- Engine torque
- Vehicle speed
- Engine rotating speed
- Vibration type - sensitivity: torque sensitivity, vehicle speed sensitivity or sensitivity of the engine rotating speed.

The following explanations can help identify the source of the vibration.

Torque sensitivity

This indicates the condition can be improved and worsened because of acceleration, deceleration, sliding, constant speed, or exerting engine torque.

Vehicle Speed Sensitivity

This indicates that vibration happens under the same vehicle speeds, and can not be affected by engine torque, engine rotating speed or gear selection of the driving axle.

Sensitivity of the Engine Rotating Speed

This indicates that vibration occurs under the identical gears and different vehicle speeds. It can be tested by increasing or decreasing engine rotating speed on Neutral Gear or under stall speed experiment. If the condition is related to engine rotating speed, the reason may have nothing to do with the tyre.

If road test indicates tyre whimper, but shaking or vibration is not indicated, the noise is caused by the contacting of the tyre and the road surface.

Huge noise usually indicates a flat tire, or the noise is created by soft thing contacting with the road surface. The tyre whimper is mistaken for wheel shaft. The tyre whimper will last under a certain vehicle speed scope.

A complete road test

Diagnosis and Test

Failure Phenomena

Phenomena	Possible Failure Causes	Measures
Excessive Wear of the Edge of the Tyre	• Insufficient tyre air pressure	• The tyre air pressure is adjusted.
	• Overload of the automobile	• Correction should be performed if necessary.
	• High-speed turning	• Correction should be performed if necessary.
	• Incorrect toe-in • Incorrect camber angle	• Toe-in is adjusted. See section 201-00 for relevant information.
Excessive Wear of the Tyre Crown	• Over high tyre air pressure	• Tyre air pressure is adjusted.
	• Frequent acceleration or braking	• Correction should be performed if necessary.
• Excessive Wear of the other Tyres	• Incorrect tyre air pressure	• Tyre air pressure is adjusted.
	• Tyre is need to be replaced.	• Tyre is replaced.
	• The automobile is overload.	• Load specification should be inspected according to requirements.
	• The front or the back damping device is loose or leaks.	• Parts should be tightened or replaced if necessary. See section 201-01(the front) or section 201-02 (the back).
	• Wheel bearing is worn.	• Wheel bearing and / or hub should be repalced. See section 201-01(the front) or section 201-02 (the back).
	• Suspension parts, axle linings and ball joint are worn or damaged.	• Inspection, repair or part replacement should be performed if necessary.
	• Lateral or radial run-out of the wheel or the tyre is excessive.	• Run-out amount should be measured by dial gauge, and inspection, repair or parts replacement should be performed id necessary.
• Wheels are difficult to install.	• The method is incorrect or parts are mismatched, the parts include wheel bolts and nuts.	
	• Parts and components are eroded, abraded or damaged.	• Clean or replace the parts.
• Wheels are rust out or eroded.	• The maintenance is improper.	• Cleaning or coating for protection should be performed.

Diagnosis and Test (continued)

Phenomena	Possible Failure Causes	Measures
• Wheel run-out is influenced by shaking or abnormal vibration.	• Wheel is disabled (especially external retaining ring of the front wheel bearing and the rolling column bearing are damaged.)	• Inspect wheel rim. Parts replacement should be performed if necessary.
• Excessive fluttering of the automobile and bad steering.	• Suspending parts are loose.	• The parts should be tightened or replaced.
• Automobile vibration caused by wheel and tyre.	• Tyre air pressure is excessive.	• Tyre air pressure should be adjusted.
	• Wheel or tyre is out of balance.	• Wheel and tyre assembly should be balanced.
	• Tyre is unevenly worn.	• The tyre should be replaced for eliminating vibration.
	• Brake disc is out of balance.	• Inspect to make sure whether dirt or fragments are on the brake disc. If a damaged brake disc or fragments are found, heavy dirt may be on the brake disc.
	• Water enters into the tyre.	• The accumulated water should be drained.
	• The wheel is bent.	• A new wheel should be installed. Trying to repair the wheel may leads to wheel break and reduce the wheel intensity.
	• Tyre edge is correctly assembled.	• The wheel should be rotated on the vehicle. The combining position of the wheel and the tyre should be inspected. If swing is found on some part when rotation is performed, wheel and tyre may not be well assembled on this part. Remove the tyre and clean the combining position of the wheel and the tyre.
	• Radial run-out of the wheel or the tyre is excessive.	• Radial run-out of the wheel or the tyre should be measured by the dial gauge. If the radial run-out amount of the wheel or the tyre is not in the regulated scope, a further inspection on radial run-out of the wheel bolt should be performed. If the radial run-out amount of the wheel bolt is out of the range, a replacement should be performed.
	• The wheel bolt is loose or damaged, or bolt holes of the wheel are expanded.	• Tightening or replacement should be performed if necessary.

Diagnosis and Test (continued)

	Foreign matters exist between the installation surface of the wheel and the installation surface of the hub.	The installation surfaces should be cleaned.
	The radial run-out of the wheel or the tyre is excessive.	Radial run-out of the wheel and the tyre should be measured by the dial gauge. If the radial run-out amount of the wheel or the tyre is out of the scope, a further inspection on radial run-out of the wheel bolt should be performed. If some parts are out of the range, replacements should be performed.
There are cracks at the bottom part of the wheel rim or the drain tank.	The vehicle is overloaded or abused.	The wheel should be replaced and load and running conditions should be inspected. An over high tyre air pressure should be avoided. Tyre rim specifications, work load, tyre size, textile cord layer and the tyre structure should be inspected.
	Tools are not properly used.	Installation, disassembly and maintenance procedures should be inspected.
Bolt thread of the wheel is damaged.	Torque is too high.	Wheel bolt should be replaced, and tightening should be performed according to the regulated requirements.
Wheel bolt is break.	Wheel bolt surface is not well processed.	The wheel bolt should be replaced, and tightening should be performed according to the regulated requirements.
	Overload	The wheel bolt should be replaced, tightening should be performed according to the regulated requirements, and practical load and the regulated load rate should be compared.
Bolt holes of the wheel are rusty.	The wheel bolts are loose.	Inspect the assembly, if damaged parts are found, replace the damaged ones. And tighten the parts as required.
Tyre bolts are damaged.	Wheel assembly is loose.	The wheel bolt should be replaced, and tightening should be performed according to the regulated requirements.
	The wheel bolts are locked too tightly.	Correct tightening procedures should be followed.

Diagnosis and Test (continued)

•The wheel bolts are deadly blocked.	•Eroded.	•Cautious: Lubrication oil should not be coated on the tapered surface of the bolt hole or the tapered surface of the wheel bolt. If corrosion is not so severe, an iron brush should be used for removal. If the corrosion is severe, new wheel bolts should be installed. If the condition still remains, graphite based lubricating oil should be used for lubricating the first three threads of the each bolt of the wheel.
	•Overload	•The weight should be reduced.

Removal and Installation (Continued)

Wheel and Tyre

Disassembly

 **Warning:** The method of heating should not be used for loosening the locked wheel bolts. Wheels and wheel rims may be damaged by heating.

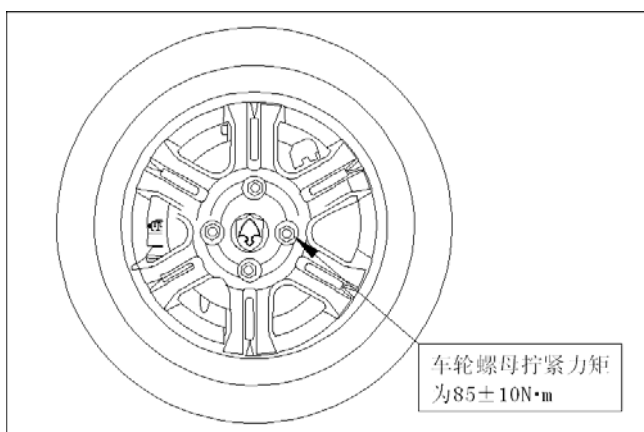
1. Loose the wheel bolts.
2. Hoist the vehicle. See section 100-02 for relevant information.
3. Disassemble the wheel and tyre assembly.

Installation

 **Warning:** Remove the rusty stain or dust on the wheels, the wheel rims and the installation surface of the brake disc. Those things may lead to wheel bolt looseness and wheel looseness during the vehicle running. Bodily injury may be caused for the incomppliance of the above instructions.

Clean the wheel hub and the installation surface.

2. Install the wheel and tyre assembly.
3. Lay down the vehicle.
4. Tighten the wheel nuts.



Chapter 202-01 Driving Axle

Applicable Vehicle Model: BENNI MINI

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Specification

Oil, fluid, sealant and adhesive

Designation	Model
High performance grease (color:Brown), constant speed universal joint	G.A.Cpalex GTE
Other replaceable greases	molybdenum disulfide

Capacity

High performance grease, external constant speed universal joint	70±10 g
High performance grease, internal constant speed universal joint	65 ±10 g

Torque specifications

Torque specifications	Nm	lb-ft	lb-in
Locking nuts of the ball head of the tie rod			-
From the front oscillating arm ball joint to steering knuckle inserting pin bolt			-
Retaining nuts of the wheel hub bearing	200±10		-
Tyre nuts			-
Front supporting column and steering knuckle connecting bolts, nuts			-

INSTRUCTION AND OPERATION

Driving axle

Constant speed universal joints are arranged at both sides of the driving axle.

The internal constant speed universal joint (constant speed ball or three-pin universal joint, roller or steel ball and housing of the universal joint) are installed on the driving axle.

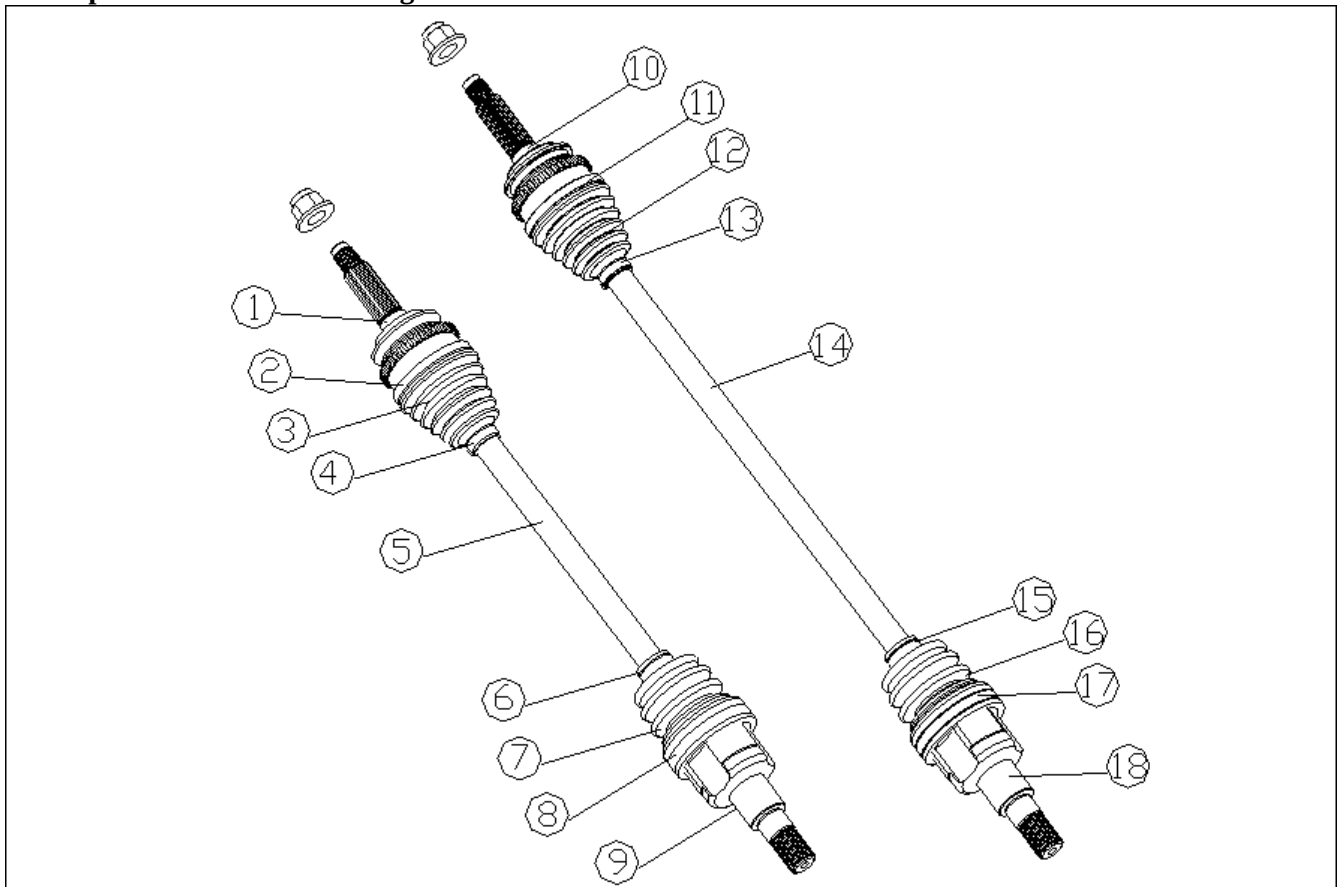
The external constant speed universal joint (composed of steel balls, rolling ball retaining frames and the housings of the universal joints) are installed at sides of the wheels.

The internal constant speed universal joint is fixed on the differential gear through a differential spring ring.

The external constant speed universal joint is fixed on the wheel hub bearing.

The external constant speed universal joint is fixed on the wheel hub bearing.

The exploded view of the driving axle



INSTRUCTION AND OPERATION (Continued)

Serial Number	Parts Number	Designation
1	2203110-K01	Fixed end ball cage universal joint
2	2203143-K01	Large nip
3	2203151-K01	Dust shield
4	2203144-K01	Small clip at the outer end
5	2203133-K01	Left shaft lever
6	2203141-K01	Small clip at the inner end
7	2203152-K01	Dust shield
8	2203142-K01	Large clip at the inner end
9	2203120-K01	Movable three-pin type universal joint
10	2203110-K01	Fixed ball cage universal joint
11	2203143-K01	Large clip
12	2203151-K01	Dust shield at the outer end
13	2203144-K01	Small clip at the outer end
14	2203233-K01	Right shaft lever
15	2203141-K01	Small clip at the inner end
16	2203152-K01	Dust shield at the inner end
17	2203142-K01	Large clip at the inner end
18	2203220-K01	Three-pin type movable universal joint

The Working Principle of the Driving Axle

The torque is transmitted from the engine to the wheels through the driving axle.

In order to adapt to the upper and lower motion of the wheel and the engine, the driving axle is required to run in various lengths and angles.

The Treatment of the Driving Axle

Note: The clipping of the driving axle by the constant speed universal joint is forbidden.

When dismantling, installation, disintegrating and assembling it should be cautious. The following instructions should be observed.

- When the driving axle is dismantled, never push or pull the constant speed universal joint
- The working angle of the constant speed universal joint can not be more than 22.5 degrees.
- Check whether the polished surface and the spline are damaged.
- It is forbidden that the dust shield is contacted with the sharp edge and the hot engine or the exhaust system.
- Do not drop the driving axle, otherwise, it could cause the inner damage of the dust shield, which can not be seen from outside.
- When other parts and components are installed, never use the driving axle as the prying tool. The driving axle can not be hung at will.
- The hitting of the universal joint cage from outside can cause the damage of the constant speed universal joint.

Front wheel balancing

Warning: When the vehicle is lifted above the ground completely, using the portable wheel balancing device can cause the damage of the constant speed universal joint or the dust shield, and this is caused due to the fact that the bending angle of the universal joint is overlarge.

When the portable wheel balancing device is used, the hand pushing type jack can be positioned under the lower cross arm. This can prevent the overlarge of the bending of the universal joint when the vehicle is lifted.

If the conditions are satisfied, it is better to dismantle the wheels, which should be performed on the fixed wheel balancing device.

INSTRUCTION AND OPERATION (Continued)

Automobile hoisting



Warning: It is forbidden to use the universal joint or the driving axle as the jacking position.

Automobile dragging



Caution: It is forbidden to tie the towing line on the driving axle.

The protection and rust prevention of the vehicle bottom

Note: When the protection and rust prevention of the vehicle bottom are performed, the dust shield should be covered.

The dirt on the dust shield can lead to the premature aging of the material, and the foreign matter on the semi-axle can cause the semi-axle to lose balance.

Driving Axle

Table of failure phenomenon

Note: Before check the wear, please reinstall the driving axle.

1. Visually inspect the dust shield whether it is torn or has cracks.

2. Whether the dust shield or the dust clip has problem can be judged by visually inspect that the front axle transmission semi-axle under the vehicle bottom has the oil penetration sign.

3. Check whether the casing of the connecting head housing has oil dripping.

4. Make sure that the self-locking nuts of the auxiliary vehicle frame has been installed.

Phenomena	Possible faults	Measures
• Sounds of breaking, knocking or friction during running	• Insufficient lubrication or pollution of the universal joint of the driving axle	• Inspect, clean and replace the grease if nesssery.
	• The driving axle contacting with other components	• Inspect and repair if nesssery
	• The wear or damage of the wheel bearing, the braking components, the suspension components or the steering components	• Inspect and repair if nesssery
• Vibration during high speed driving	• The wheels losing balance.	• Balancing the wheels
	• Radial run-out of the front wheels	• Disassembling and installation instructions of the driving axle
	• Incorrect installation of the driving axle	•
• Fluttering during acceleration	• Inappropriate assembling height cause a larger angle of the three-ball-pin type universal joint	• Check the vehicle height of the vehicle and the height of the shock absorbing spring
	• The driving axle is excessively worn or damaged	• Check and replace if necessary

DIAGNOSIS AND TESTING (Continued)

Phenomena	Possible faults	Measures
•Three-ball-pin type universal joint is parted from the sliding ball cage joint	•The retaining ring of the driving axle drops off or incorrectly mounted in the differential gear	•Replace the retaining ring
	•The engine and the speed changer are not correctly mounted.	• Check the installation bracket of the engine for damages and wears
	• Auxiliary vehicle frame or the chassis is distorted or bended	•Measure the chassis
	• Components of the front suspension are worn or damaged	•Check the shaft lining for wear or check the components for distortion(stabilizing rod, suspended arm, etc.), make replacement if necessary

DISASSEMBLING AND INSATLLATION

Driving axle (left)

To use the special tool: puller (CA201-006)

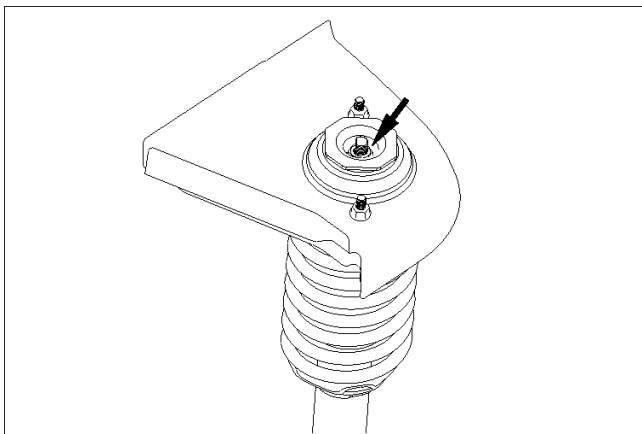
General tool

Two-claw puller

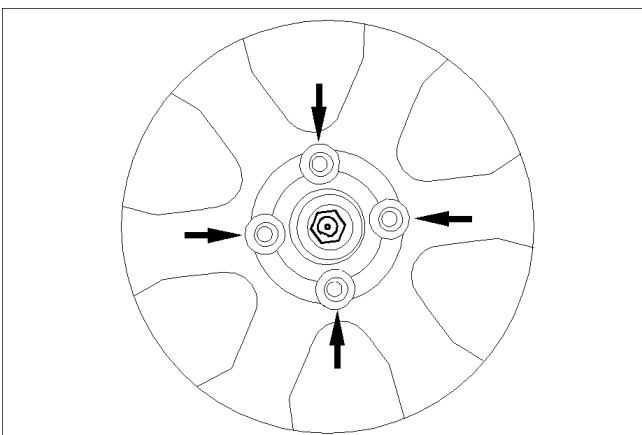
Dismounting

1.  **Warning:** The hexagonal socket wrench Is used to prevent the piston rod from rotating.

The fixing nuts of the front left supporting column are loosened

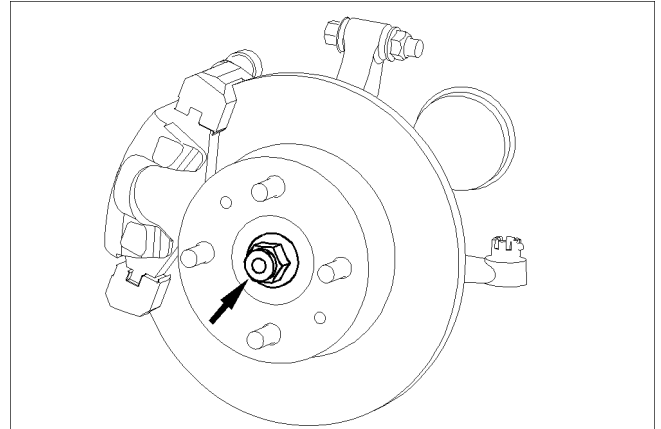


2. The wheels and tyres are dismantled. See Chapter 201-03 for relevant information.

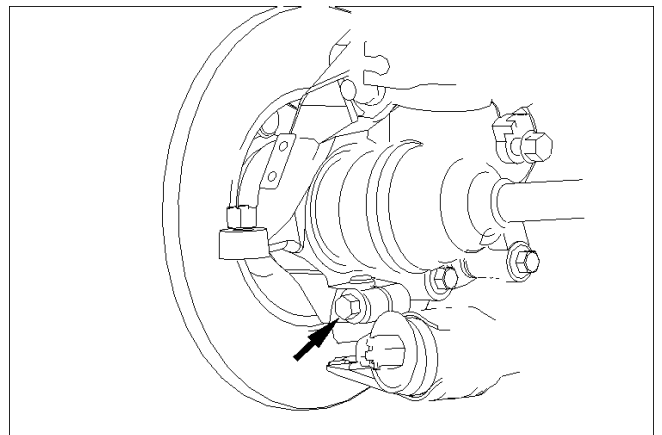


3.  **Warning:** The wheel hub fixing nuts are dismantled by using the socket and prevented from being damaged.

1. The wheel hub nuts and washers are loosened.

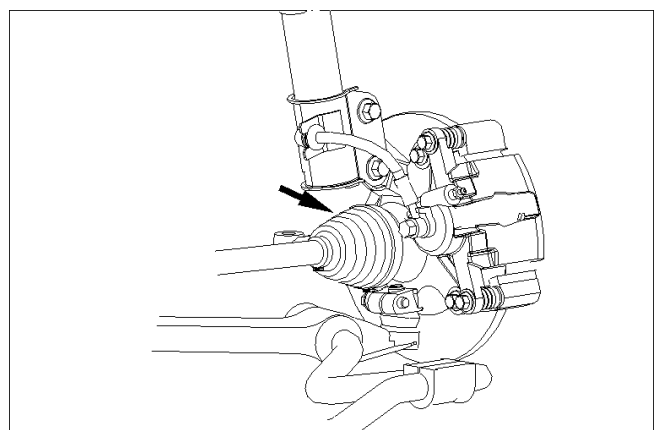


4. The front oscillating arm ball joint are taken out from the steering knuckle.



5.  **Caution:** The driving axle should be well protected for fear that the constant speed universal joint is damaged. The working angle of the internal constant speed universal joint should not be more than 22.5 degrees. The working angle of the external constant speed universal joint should not be more than 45 degrees.

Use the suitable two-claw puller. The driving axle is taken out from the wheel hub.



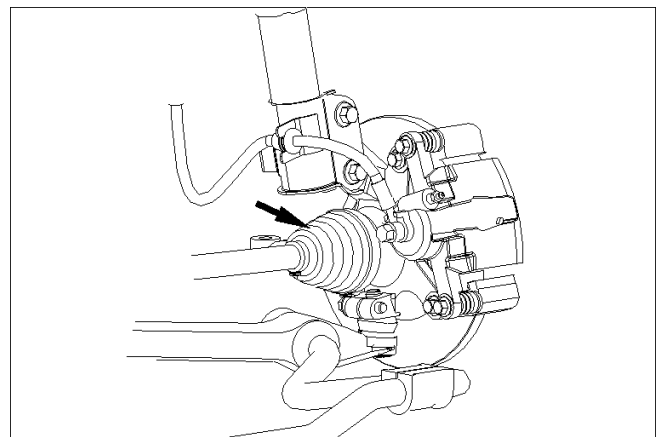
DISASSEMBLING AND INSTALLATION (Continued)

6.  **Caution:** The driving axle should be well protected for preventing the constant speed universal joint from being damaged. The working angle of the internal constant speed universal joint should not be more than 22.5 degrees. The working angle of the external constant speed universal joint should not be more than 45 degrees.

 **Caution:** Make sure that the oil seal of the driving axle is not damaged.

The driving axle is dismantled from the variator by applying skillful strength. •

The transmission oil is allowed to be discharged into a suitable container.

**Installation**

1.  **Caution:** The driving axle should be well protected for preventing the constant speed universal joint from being damaged. The working angle of the internal constant speed universal joint should not be more than 22.5 degrees. The working angle of the external constant speed universal joint should not be more than 45 degrees.

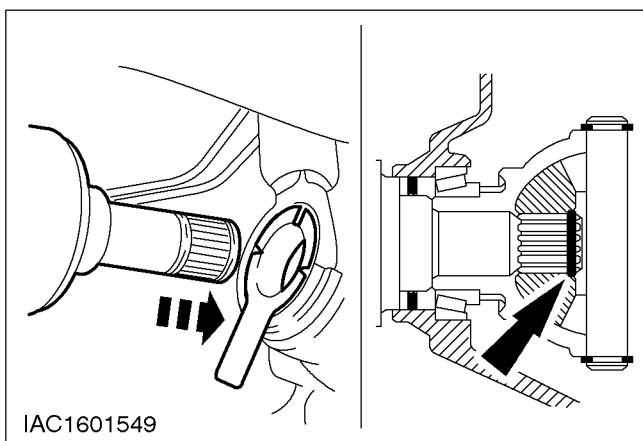
 **Caution:** When the driving axle is inserted, the installation device of the oil seals (supplied with the oil seal) should be used to protect the oil seal of the driving axle.

Note: New retaining ring is installed.

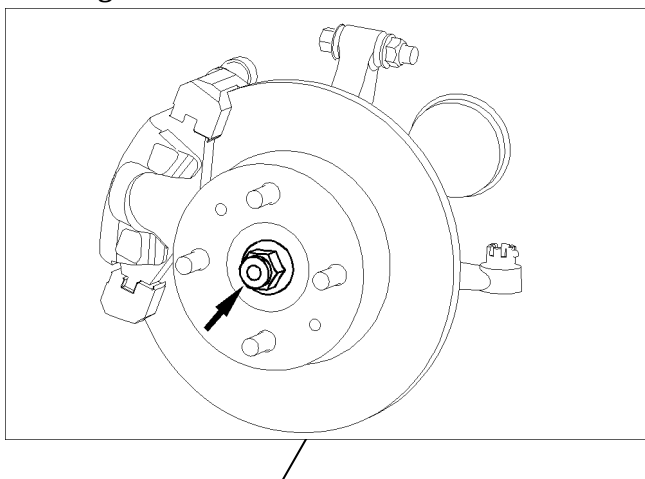
Note: Make sure the retaining ring is installed in the groove.

The driving axle is installed on the driving axle.

DISASSEMBLING AND INSTALLATION (Continued)



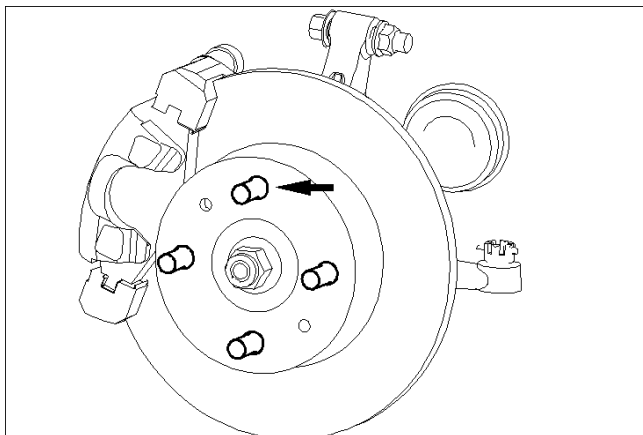
2. The driving axle is installed on the wheel hub bearing.



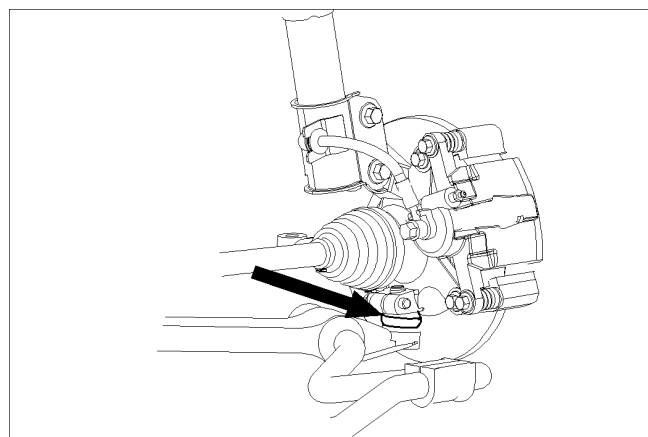
3. Note: The wheel hub fixing nut should be reinstalled.

Note: The wheel hub fixing nut should not be locked at this stage.

The wheel hub fixing nuts is installed.



4. The lower cross arm is installed in the steering knuckle.

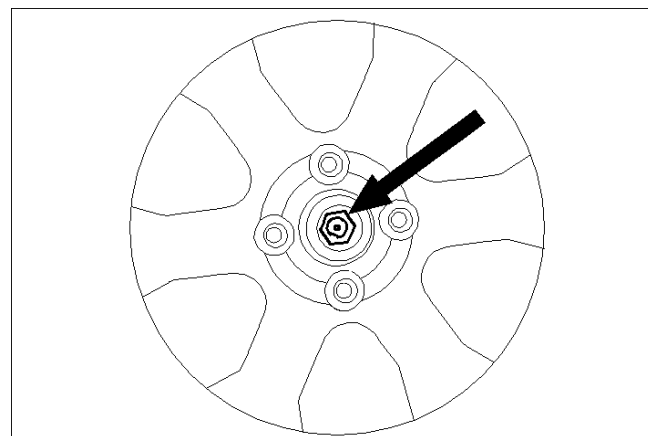


5. The wheel and tyre are installed. See Section 201-03 for relevant information.

6. The transmission oil level is checked. See Section 301-03 for manual transmission gear.

7. ⚠ Warning: The wheel hub retaining nuts should be locked through the socket for preventing it from being damaging.

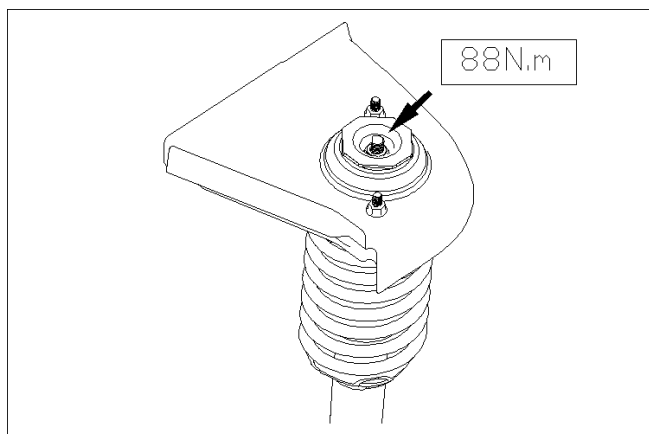
The wheel hub fixing nut is secured, and the locking pin is inserted. (the torque should be $200 \pm 10 \text{ Nm}$)



DISASSEMBLING AND INSTALLATION (Continued)

8.  **Warning:** The hexagonal socket wrench Is used to prevent the piston rod from rotating.

The fixing nuts on the front supporting column assembly are secured.



DISASSEMBLING AND INSTALLATION (Continued)

Driving axle(right)

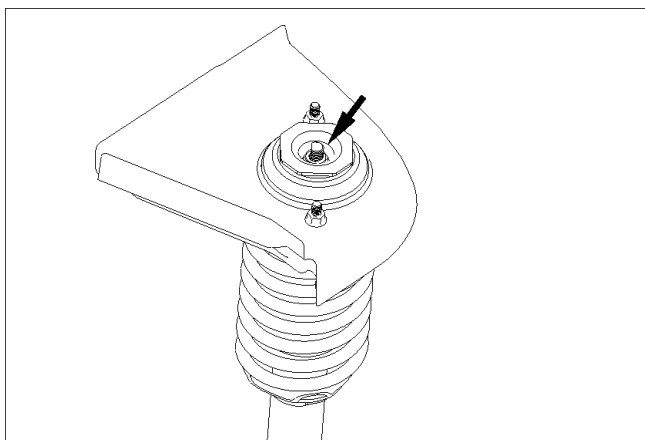
Use the special tool
puller (CA201-006)

General tool
Two-claw puller

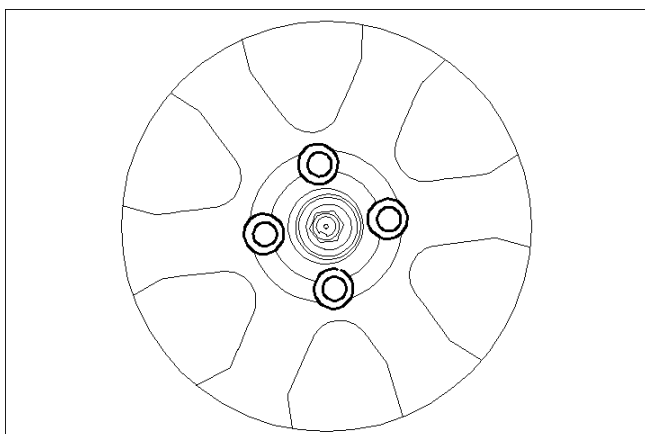
Dismounting

1.  **Warning:** The hexagonal socket wrench is used to prevent the piston rod from rotating.

The fixing nuts on the front supporting column assembly at left are loosened.

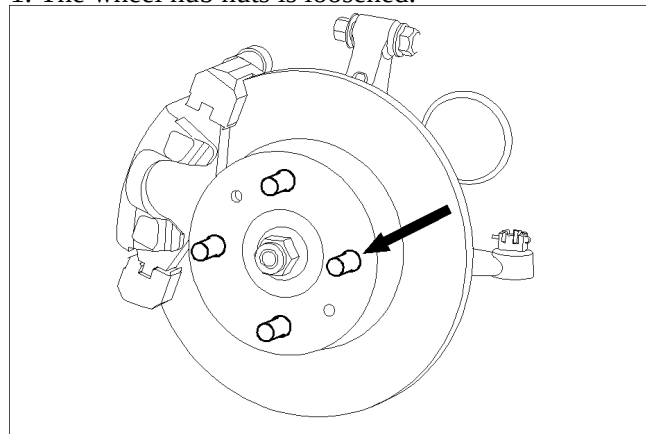


2. The wheels and tyres are dismounted. See Section 201-04 for relevant information.

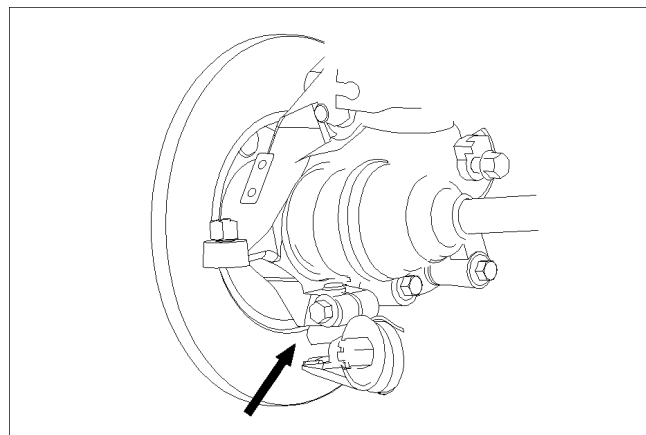


3.  **Warning:** The wheel hub fixing nuts are loosened by using the socket.

1. The wheel hub nuts is loosened.



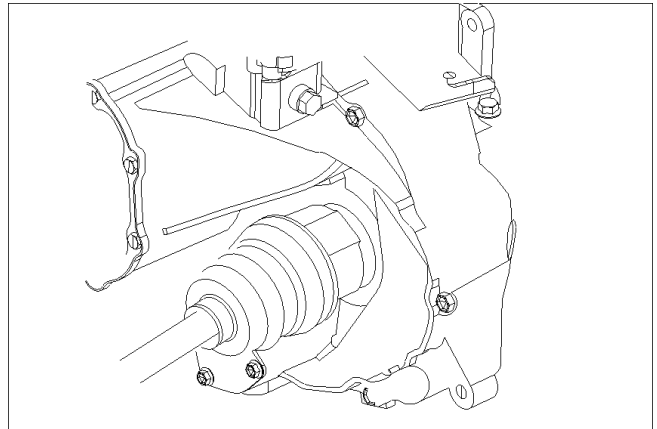
4. The front oscillating arm ball joint are taken out from the steering knuckle.



DISASSEMBLING AND INSTALLATION (Continued)

5.  **Warning:** The driving axle is well protected for fear that the constant speed universal joint is damaged. The working angle of the internal constant speed universal joint should not be more than 22.5 degrees. The working angle of the external constant speed universal joint should not be more than 45 degrees.

The driving axle is taken out from the wheel hub by using a suitable two-claw puller.



Installation

1.  **Warning:** The driving axle is well protected for fear that the constant speed universal joint is damaged. The working angle of the internal constant speed universal joint should not be more than 22.5 degrees. The working angle of the external constant speed universal joint should not be more than 45 degrees.

 **Warning:** When the driving axle is inserted, the oil seal installation sleeve (supplied along with the oil seal) is used to protect the oil seals.

Note: New retaining ring is installed.

Note: Make sure the retaining ring is correctly installed in the groove.

The driving axle is installed on the driving axle.

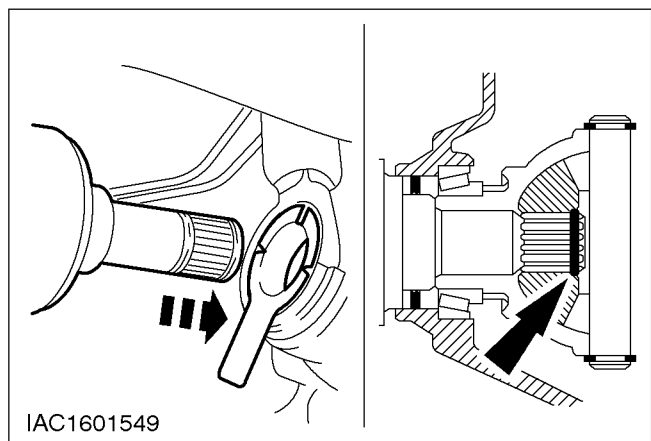
6.  **Warning:** The driving axle is well protected for fear that the constant speed universal joint is damaged. The working angle of the internal constant speed universal joint should not be more than 22.5 degrees. The working angle of the external constant speed universal joint should not be more than 45 degrees.

 **Warning:** Make sure that the oil seals of the driving axle are not damaged.

Note: The driving axle is plugged to prevent oil from losing or dirt from entering.

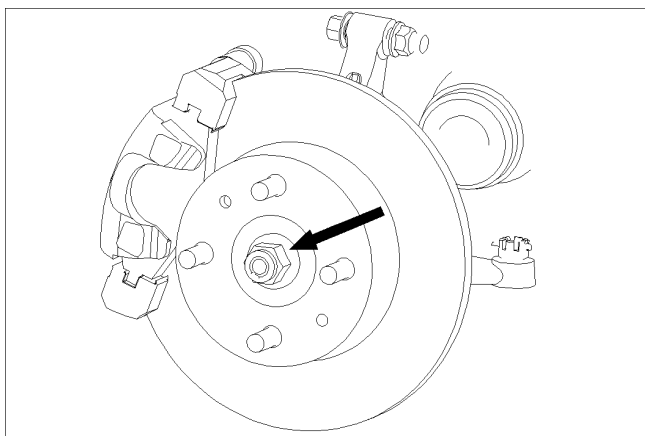
The driving axle is dismantled from the variator by applying skillful strength.

- The transmission oil is permitted to be discharged into a suitable container.



DISASSEMBLING AND INSTALLATION (Continued)

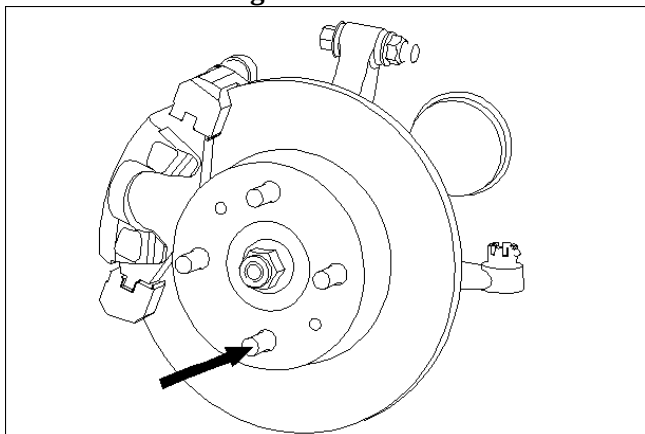
2. The driving axle is installed on the wheel hub bearing.



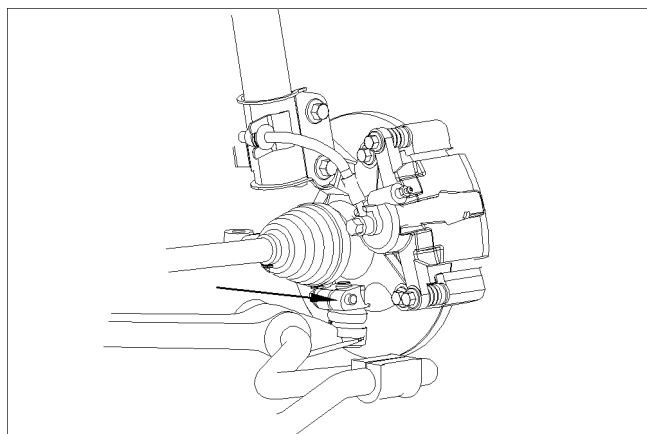
3. **Note:** The wheel hub fixing nut should be reinstalled.

Note: The wheel hub fixing nut should not be secured at this stage.

The wheel hub fixing nuts and washers are



4. The lower oscillating arm is installed on the steering knuckle.

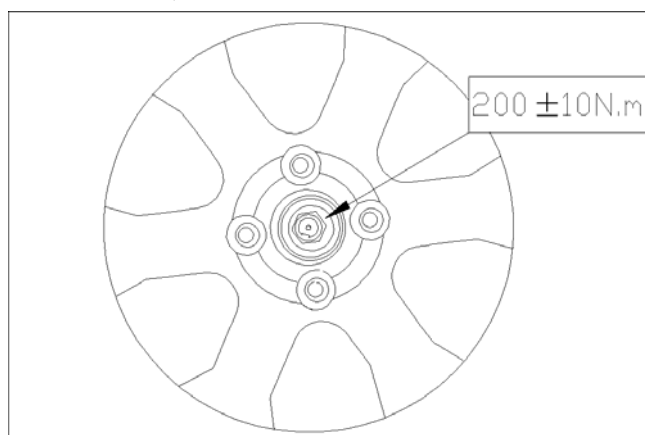


5. Install the wheel and tyre. See Section 201-03 for relevant information.

6. Check the transmission oil. See Section 302-03 for the manual transmission gear.

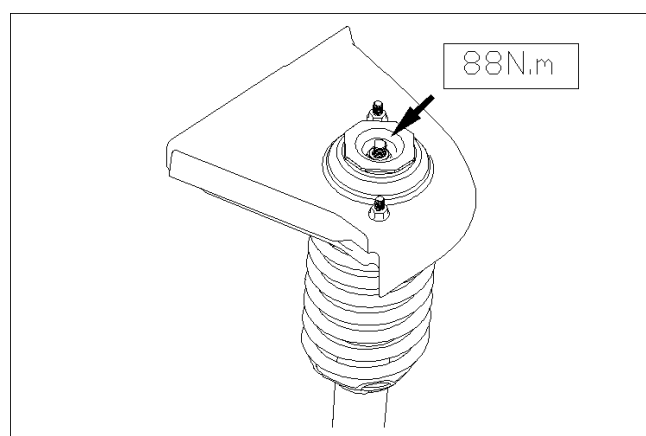
7.  **Warnings:** use socket wrench to fix the wheel hub fixing nut to prevent damage.

The fixing wheel hub fixing nut is inserted into the locking pin. (The tightening torque shall be $200 \pm 10 \text{ Nm}$)



8.  **Warning:** The hexagonal socket wrench is used to prevent the piston rod from rotating.

Fix the upper nuts on the front supporting column assembly.



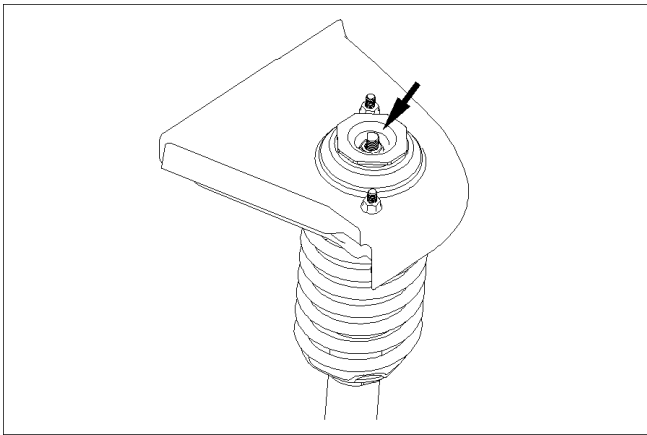
DISASSEMBLING AND INSTALLATION

Dust shield of the inner constant speed universal joint
Using the special tool: installation tool (CA201-008)

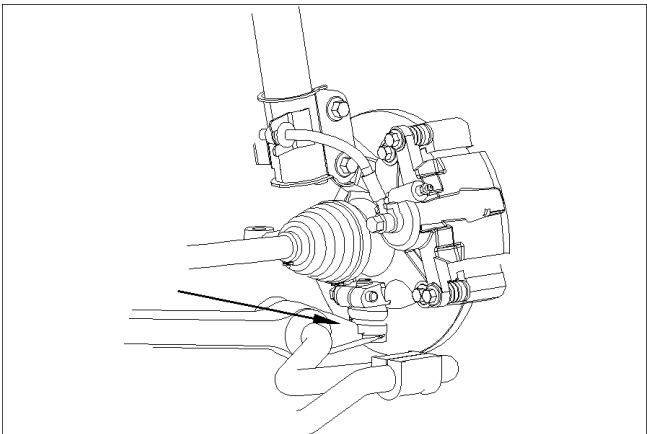
General Tool	
Retaining ring caliper	
Name	Model
High performance grease	G.A.Cpalex GTE
Tape	

Disassembly

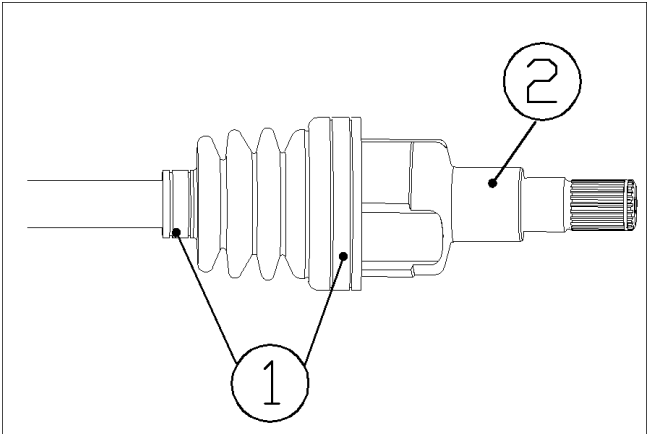
1. **Warning:** The hexagonal socket wrench Is used to prevent the piston rod from rotating.
- Loosen the fixing nuts on the supporting column of the suspension.



2. Hoist the vehicle.
3. Disassemble the front oscillating arm on the steering knuckle.



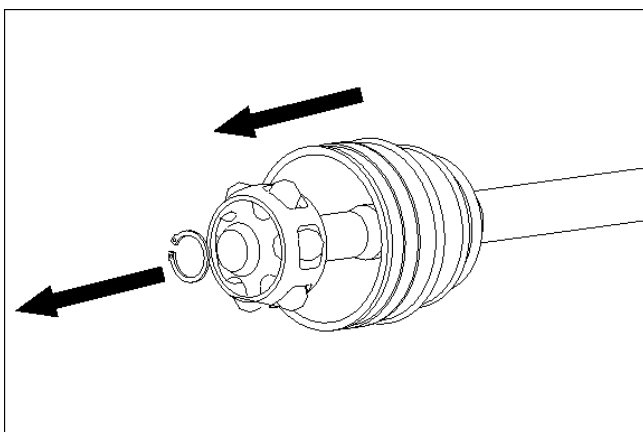
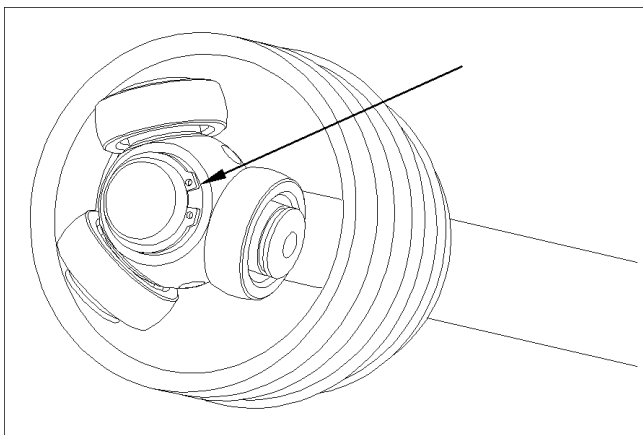
4. **Notes:** Use the protective shield.
- Loosen the nip of the dust shield from the transmission end. The sliding dust shield is nested on the driving axle.



5. **Disassemble the three-ball-pin type universal joint.**
- Eliminate the universal joint inner grease.

DISASSEMBLING AND INSTALLATION (continue)**6. Disassemble the triangular frame/ball-cage frame and dust shield.**

- Use the retaining ring caliper to take out the retaining ring and pull out the three-ball-pin type universal joint.
- Remove the dust shield.

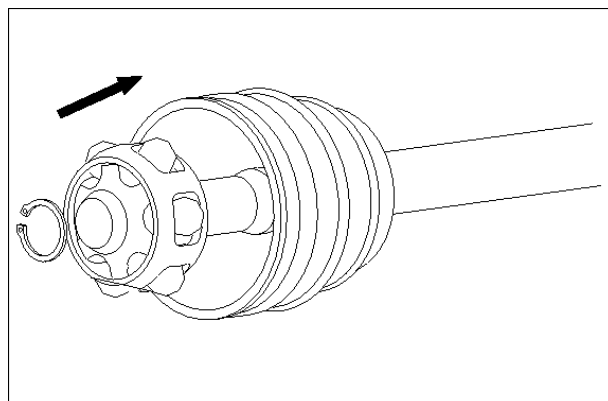
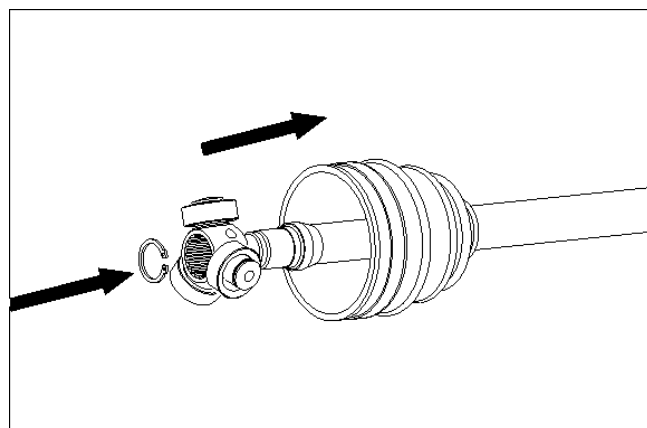
**Installation****1. Notes**

Replace all the retaining rings and nips.

2. Notes: the chamfer should point to the driving axle.

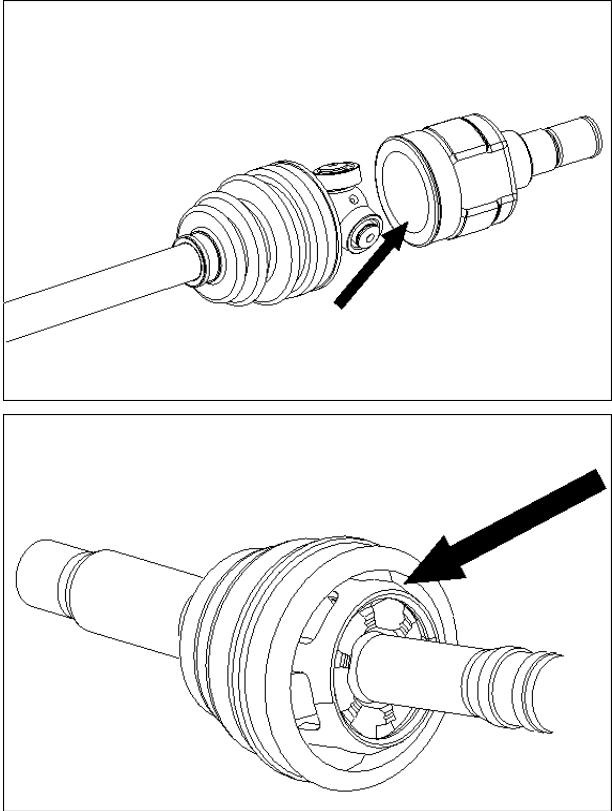
Install three-ball-pin/ball-cage type universal joint assembly.

- Cover the dust shield.
- Install and fix the three-ball-pin type universal joint.



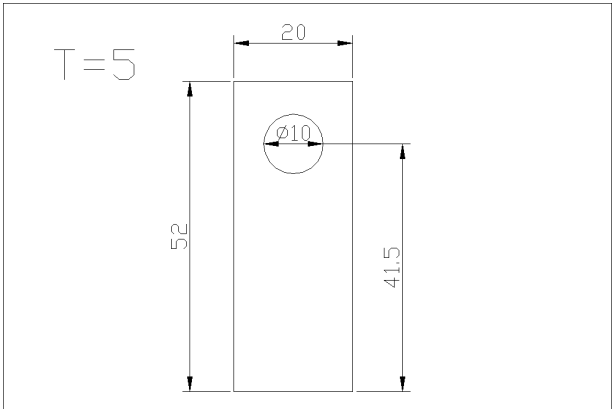
拆卸和安装 (续)

3. Fill the grease in the three-ball-pin type universal joint (G.A.Cpalex GTE).

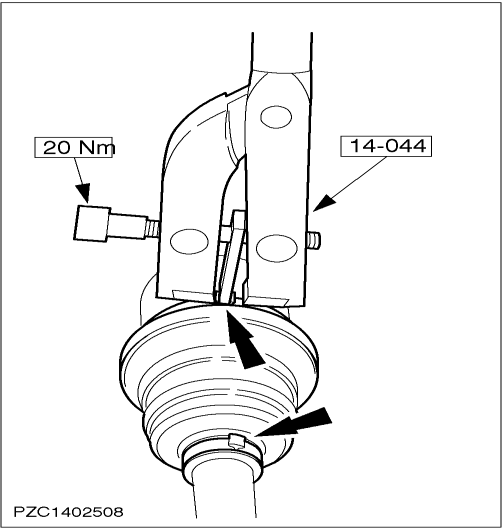


4. Configure a nip for the special tool 14-044.

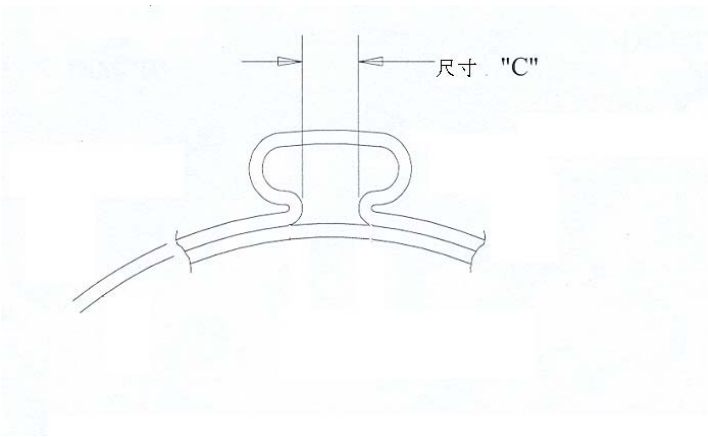
- Material: aluminum plate or steel plate



Use the special tool to fix the nip.



The size C of the opening of the nip is not bigger than 1.5mm after the large and small nip are tightly hooped.



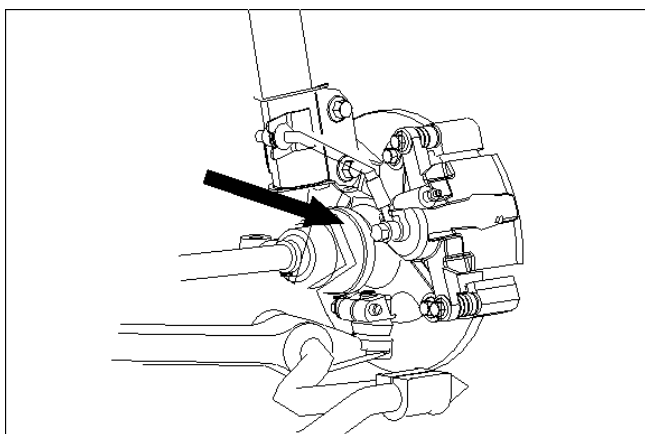
5. Install the dust shield and fix with a nip.

Use the special tool to install the nip.

Notes: the fixing torque of the 0.8mm nip is 12Nm and the fixing torque of the 1.1mm nip is 20Nm.

DISASSEMBLING AND INSTALLATION (continue)

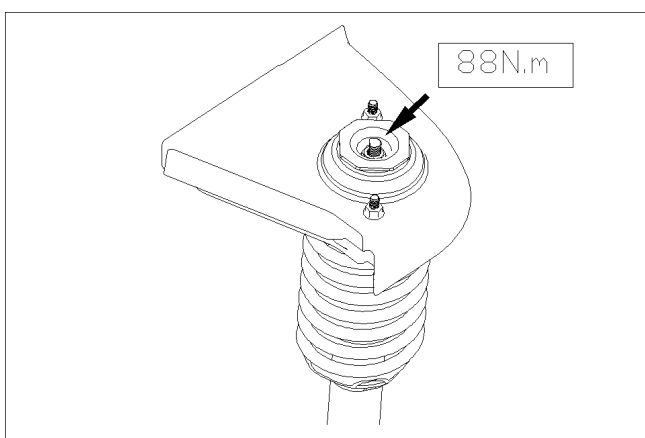
- 6. Install the front oscillating arm in the steering knuckle.**



- 7. Put down the automobile.**

- 8. Warning: The hexagonal socket wrench is used to prevent the piston rod from rotating.**

Fix the nuts of the front supporting columns of the suspension.



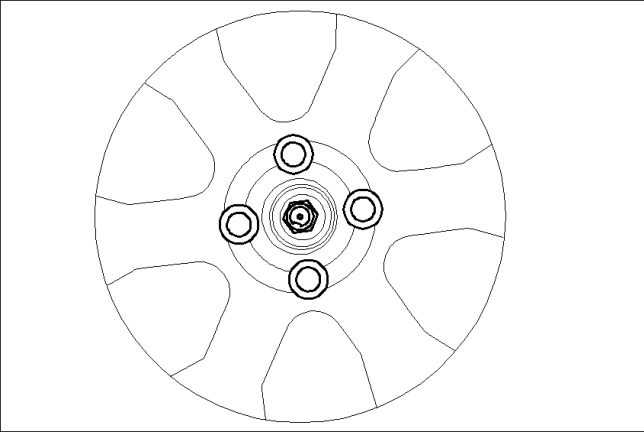
DISASSEMBLING AND INSTALLATION

Dust shield of the external constant speed universal joint (including the universal joint)

General Tool	
Retaining ring caliper	
Name	Model
High performance grease	G.A.Cpalex GTE
Tape	

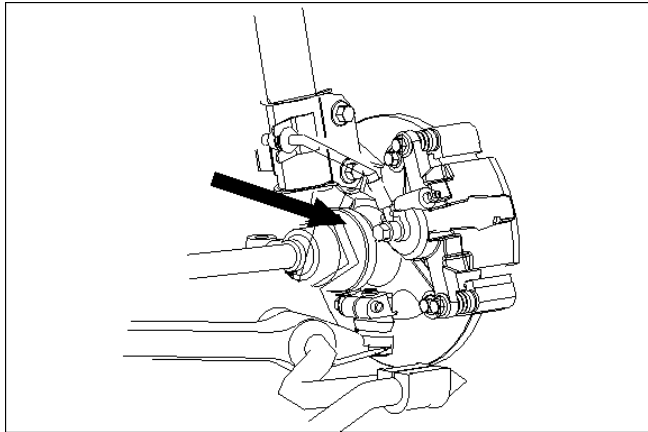
2. Disassemble the wheel and tyre. See Section 201-03 for relevant information.

Take out the locking pin, and use the socket wrench of 32mm to loosen the wheel hub nuts.



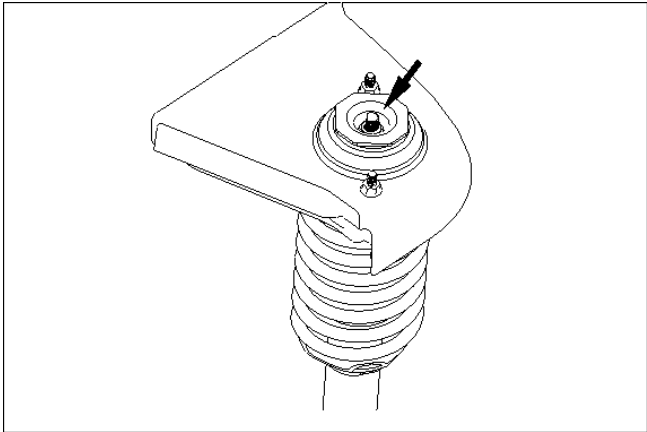
3. Automobile hoisting. See Section 100-01 for relevant information.

4. Disassemble the front oscillating arm in the steering knuckle.



Disassembly

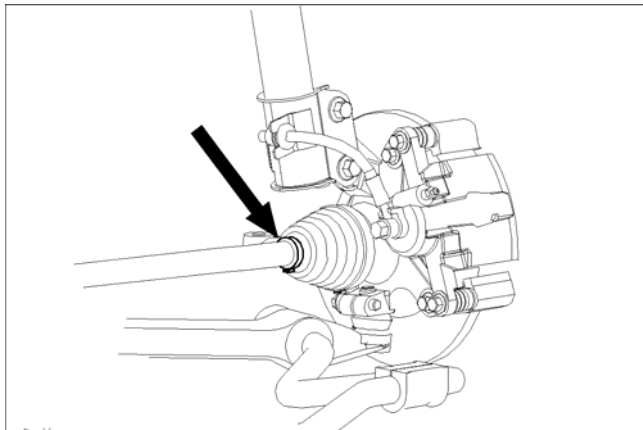
1. Warning: The hexagonal socket wrench Is used to prevent the piston rod from rotating.
Loosen the fixing nuts on the left and right front



DISASSEMBLING AND INSTALLATION (Continued)

5. Loosen the nips on the dust shield.

Slide the dust shield on the driving axle.

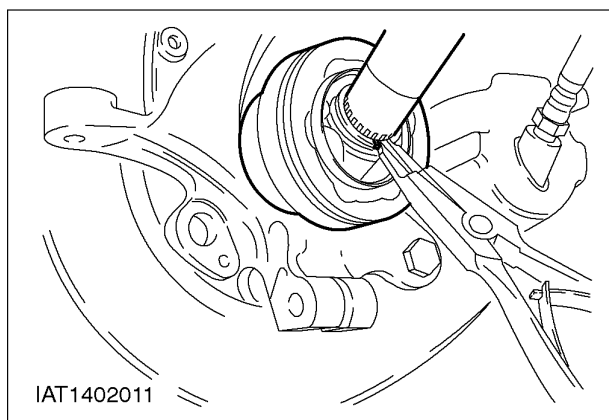


6.  **Warnings:** the working angle of the inner constant speed universal joint can not surpass 22.5°. The working angle of the external constant speed universal joint can not surpass 45°.

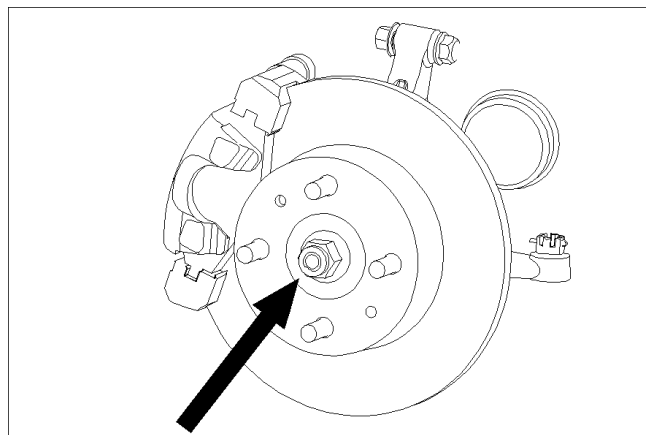
 **Warnings:** slightly push the wheel suspension outward avoiding the damage of the inner constant speed universal joint.

Take out the driving axle from the universal joint of the driving axle.

- Take out the dust shield and fix the driving axle.
- Eliminate the grease in the universal joint.
- Use the retaining ring caliper to expand the retaining ring and keep the retaining ring in expansion state.
- Take out the retaining ring.



Disassemble the driving axle nut, and take out the locking pin and the washer.



Installation

1. Notes

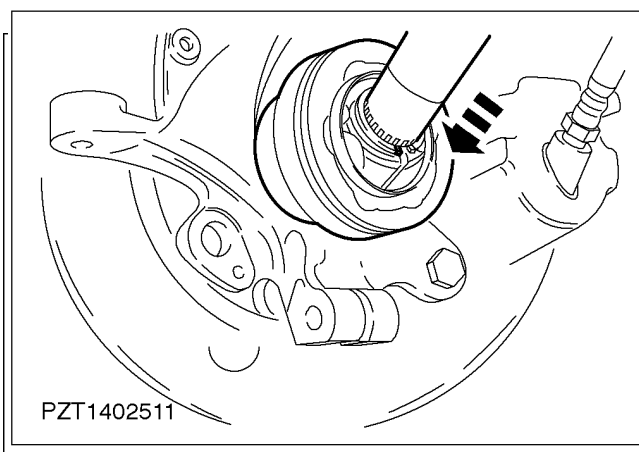
- Replace all the retaining rings and nips.

- 2. Notes:** Make sure that the retaining ring is well installed.

安装驱动轴。

Install the driving axle.

- Install new retaining ring in the driving axle groove.
- Sliding the dust shield on the driving axle.
- Insert the driving axle into the universal joint of the driving axle until the retaining ring (or clipping ring) is clipped.



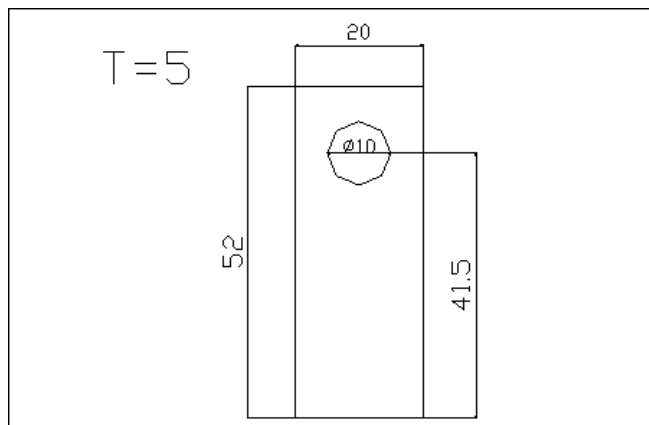
- 3. Fill in high performance grease (G.A.Cpalex GTE).**

Quantity: 70 plus or minus 10 grams.

- 4. Configure a nip for the special tool 14-044.**

DISASSEMBLING AND INSTALLATION (Continued)

- Material: aluminum plate or steel plate

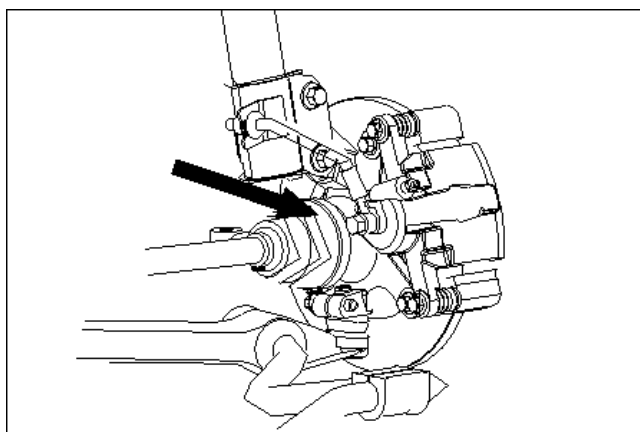


5. Well install the universal joint of the driving axle and fix the universal joint of the driving axle with a new nip.

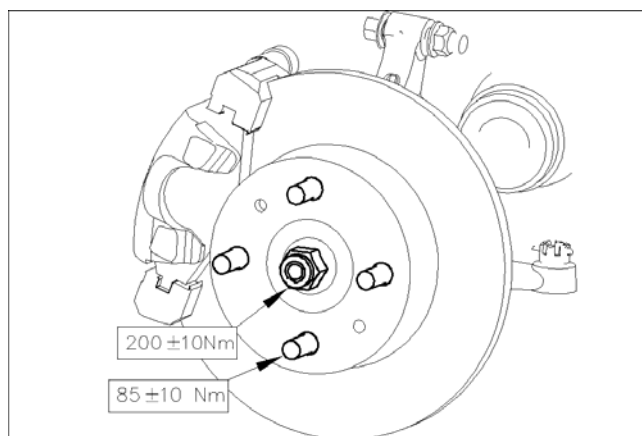
- Use the special tool to clip the head of the nip.
- Install the nip.

Notes: The fixing torque of the 0.8mm nip is 12Nm and the fixing torque of the 1.1mm nip is 20Nm.

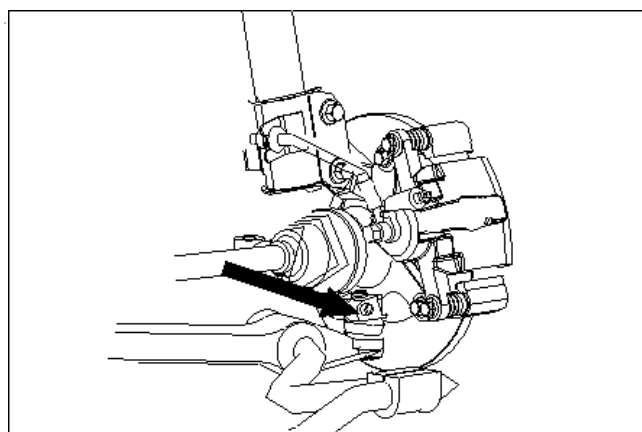
- Use the special tool to fix the nip.



6. Install wheel hub fixing nuts and washers, and insert the locking pin. Fix the tyre nuts (The torque is 85 ± 10 Nm) and the hub faxing nuts (The torque is 200 ± 10 Nm) .



7. Install the front oscillating arm in the steering knuckle.

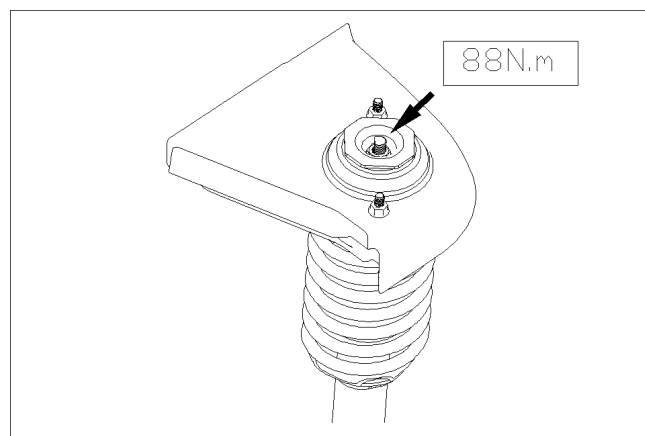


8. Install the wheel and tyre. See Section 201-03 for relevant information.

DISASSEMBLING AND INSTALLATION (Continued)**9. Put down the automobile**

- 10. 1. Warning: The hexagonal socket wrench Is used to prevent the piston rod from rotating.**

Fix the nuts of the suspension supporting columns.



DISASSEMBLY AND ASSEMBLY

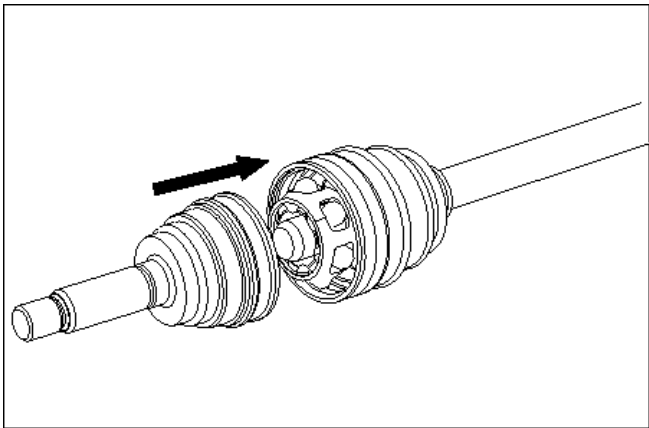
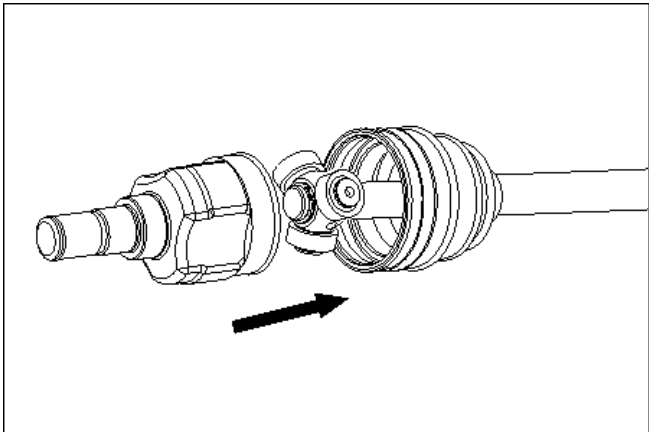
The special tool for semi-axle (movable joint): caliper (CA201-002)

General Tool	
Retaining Ring Caliper	

Name	Model
High Performance Grease	G.A.Cpalex GTE
Nip of Dust Shield	

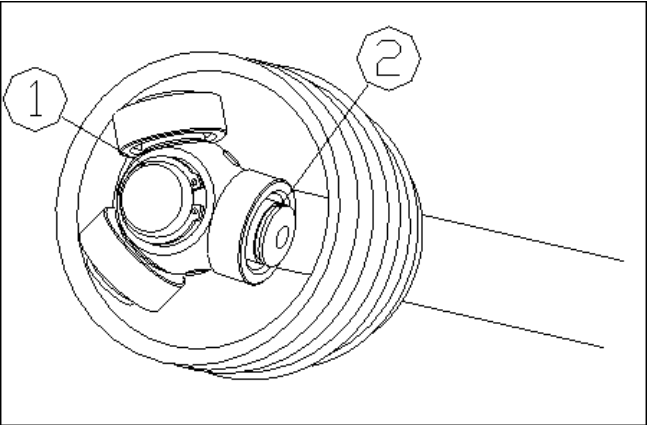
2. Uncover the inner constant speed universal joint housing.

- Eliminate the grease.

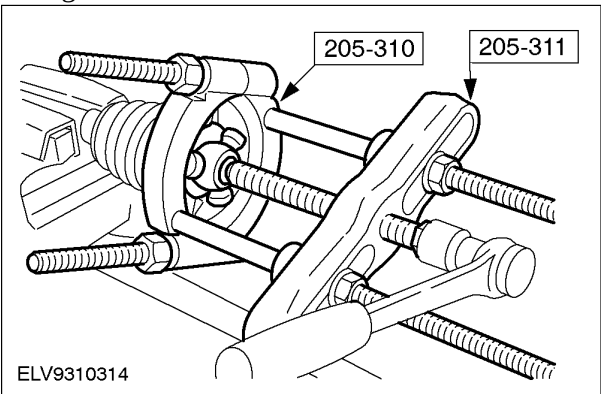


3. Disassemble the three-ball-pin/ ball-cage and dust shield.

1. Disassemble the retaining ring.
2. Uncover the dust shield.
3. unlock three-ball-pin frame, and disassemble the rolling column.

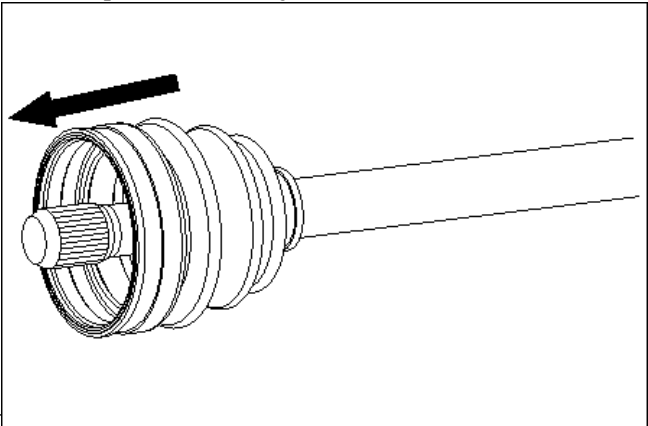


unlock the ball pin assembly according to the following diagram



4. Disassemble and discard the nip of the dust shield.

1. Take off the sliding dust shield, and clear away grease.
2. Take out the driving axle from the constant speed universal joint.



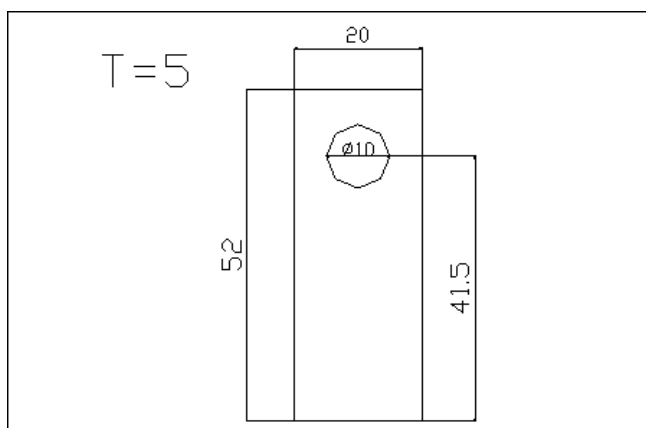
DISASSEMBLY AND ASSEMBLY (continued)

Assembly

- Notes: replace all the retaining ring and nip of the dust shield.

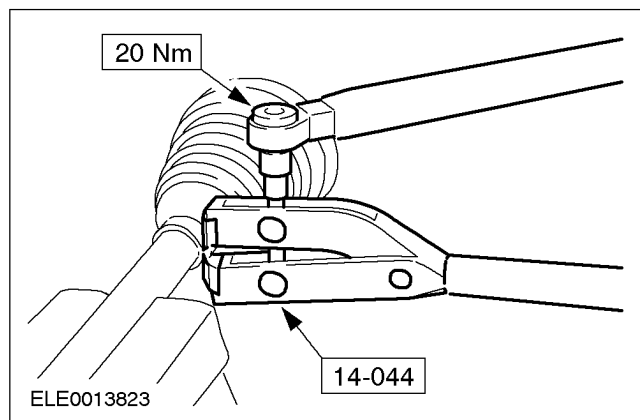
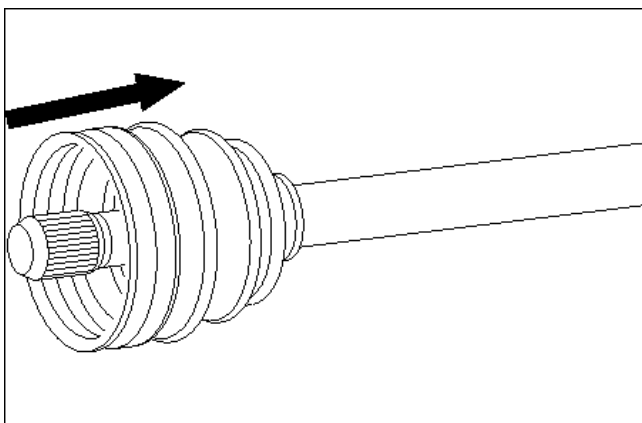
Configure a nip for the special tool 14-044.

- Material: aluminum plate or steel plate.



- Notes: the fixing torque of the 0.8mm nip is 12Nm and the fixing torque of the 1.1mm nip is 20Nm..

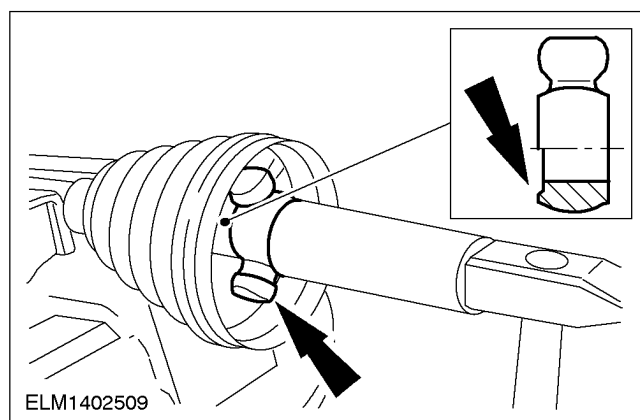
Nest the dust shield and small nip on the axle rod, place the nip in the groove of the dust shield and fix the groove of the dust shield with the special tool.



- Warnings: do not damage the bearing seat of the rolling column.**

Install the ball pin frame (only for driving axle side of the driving axle)

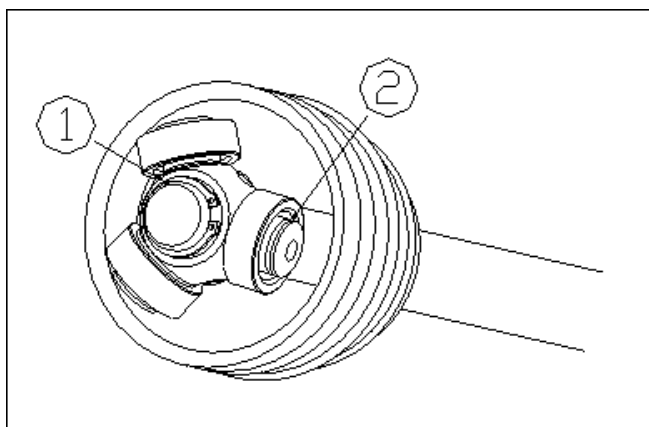
- Use proper pipe to install the ball pin frame to the place where is most near the driving axle.



Notes: use a new retaining ring, and make sure the retaining ring is well installed.

The front face of the three-ball-pin frame points to the driving axle.

- Install the nip of the inner dust shield on the driving axle.
- Install constant speed rolling column.
- For the three-ball-pin frame, use the sharp nose pliers to fix the new retaining ring (clipping ring on the axle end).

DISASSEMBLY AND ASSEMBLY (continued)

4. Notes: use new retaining ring, and make sure the retaining ring is well installed.

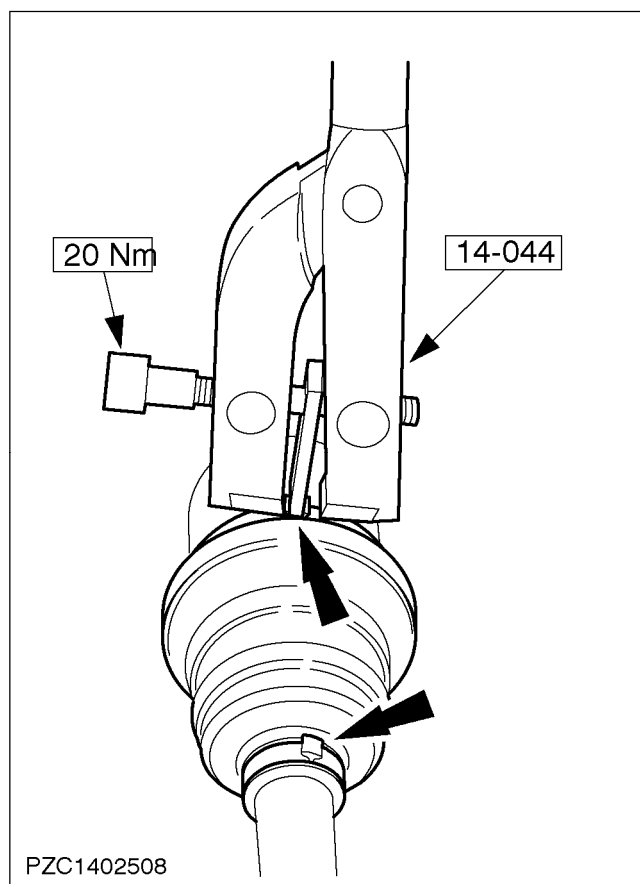
5. Notes: do not damage the installing surface of the dust shield.

Fill high performance grease in the constant speed universal joint housing and dust shield.

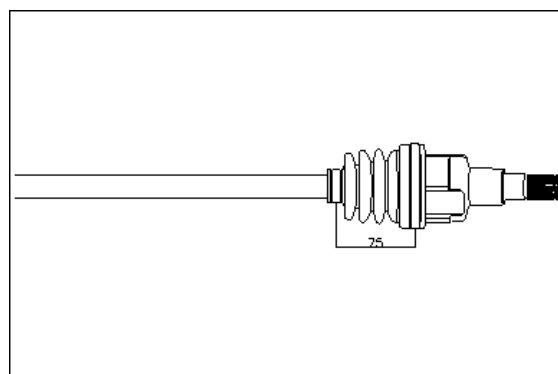
Well install the movable universal joint

6. Notes: the fixing torque of the 0.8mm nip is 12Nm and the fixing torque of the 1.1mm nip is 20Nm.

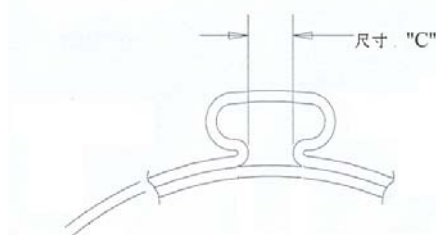
1. Move the dust shield of the constant speed universal joint to installation position. Use a new nip for fixing.
2. Insert the custom-made compression component into the special tool.
3. Insert a small screwdriver under the edge of the dust shield to make the air overflow.
4. Well install the special tool, and make the compressor close to the clipping head of the nip.
5. Take out the screwdriver. Use the special tool to fix the nip.
6. Take away the special tool.



Keep the dust shield in the length and size state in the diagram



The size C of the opening of the nip is not bigger than 1.5mm after the large and small nip are tightly hooped.



DISASSEMBLY AND ASSEMBLY (continued)

DISASSEMBLY AND ASSEMBLY

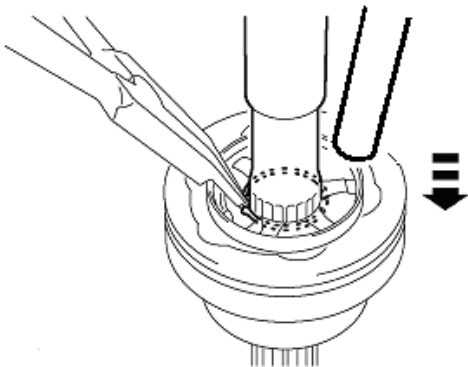
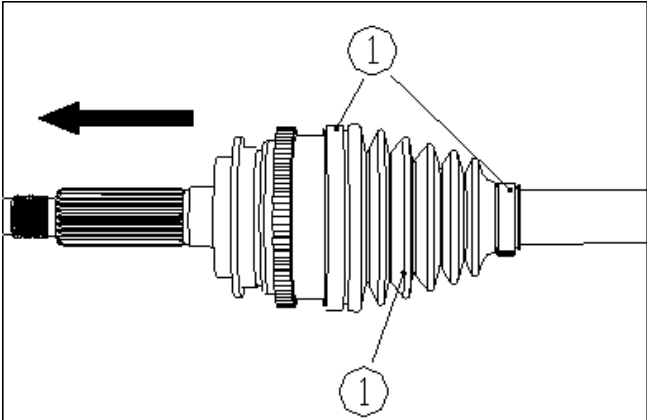
Semi-axle (fixing joint)

General Tool	
Retaining ring caliper	
Tape	

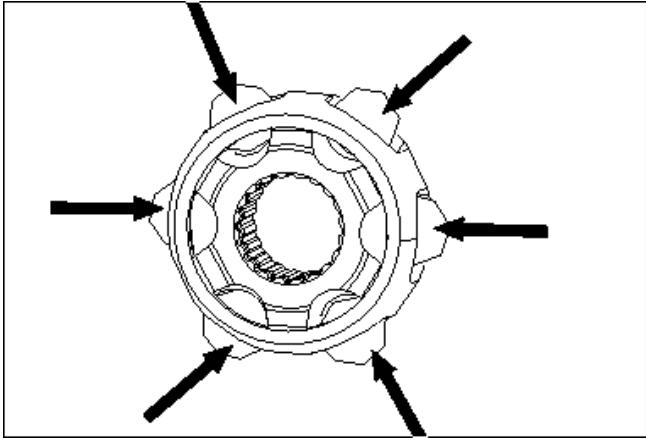
Name	Model
High Performance Grease	

1. Disassemble the dust shield of the fixing joint of the driving axle.

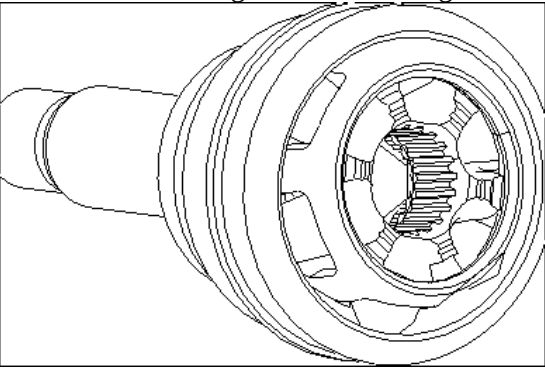
- 1. Loosen the large and small nips with a screwdriver.
- 2. Uncover the dust shield.
- 3. Eliminate the grease.



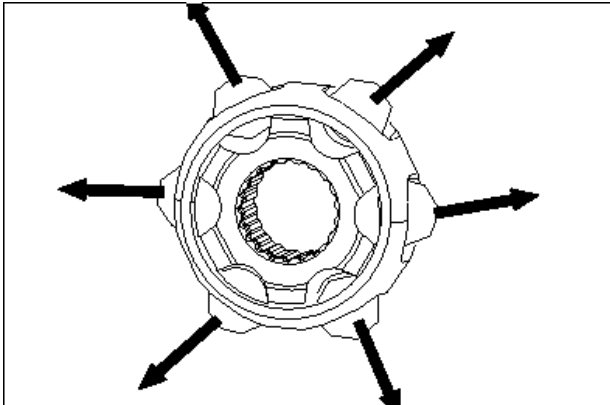
Take out the driving axle from the universal joint.
Take out the retaining ring from the universal joint.
Take out the dust shield.



Rotate the ball cage and the ball-cage frame.
Take out the ball cage and the ball-cage frame



Take out the rolling ball from the ball cage.



2. Take out the ball cage and the ball-cage frame in the housing. (Wheel side)

Insert the clipping ring at the intermediate position of the notch of the inner ring groove
Open the clipping ring with sharp nose pliers.
Slightly knock with a copper bar, and disassemble the constant speed universal joint.

DISASSEMBLY AND ASSEMBLY (continued)

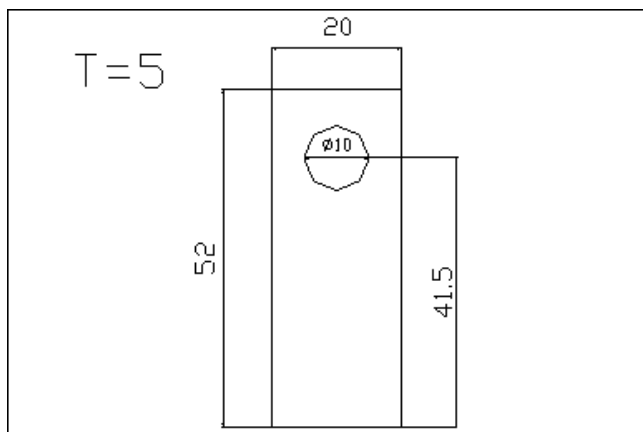
3. Notes: make sure that the ball cage, housing, rolling ball and frame are free from the grease and engine oil.

Inspect the wear of the motion surface.

Assembly

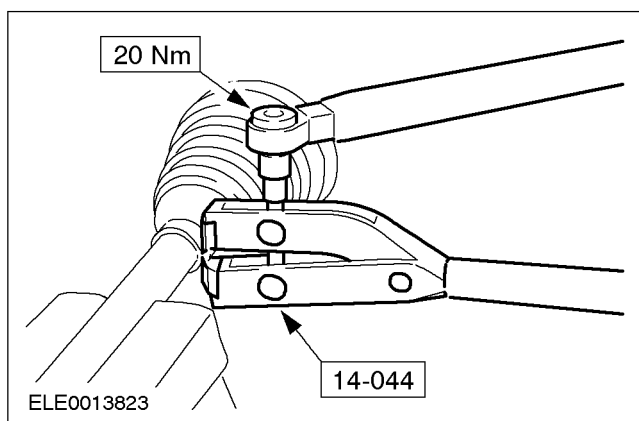
1. Configure a nip for the special tool 14-044.

- Material: aluminum plate or steel plate



2. **Notes:** the fixing torque of the 0.8mm nip is 12Nm and the fixing torque of the 1.1mm nip is 20Nm.

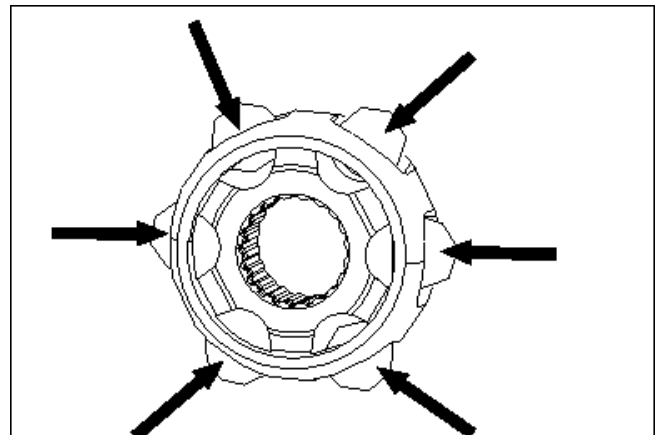
Place the nip in the groove of the dust shield, and fix with the special tool.



3. Install the ball cage.

1. Install the ball cage on the ball-cage frame.

2. Install the ball cage and the ball-cage frame in the housing.



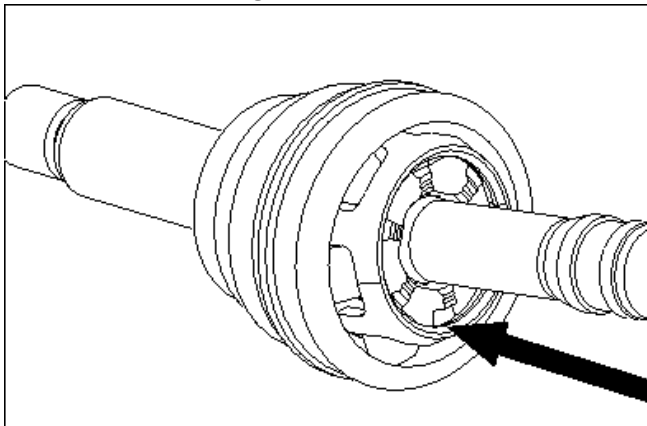
3. Rotate the ball cage and the ball-cage frame.

DISASSEMBLY AND ASSEMBLY (continued)

4. Notes: make sure the retaining ring is well installed.

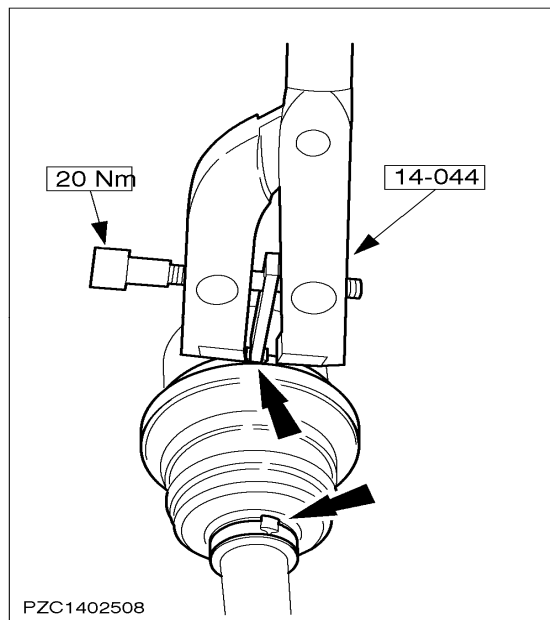
Install the driving axle in the universal joint.

- Nest the dust shield and inner nip.
- Insert a new retaining ring in the universal joint of the driving axle.
- Insert the driving axle in the universal



6. Fill the high performance grease in the outer universal ring of the driving axle and then fix the dust shield.

- Nest the dust shield.
- Use the special tool. Ensure that the special tool nip vertical to the clipping head of the nip.



Section 203-00: Steering System-General

Applicable Vehicle Model: BENNI MINI

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Diagnosis and Test	
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Road Test	203-00-4
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Component Test	203-00-19
Inspection Braking System	203-00-19
Inspection Brake Booster Function	203-00-19
Common Procedures	
Exhausting of Braking System..... (12 141 0)	203-00-22
Pressure Exhausting of Braking System..... (12 141 0)	203-00-23
Run-Out of Brake Disc Measurement..... (12 221 0)	203-00-24

Specifications

Grease, Oil Fluid, Sealant and Bonding Agent

Name	Model
Braking Fluid	HZY4

Specifications of Disc Type Brake

	mm
Diameter of Brake Disc	236
Normal thickness of Brake Disc	12.5
Disabled thickness of the brake disc	9.7
Maximum Run-out Amount of Brake Disc (arranged)	0.1
Maximum Thickness Variation Value of Brake Disc	0.015
Piston Diameter of Brake Caliper	48
Minimum Thickness of Brake Friction Block	3

* When the brake disc reaches the disabled thickness, the brake disc must be replaced. When the polishing treatment is performed for the brake disc which does not reach the disabled thickness, special attention shall be paid.

Specifications of Drum Type Brake

	mm
Normal Thickness of New Brake Drum	180
Disabled Diameter of Brake Drum	182
Inner Diameter of Braking Cylinder	17.46 (ABS) 15.87 (WITHOUTABS)
Thickness of Friction Lining Surface of New Master Brake Shoe	4.5
Thickness of Friction Lining Surface of New Distributed Brake Shoe	4.5
Disabled Thickness of Friction Lining Surface of Brake Shoe	1.5

* When the diameter of the braking drum reaches the disabled standard, the brake drum must be replaced. When the polishing treatment is performed for the brake drum which does not reach the disabled thickness, special attention shall be paid.

Instruction and Operation

Braking System

This braking system adopts the double loops and diagonal arrangement, the front-disc-rear-drum or the front-disc-rear-disc braking system.

Each pair of wheels is provided with the hydraulic system of the independent loop. The front brake caliper is arranged on the steering knuckle and is a floating caliper type brake caliper, and then the equal size of the braking force exerted on the two brake friction linings can be ensured.

The brake drum adopts the conventional design and is composed of the brake leading shoe and trailing shoe bonded with thick/thin inner linings. The inner linings adopt the thick/thin design allow the brake shoe wearing at a certain rate. The braking system can be freely adjusted in the foot braking.

The controlling rod of the parking braking is positioned between two front seats, and the rear brake is controlled by the dragline device. The parking braking can be adjusted in the hollow box on the vehicle.

The master braking pump adopts the vertical series connection design and is directly connected with the booster, which can reduce the force exerted on the brake pedal. The vertical series connection design can ensure that when one braking loop fails and the other braking loop still keep the perfect working state. The master braking pump and the brake booster are positioned at the left side of the engine compartment.

The proportioning valve is arranged below the outlet of the master braking pump by the basic configuration. The proportioning valve can control the hydraulic pressure acted on the rear brake to reduce the danger of locking when the rear wheel is brake

Diagnosis and Test

Braking System

The braking system transmits the force exerted on the brake pedal by the driver to the brake of each wheel.

The hydraulic system transmits the braking force to each wheel. The vacuum brake booster can reduce the force exerted on the brake pedal and increase the braking pressure.

The parking braking is controlled by using the manual controlling rod and acts on the rear wheel.

Inspection and Confirmation

Notes: Confirm that the warning indication lamp of the braking system is normal before diagnosis.

1. Confirm the customer's problem.
2. Visually inspect the obvious mechanical failure.

Visual Inspection Table

Machinery
– Tyre Pressure – Wheel and Tyre – Leakage of Braking Pipeline

3. If the obvious failure is found, the failure is settled before performing the next step (if possible).
4. If the failure phenomenon is not obvious, confirm this failure and refer to the Failure Inspection Table.

Road Test

The implementation of the road test is to compare the practical braking performance of the vehicle with the standard braking performance the driver expected. The driver's correct comparison and his ability of determining the braking performance depend on the experience of the vehicle testing driver. The vehicle testing driver must have the complete knowledge of the working principle of the braking system and have received the systematic direction to perform the correct comparison and discover problems.

The experienced technician will select a route for the braking diagnosis road test. The road surface of the route shall be flat but not be the pebble or bumpy road. It is mainly because that the pebble or bumpy road

makes the adhesive forces of the tyre and the road surface different. The arch road is also not suitable, because the weight of the vehicle body is mostly concentrated on the two lower wheels. Once the route is conformed and usually used, the road factor will not be considered.

The description of the failure from the customer should be known about before the road test. According to the description, the technician can relate the possible reasons with the symptom. Some parts can be seen as the suspected reason, while the others can be eliminated. What is more important is that the unsafe hidden dangers can be inspected or eliminated before the road test according to the description from the customer. The problem can be concentrated on the specific components, the vehicle speed or situation, which is helpful to decide the method of road test.

The road test shall start with the common braking performance inspection. According to the description from the customer, inspect the braking of vehicles of various speeds with various pedal pressures. When it is judged whether the problem exists in the front or rear braking system, the braking is implemented by first using the pedal braking and then using the parking braking. If the symptoms (hoisting, vibration and rhythmic jumping) only occur in using the parking braking, which indicates the problem exist in the parking braking.

The brake locking and tyre lagging shall be avoided in the road test. This situation does not indicate that the braking is effective. The powerful braking and keeping the wheel rotating can make the automobile stop in a shorter distance than the brake locking.

If the failure is very obvious in the test, confirm this failure is matched with the description. If the failure is not obvious, try to re-appear the situation by using the information from the description.

If the failure exists, resolve the problems in the specific subsystem and the relevant status description by using the Failure Inspection Table. The reasons can be reduced to the specific portion or status by a list of the possible reasons through using the described phenomena.

Phenomenon	Possible Reasons	Contents/results/measures
• Brake Slip or Deviation	• The brake shoe or the inner lining of the braking disc is worn or damaged	• Replace the brake shoe or the brake disc
	• The front brake disc is improperly worn or bent	• Replace the front brake disc
	• The rear braking adjustment is not correct	• Adjust the parking braking dragline. See 203-03

Diagnosis and Test (continued)

Phenomenon	Possible Reasons	Contents/results/measures
	•The wheel alignment is not correct	•Perform the wheel alignment. See 201-00
	•The load adjustment of the wheel bearing is not correct	•Adjust or replace the wheel bearing. See 203-02.
	•The tyre pressure is not consistent	•Adjust the tyre pressure
	•The oil fluid or butter is adhered on the brake shoe or the brake disc	•Replace the brake shoe or the brake disc
	•The brake caliper is deadlocked	•Turn to the fixed point inspection A.
• The brake warning indicating lamp always light	•The level of the braking fluid is too low	•Fill the braking fluid. Inspect the braking and clutch system including the brake booster leakage.
	•The primary piston cap of the master braking pump leaks	•Replace the master braking pump
	•The parking brake control is not completely released	•Loosen and adjust the parking braking dragline. See 203-03. Replace the component if necessary
	•The short circuit occurs in the indication lamp circuit	•Turn to the fixed point inspection B.
•Vibration occurs in baking	•Oil is attached to the brake shoe or the brake disc	•Replace the brake shoe or the brake disc
	•The brake disc or the brake shoe is worn or damaged	•Replace the brake shoe or the brake disc
	•The installation bolt of the brake caliper is loosened	•Tighten the installation bolt of the brake caliper
	•The lubrication of the sliding components is insufficient	•Fill oil if necessary
	•The contacting surface of the brake drum is damaged	•Replace the brake drum
	•The bolts of the wheel hub is loosened or lost	•Tighten or replace the bolts of the wheel hub •Turn to the fixed point inspection C.
•The pedal is rapidly sunk	•The hydraulic system leaks	•Repair the leakage. Inspect the entire hydraulic system. Fill up and exhaust the braking system
	•Air exists in the system	•Inspect the leakage. The exhausting of the braking system. See 203-00.
	•The primary piston cap of the master braking pump is worn or the cylinder body is cracked	•Replace the master braking pump

Diagnosis and Test (continued)

Phenomenon	Possible Reasons	Contents/results/measures
	•The “aftershock” of the brake disc (The brake caliper piston is pushed backwards into the brake caliper by the friction plate due to the too large axial run-out of the braking disc or the loosened vehicle wheel bearing)	•Replace the brake disc. See 203-01
	•The brake shoe or the brake disc is abraded	•Replace the brake shoe or the brake disc. •Turn to the fixed point inspection D.
• The pedal is slowly sunk	•Air exists in the system	•The exhausting of the braking system. See 203-00.
	•The mater braking pump fails	•Turn to the fixed point inspection E.
•The pedal position is low or feels soft	•The brake shoe is abraded	•Replace the brake shoe or the brake disc
	•The hydraulic system	•Turn to the fixed point inspection F.
•The braking is locked when slightly step on the pedal	•The tyre pressure is not correct	•Adjust the tyre air pressure
	•The tyre is abraded	•Replace the tyre
	•The brake shoe or the brake disc slips or is abraded	•Replace the brake shoe or the brake disc
	•The brake booster	•Turn to the fixed point inspection G.
• The pedal travel is too large or instable	•The brake shoe or the brake disc is abraded	•Replace the brake shoe or the brake disc
	•The brake disc	•Turn to the fixed point inspection H.
•The brake is dragged	•The brake booster •The brake lamp switch adjustment is not correct •The control valve of the braking pressure •The brake caliper or braking pump is deadlocked •The parking braking acts or fails •The parking braking dragline is stuck •The sliding pin of the parking braking is stuck	•Turn to the fixed point inspection. •Adjust the brake lamp switch
•The brake pedal is too largely forced	•The brake booster does not act	•Perform the brake booster test
	•The brake shoe or the brake disc is abraded or polluted	•Replace the brake shoe or the brake disc •Turn to the fixed point inspection J.
•The braking noise	•The brake shoe or the brake disc is abraded	•Replace the brake shoe or the brake disc
	•The brake booster	•Turn to the fixed point inspection K.

Diagnosis and Test (continued)

Phenomenon	Possible Reasons	Contents/results/measures
•The pedal return is low or incomplete	•The brake booster •The master braking pump	•Turn to the fixed point inspection L.

Fixed Point Inspection

Fixed Point Inspection A: Brake Slip or Deviation

Phenomenon	Measures
A1: Road Test	
	1 The automobile performs the road test and steps on the brake pedal • Does the automobile deviate or slip? Yes Turn to A2 No The automobile has no failure
A2: Tyre Air Pressure	
	1 Inspect the tyre abrasion and the tyre air pressure • Is the tyre situation good? Yes Turn to A3 No Adjust the tyre air pressure. Replace the severely abraded tyre. Test and operate the system to see if it is in the normal condition.
A3: Inspection of the brake shoe or the brake disc and the inner lining	
	1 Inspect whether the inner lining of the brake shoe or the brake disc leaks and the abrasion situation. • Does the above situation exist? Yes Replace the brake shoe or the brake disc. Test and operate the system to see if it is in the normal condition. No Turn to A4
A4: Measure the right rear pressure control valve	
	1 Connect the pressure gauge on the left front or right rear air outlet. Step on the brake pedal, and the reading of the left front wheel is 6895 kPa (1000 psi). - Read the reading of the right rear wheel. • Is the reading of the pressure gauge between 4692 kPa to 5164 kPa (680-750 psi)? Yes Inspect the brake caliper and replace the components if necessary. Turn to A5 No

Diagnosis and Test (continued)

Phenomenon	Measures
	Replace the pressure controlling valve of the right rear wheel. The braking system exhausts. Refer to the Chapter 203-00. Test and operate the system to see if it is in the normal condition.
A5: Inspect the Left and Right Pressure Controlling Valve	
	1 Connect the pressure gauge on the right front or left rear air outlet. Step on the brake pedal, and the reading of the right front wheel is 6895 kPa (1000 psi). - Read the pressure of the left rear wheel. • Is the reading of the pressure gauge between 4692 kPa to 5164 kPa (680-750 psi)? Yes Inspect the brake caliper and replace the components if necessary. Test and operate the system to see if it is in the normal condition. No Replace the rear brake controlling valve. The braking system exhausts. Refer to the Section 203-00. Test and operate the system to see if it is in the normal condition.

Fixed Point Inspection: B: Constant Lightening o Brake Warning Lamp

Phenomenon	Contents/results/measures
B1: Inspect the brake warning	
Notes: When the ignition key is turned to the START or RUN position and the parking braking acts, the brake warning lamp will flash.	
	1 Turn the ignition key to the ON position. 2 Release the parking braking. - Inspect the level of the braking fluid at the MAX position. • Does the brake warning lamp flash? Yes See Section 4 0 3-0 2 No 转到B2 Turn to B2
B2: Inspect the leakage of the braking system	
	1 Inspect the leakage of the sealing points of the fluid can of the master braking pump and the clutch system. This section performs the master braking pump component test. • Does the system leak? Yes Repair if necessary. Add the liquid and exhaust. See Section 203-00. Test and operate the system to see if it is in the normal condition.

Diagnosis and Test (continued)

Phenomenon	Contents/results/measures
	No Turn to B3
B3: Inspect the brake warning switch or circuit	
	1 Turn the ignition switch to the ON position. 2 Disassemble the filtering cap or the switch of the fluid can of the master braking pump. Allow the liquid level being at the lowest (highest) point. • Does the brake warning indicating lamp flash? Yes The switch or the circuit is normal. Test and operate the system to see if it is in the normal condition. No See Section 413-0 2 .

Fixed Point Inspection C: Vibration in Baking

Phenomenon	Contents/results/measures
C1: Road Test	
	1 When the road test is performed to the automobile, the braking is performed in 40-80 km/h (25-50 mph). • Does the vibration occur? Yes See Section 2 0 3 - 0 0 . Test and operate the system to see if it is in the normal condition after being repaired. No Turn to C2
C2: Inspect the fluttering of the rear brake	
Notes: when the parking braking control acts, keep the releasing button of the parking brake being at the releasing position.	
	1 In the road test, when the automobile is in 40-80 km/h (25-50 mph), pull the parking braking to the intermediate combining position. • Does the fluttering occur? Yes Inspect whether the rear brake drum is over abraded. Replace the components if necessary. Test and operate the system to see if it is in the normal condition. No Turn to C2
C3: Inspect the fluttering of the front wheel braking	
	1 In the road test, when the automobile is in 40-80 km/h (25-50 mph), slightly step down the braking. • Does the fluttering occur? Yes

Diagnosis and Test (continued)

Phenomenon	Contents/results/measures
	Inspect whether the rear brake drum is over abraded or cracked. Replace the components if necessary. Test and operate the system to see if it is in the normal condition. No The automobile is normal

Fixed Point Inspection D: the Brake Pedal is Rapidly Sunk

Phenomenon	Contents/results/measures
D1: Road Test	
	1 When the road test is performed to the automobile, step down the brake pedal. Is the force acted on the pedal normal? Yes The automobile is normal. No Turn to D2
D2: Inspect the level of the braking fluid	
	1 Inspect the fluid level of the fluid can of the master braking pump. Is the level of the braking fluid normal? Yes Turn to D3 No Inspect the leakage of the sealing points of the fluid can of the master braking pump. See “Master Braking Pump Component Test” in this section. For the relevant information of adding the braking oil liquid and exhaust, please see Section 203-00. Test and operate the system to see if it is in the normal condition.
D3: Pressurize the system	
	1 1 Rapidly step the brake pedal for 5 times. Is the height of the brake pedal raised and kept? Yes Inspect the adjustment of the parking braking. Adjust if necessary. Please see Section 203-0 3 for the relevant information. If the failure continues exist, exhaust to the braking system. Please see Section 203-00 for the relevant information. Test and operate the system to see if it is in the normal condition. No Turn to D4

Diagnosis and Test (continued)

Phenomenon	Contents/results/measures
D4: Inspect the leakage of the braking system	
	1 Inspect the external leakage of the brake and clutch system. Please read “Master Braking Pump Component Test” in this section. • Is the leakage discovered? Yes Repair if necessary. Add the braking fluid and exhaust. Please see Section 203-00 for the relevant information. Test and operate the system to see if it is in the normal condition. No Turn to D5
D5: Perform one status inspection of the bypass of the master braking pump	
	1 Test the pass-by of the master brake pump. Please read “Master Braking Pump Component Test” in this section for the relevant information. • Is the failure discovered? Yes Replace the master braking pump. Add the braking fluid and exhaust. Please see Section 203-00 for the relevant information. Test and operate the system to see if it is in the normal condition. No The system is perfect.

Diagnosis and Test (continued)**Fixed Point Inspection E: The Pedal is slowly Sunk**

Phenomenon	Contents/results/measures
E1: Inspect the running of the brake pedal	
	1 When the automobile runs, step down the brake pedal and inspect the failure. Does the failure occur when the automobile is stopped? Yes Turn to E2 No Please read "Master Braking Pump Component Test" in this section.
E2: Inspect the leakage of the braking system	
	1 Check the external leakage of the braking system. See "Master Braking Pump Component Test" in this section. Is the leakage found? Yes Repair if necessary. Add the braking fluid and exhaust. See Section 203-00 for relevant information. Test and operate the system to see if it is normal. No Turn to E3
E3: Perform the pass-by test of the master braking pump	
	1 Test the pass-by of the master braking pump. See "Master Braking Pump Component Test" in this section for relevant information. Is the failure found? Yes Replace the master braking pump. Add the braking fluid and exhaust. See Section 203-00 for relevant information. Test and operate the system to see if it is normal. No The system is normal. Test and operate the system to see if it is normal.

Fixed Point Inspection F: The Pedal Position is Low or Feels Soft

Phenomena	Contents/results/measures
F1: Perform the road test	
	1 When the road test is performed to the automobile, step down the brake.

Diagnosis and Test (continued)

Phenomena	Contents/results/measures
	- Does the brake pedal feel soft? Yes Turn to F2 No The automobile is normal.
F2: Check the level of the braking fluid	
	- Check the fluid level of the fluid can of the master braking pump. - Is the level of the braking fluid normal? Yes Turn to F3 No Check the sealing position of the fluid can of the master braking pump. See "Master Braking Pump Component Test" in this section. Add the braking oil liquid and exhaust. See Section 203-00 for relevant information. Test and operate the system to see if it is normal.
F3: Check the ventilation hole on the cover of the oil storage can	
	- Check whether the ventilation hole on the cover of the oil storage can is blocked or become dirty. - Is the failure found? Yes Clean if necessary. Test and operate the system to see if it is normal. No Turn to F4
F4: Exhaust the braking system	
	- Check the air in the braking system. Exhaust to the braking system. See Section 203-00 for relevant information. - Does the situation continue to exist? Yes Turn to F5 No The automobile is normal.
F5: Check the wheel hubs retaining nuts of the front wheels	
	- Check whether the wheel hubs retaining nuts of the front wheels are loosened. See Section 203-01 for relevant information. - Is the wheel hubs retaining nuts of the front wheels is loosened? Yes

Diagnosis and Test (continued)

Phenomena	Contents/results/measures
	Replace the wheel hubs retaining nuts of the front wheels, note: the wheel hubs retaining nuts of the front wheels can not be used again. Test and operate the system to see if it is normal. No Check the parking braking adjustment. See Section 203-05 for relevant information.

Fixed Point Inspection G: Locked Brake after Being Slightly Stepped

Phenomena	Contents/results/measures
G1: Perform the road test	
	1 When the road test is performed to the automobile, lightly step down the brake pedal. Is the rear wheel locked? Yes Turn to G2 No The automobile is normal.
G2: Check the tyres	
	1 Check the excessive wear of the tyre or the incorrect tyre air pressure. Is the status of all the tyres normal? Yes Turn to G3 No Replace the tyre. Adjust the tyre air pressure. Test and operate the system to see if it is normal.
G3: Check the brake shoe or the brake disc	
	1 Check whether the brake shoe or the brake disc is correctly installed or is polluted by the oil liquid or is excessively worn. Do these situations exist? Yes Repair or replace the components if necessary. Test and operate the system to see if it is normal. No Turn to G4
G4: Check the right rear braking and pressure reducing valve	
	1 Connect the pressure gauge on the left front and right rear exhaust holes. Step on the brake pedal, and the reading of the left front wheel is 6895 kPa (1000 psi). - Read the pressure of the right rear wheel. - Are the readings of the pressure gauge of the right rear wheel between 4692kPa and 5164 kPa (680-750 psi)?

Diagnosis and Test (continued)

Phenomena	Contents/results/measures
	Yes Test the brake booster. Turn to the Fixed Point Inspection I. No Replace the right rear pressure control valve. See Section 203-00 for relevant information. Test and operate the system to see if it is normal.
G5: Check the left and right pressure controlling valves	
	1 Connect the pressure gauge on the right front or left rear exhaust holes. Step on the brake pedal, and the reading of the right front wheel is 6895 kPa (1000 psi). - Read the reading of the pressure gauge of the left rear wheel. • Are the readings of the pressure gauge of the right rear wheel between 4692 kPa to 5164 kPa (680-750 psi)? Yes Test the brake booster. Turn to the Fixed Point Inspection I. No Replace the left rear pressure control valve. See Section 203-00 for relevant information. Test and operate the system to see if it is normal.

Fixed Point Inspection H: Excessively Long and Unstable Free Travel of Brake Pedal

Phenomena	Contents/results/measures
H1: Perform the road test	
	1 Perform the road test on the rough road. Step the brake pedal. • Is the travel of the brake pedal normal? Yes The automobile is normal. No Turn to H2
H2: Check the wheel bearing	
	1 Check the loosening of the front wheel bearings. • Is the front wheel bearings loosened? Yes Check the fixing nuts of the hub of the front wheel. Replace the worn or damaged front wheel bearings. See Section 203-01 for relevant information. Test and operate the system to see if it is in the normal condition. No

Diagnosis and Test (continued)

Phenomena	Contents/results/measures
	Check the changing situation of the thickness of the braking disc. Replace the components if necessary. Test and operate the system to see if it is in the normal condition.

Fixed Point Inspection 1: Towing of the Brake

现象	内容/结果/措施
I1: Check Brake Booster	
	1 Check the travel of the push rod and brake pedal of the brake booster. Is the travel of the brake push rod and brake pedal normal? Yes Go to I2 NO Replace the brake booster. Test and operate whether the system is normal.
I2: Road Test	
	1 Perform the road test to vehicles, press the brake. Is the performance of the brake normal? Yes The vehicle is normal. NO Check whether there are lagged components on the brake distributing pump or the brake caliper of each wheel, replace the components if necessary. Exhaust the braking system. See Section 203-00 for relevant information. Test and operate the system to see if it is in the normal condition.

Fixed Point Inspection J: Too much Force on Brake Pedal

Phenomena	Contents / Results / Measures
J1: Check the braking status	
	1 When the engine stops running, press the pedal for 5 times to eliminate the vacuum in the brake booster. Press the pedal and keep the slight pressure. Start the engine. Is the brake pedal at the original position? Yes Turn to J2 NO Turn to J6

Diagnosis and Test (continued)

Phenomena	Contents / Results / Measures
J2: Check the leakage of the brake booster	
	1 Keep the idle running of the engine, release the acceleration pedal and shut down the engine. Step the brake after 90 seconds, the brake shall work through press twice or more times. Does the brake booster work? Yes The vehicle is normal. NO Turn to J3
J3: Check the check valve of the brake booster	
	1 Take down the vacuum tube of the brake booster from the intake manifold, blow air to the vacuum tube. Does air go through the check valve? Yes Replace the check valve of the booster. Test and operate the system to see if it is in the normal condition. NO Turn to J4
J4: Check the check valve vacuum of the brake booster	
	1 Remove the vacuum tube of the check valve from the brake booster. Ensure idle running of the engine, connect the vacuum gauge and check the vacuum. Is the vacuum pressure of the brake booster above 66.7 kPa (19.7 in-Hg)? Yes Turn to J5 NO Repair or replace the vacuum tube. Test and operate the system to see if it is in the normal condition.
J5: Check the brake booster	
	1 Check the brake booster. See Component Test Procedures in this Section. Is the brake booster normal? Yes Turn to J6 NO Replace the brake booster. Test and operate the system to see if it is in the normal condition.
J6: Check the brake pedal mechanism	
	1 Dismount the push rod from the braking pin axle, press the brake pedal to the bottom. Is the brake pedal is freely moved?

Diagnosis and Test (continued)

Phenomena	Contents / Results / Measures
	Yes Turn to J7 NO Repair or replace the bushing of the brake pedal. Test and operate whether the system is normal.
J7: Check the control valve of the braking pressure	
	1 Check the pollution of the control valve of the braking pressure. Is the braking fluid polluted? Yes Replace the control valve of the braking pressure. Add the braking fluid. See Section 203-00 for relevant information. Test and operate the system to see if it is in the normal condition. NO The vehicle is normal.

Fixed Point Inspection K: Braking Noise

Phenomenon	Contents / Results / Measures
K1: Check the noise of the brake pedal	
	1 Check the excessive wear of the brake disc and the brake shoe. - Ensure the idle running of the engine for 10 seconds, press the brake pedal, listen to the noise and compare it with that in normal cases. Are there noises? Yes Turn to K2 NO The vehicle is normal.
K2: Check the poistion of the push rod	
	1 Check the position and the travel of the push rod of the brake booster. Is the push rod normal? Yes Exhaust the braking system for the braking system. See Section 203-00 for relevant information. Test and operate the system to see if it is in the normal condition. NO Replace the brake booster. Test and operate the system to see if it is in the normal condition.

Fixed Point Inspection L: the Return of the Brake Pedal is Slow or Abnormal

Diagnosis and Test (continued)

Phenomenon	Contents/Results/Measures
L1: Check the return of the brake pedal	
	1 Ensure the fast idle running of the engine, press the brake for several times. Pull the brake pedal backwards with the force of approximately 44.5 N (10 lbs). Release the brake pedal and measure the distance from the brake pedal to the floor. The brake pedal should come back to the original position. • Does the brake pedal return to the original position? Yes The vehicle is normal. NO Turn to L2
L2: Check the jamming of the brake pedal	
	1 Check the free motion of the brake pedal. • Does the brake pedal freely move? Yes Replace the brake booster. Test and operate whether the system is normal. NO Repair or replace the bushing of the brake pedal. Test and operate whether the system is normal.

Component Test

Check hydraulic leakage

If the vehicle runs in the rain or snow, the leaking trace may be rinsed away, for the braking fluid is water-soluble. Press the brake for several times after the braking fluid is added. Check the decrease of the braking fluid in the system. Confirm and repair the external leakage. If the liquid level decreases and the leakage position can not be found, check whether the oil seal at the hole end of the master braking pump leaks.

Check the braking system

Check the travel allowance of the brake pedal

When you feel the brake pedal is low or touches to the bottom, check the travel allowance of the brake pedal.

1. Ensure the idle running of the engine, and put the transmission in the neutral gear.
2. Slightly press the brake pedal for 3 or 4 times.
3. Maintain the booster to supplement vacuum for 15 seconds.

Notes: When the resistance is increased, you shall feel that the brake is floored.

4. Press the brake pedal till the downward movement stops or no **increased** resistance.
5. Keep the brake pedal at the position where causes the brake to work, increase the engine rotating speed to 2000 rpm.

Notes: The additional movement of the brake pedal is the result of the increase of the vacuum degree in the intake manifold of the engine. Therefore, the additional travel is caused to act on the master braking pump, and the braking system shall not touch the bottom.

6. Release the acceleration pedal, and observe the downward movement of the brake pedal in the

诊断和测试 (续)

process that the engine rotating speed reduces to the idle speed.

Check the status of the brake booster

Check all vacuum tubes and connectors. All unused vacuum connectors should be well blocked. The vacuum tube and the connector should be correctly fixed without leak or aging. Check whether the check valve on the brake booster is damaged or not.

Check the function of the brake booster

1. Check the leakage or the low liquid level of the hydraulic braking system.
2. Put the transmission in the neutral gear, shut down the engine, and push the parking braking. Press brake pedal for several times in order to eliminate the vacuum in the system.
3. Start the engine. If the vacuum system works, the brake pedal shall move downwards. If you can not feel the movement, the vacuum power system does not work.
4. Get down the vacuum tube from the brake booster. When the engine is in the neutral gear with idle speed, the vacuum in the intake manifold will act at the brake booster end of the hose. Ensure that all unused outlets well blocked, the connectors are perfect, and the vacuum tube is normal. If the vacuum degree of the air intake pipe can work, the hose is connected back to the brake booster, and repeat the third step. If the downward movement can not be felt, replace the brake booster.
5. Ensure the engine to run at the fast idle speed for 10 seconds. Press the brake pedal with the force of approximately 889 N (20 lb) 10 minutes after the engine is shut down and the feeling to the brake pedal should be the same as that when the engine works. If the brake pedal feels too stiff, replace the brake booster. If the brake pedal feels soft, exhaust the braking system, See Section 203-00 for relevant information.

Master Braking Pump

Generally, the first and most efficient method for any failure of the braking system is to feel the brake pedal. When the failure of the mater braking pump is diagnosed, check the feeling of the brake pedal and take the result as the evidence of the braking problem. Check the flash of brake warning indicating lamp and the braking fluid level.

Normal Situations

The following statuses are normal, which does not indicate the master braking pump needs repairing.

- The new braking system design is different from before: the required force for pressing the brake pedal is lighter. Therefore, the complaint that the action of the pedal is too light should be compared with that of the automobile with the same model and the same manufacturing year.
- The braking fluid level ascends when the brake is normally operated, and descend when release. The total amount of the braking fluid does not change.
- There are braking fluid traces on the brake booster below the retainer flange of the master pump, which is caused by the normal lubrication to the oil seal of the end of the master pump cylinder diameter.
- The height of the braking fluid shall decline along with the wear of the brake block.

Abnormal Situations

Notes: Before the diagnosis, ensure the warning indication lamp of the barking system be normal.

The change of the feelings of the brake pedal or the travel indicates that problems may exist in the braking system. The diagnosis procedures and skills comprise the feeling of the brake pedal, the indications of the brake warning indicating lamp and the height of the low braking fluid when the system problems are diagnosed. The following statues are abnormal, which indicate that the master braking pump needs repairing.

- The rapid decline of the brake pedal may be caused by the internal or external leakage.
- The automatic slow decline of the brake pedal may be caused by the internal or external leakage.
- The brake pedal feels soft, which may be caused by that there is no oil in the fluid can of the master braking pump, the ventilation hole of the fluid can is blocked or there is air in the hydraulic system.
- The force to the brake pedal is too large, which may be caused by the clamping and the blocking of the pedal or the push rod, the blocking of the liquid control valve or the insufficient vacuum in the brake booster.
- The rear brake locks when the brake pedal is slightly pressed, which may be caused by that the tyre air pressure is incorrect, there is oil on the brake shoe or the inner lining, the parking braking

Instructions and Operations (Continued)

is adjusted improperly, or the control valve of the braking pressure is damaged or polluted.

- The acting force of the brake pedal is unstable, which may be caused by the failure of the brake booster, the over large backward shock of the brake caliper piston or the incorrect installation of the brake shoe.
- The brake warning indicating lamp lights, which may be caused by that the braking fluid level is low, the ignition circuit is too close to the indicator lamp of the braking fluid level, or the float assembly is damaged.

Pass-by Status Test

1. Check the master braking pump. Add the braking fluid if the fluid level of the fluid can of the master braking pump is too low or short of oil.
2. Observe the liquid level of the fluid storage can of the master braking pump. If the braking fluid level is constant after the brake pedal is pressed for several times, measure the required torque when the vehicle wheel rotates backwards under braking action according to the following methods:

Put the transmission in the neutral gear, and hoist the automobile. See Section 100-01 for relevant information.

Press the brake with force of at least 445 N (100 lb) and maintain the action for 15 seconds. Exert a torque with 10.1 Nm (75 lb.ft) on the vehicle wheels under the condition that the brake still works. Replace the master braking pump if any wheel rotates.

Non-Pressure Leakage

Any empty situation of the fluid storage can of the master braking pump may be caused by the two kinds of non-pressure external leakage.

Type 1: Because of the incorrect position of the washer and the cover, the external leakage may exist on the cover of the fluid storage can of the master braking pump.

Type 2: The external leakage may exist on the installation sealing gasket of the fluid storage can of the braking fluid. Install the new oil seal in order to repair such leakage.

General Procedures

Exhausting of the Braking System (12 141 0)

Exhausting

Configure Anti-lock Automobile

1. Take down the negative electrode wire of the battery. See Section 407-00 for relevant information.

All Vehicle Models



Warnings: The braking fluid contains polyglycol ether and polyethylene glycol. Avoid contacting with eyes. Thoroughly wash hands after the treatment. Rinse eyes with cold water from the water tap for 15 minutes if eyes contact with the braking fluid. Send to the hospital if the pain still exists. If the braking fluid is inadvertently swallowed down, drink water and induce vomiting, and send to the hospital immediately. Failure to follow the instructions may lead to bodily injury.



Cautions: Immediately clean the affected position if the braking fluid is splashed on the paint.

Notes: Ensure that the vehicle stops on the flat road.

Notes: The braking system is formed through crossing the relatively independent loops of the front/rear wheels. Each loop can exhaust independently.

2.  **Cautions:** The liquid storage can of the braking fluid should be constantly added with the new and clean braking fluid.

Connect the exhaust pipe to the exhaust hole.

3. Immerge the end of the exhaust pipe into an exhausting tank with little qualified brake.
4. Put the exhausting tank at the position where the bottom of which is at least 300 mm above the exhaust hole to keep the hydraulic pressure and avoid the air entering through the screw thread of the exhaust hole.
5. Release the exhaust hole for one circle and a half.
6. Floored the brake pedal (the pump sends the braking fluid and air into the exhausting tank), and make the brake pedal come back to the stopping position.
7. Add the braking fluid into the braking fluid can.

8. Continuously press the brake pedal until the braking not containing air flows into the exhausting tank.

9. Press the brake pedal and fasten the exhaust hole.

10.  **Cautions:** Ensure that the exhaust hole is covered after the air in the braking pipeline is exhausted. This can prevent the exhaust hole from eroding. Failure to follow this instruction may lead to blocking of the exhaust hole.

Repeat the procedures for other braking pipelines.

General Procedures

Pressure Exhausting of the Braking System (12 141 0)

Exhausting

Warnings: The braking fluid contains polyglycol ether and polyethylene glycol. Avoid contacting with eyes. Thoroughly wash hands after the treatment. Rinse eyes with cold water from the water tap for 15 minutes if eyes contact with the braking fluid. Send to the hospital if still feel pain. If inadvertently swallow the braking fluid, drink water and induce vomiting, and send to the hospital immediately. Failure to follow the instructions may lead to the bodily injury.

Cautions: Ensure that the vehicle stops on the flat road.

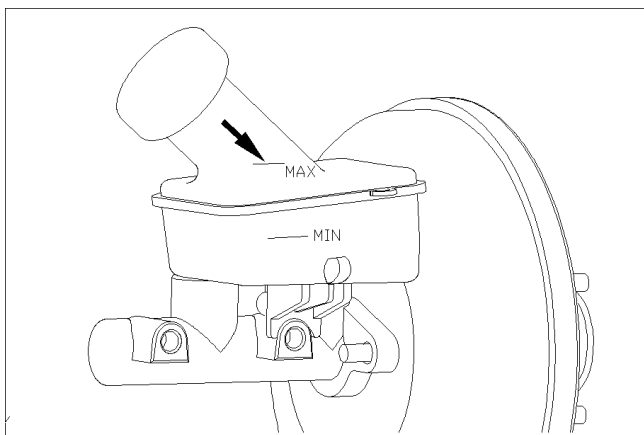
Cautions: Immediately clean the affected position if the braking fluid splashes on the paint.

Cautions: Confirm that the anti-lock brake (ABS) vehicle is configured and the negative electrode wire of the battery has been detached.

Notes: The braking system is formed through crossing the relatively independent loops of the front/rear wheels. Each loop can exhaust independently.

Notes: Because the ABS hydraulic control unit (HCU) has been filled with braking fluid during the maintenance. Therefore, conventional exhausting procedures can be satisfied.

1.Fill the fluid storing can with the braking fluid to the MAX position.

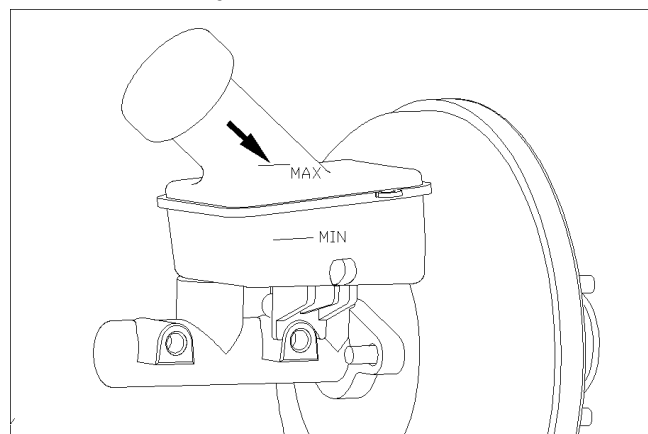


2. Cautions: Please strictly comply with manufacturer's instruments

The appropriate pressure exhausting machine is needed for pressurizing and exhausting the system. Please comply with manufacturer's instruments when use.

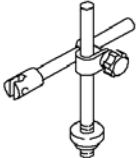
3. Cautions: Ensure that the exhaust hole is covered after the air in the braking pipeline is exhausted. This can prevent the exhaust hole from eroding. Failure to follow this instruction may lead to blocking of the exhaust hole.

Add the brake fluid to the MAX position if necessary



General Procedures

Run-out Measurement of the Brake Disc (12 221 0)

Special Tool	
	Fixing Supporting Seat of the Dial Gauge 205-070 (15-022A)

General Tools	
Dial Gauge	
Micrometer Caliper	

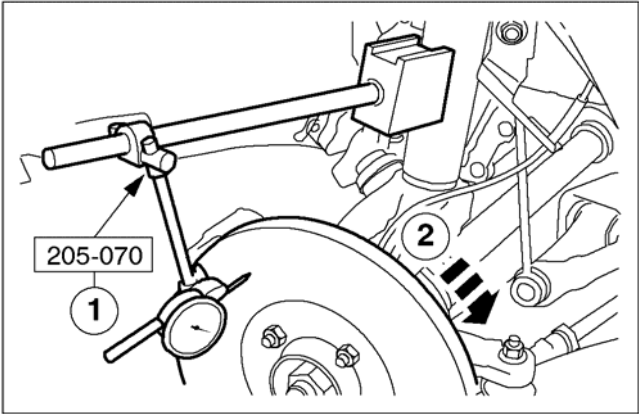
Measurement

1. Loosen the tyre nuts.
2. Hoist automobile. See Chapter 100-01 for relevant information.
3. Disassemble the tyre.
4. Disassemble the brake disc. See Chapter 203-01 for relevant information.
5. Install the tyre nuts in an opposite sequence, and fix the brake disc in its position.
6. Install the dial gauge and fix the bearing on the supporting column of the suspension.

7. **Notes:** If the run-out amount exceeds the specified value, measure the run-out of the wheel hub surface.

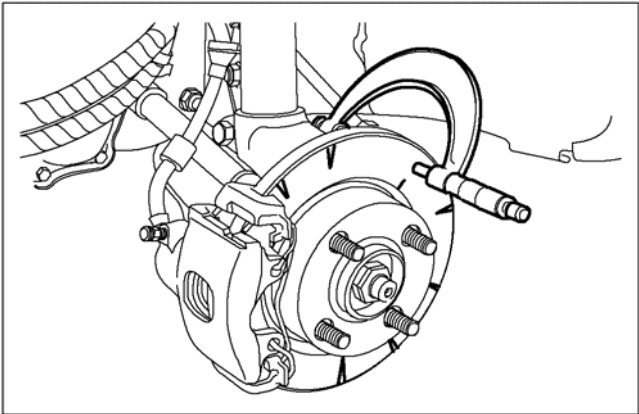
Use the appropriate dial gauge to measure the internal and external surfaces of the brake disc.

1. Install the dial gauge at the position 10 mm (0.4 inch) away from the exterior braking margin.
- 2 .Slowly rotate the brake disc. The total readings on the dial gauge should not exceed the given standards. See the partial contents in this section for relevant information.



8. Measure the thickness variation value of the brake disc.

- Use the micrometer caliper to measure the thickness of the brake disc at 8 positions where the positions are 15 mm away from the exterior margin of the brake disc with the interval of 45°.
- If the variation value reaches or exceeds 0.015 mm, or the thickness of the brake disc is smaller than the minimum regulated value, the brake disc should be replaced.



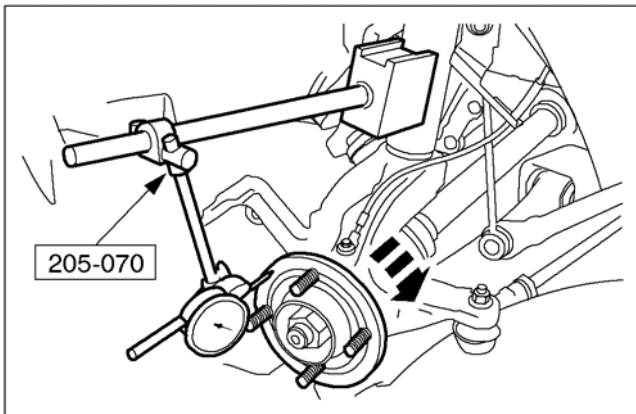
GENERAL PROCEDURES (Continued)

9. Disassemble the brake disc. See Section 203-01 for relevant information.

10. 10. Notes: Ensure the wheel hub is clean and without dust and sundries.

Use the special tool to measure the run-out of the wheel hub surface.

- Slightly rotate the wheel hub and check the run-out. If the run-out exceeds the regulated scope, replace another wheel hub and check again. See Chapter 204-01 for relevant information.



11. If the run-out of the wheel hub is within the specified value, install a new brake disc and check the run-out of the brake disc again. See Section 203-01 for relevant information.

Section 203-01 Disc Type Brake of the Front Wheel

Applicable Vehicle Model: BENNI MINI

Contents	Pages
Specifications	
Specifications	203-01-2
Instruction and Operation	
Disc Type Brake of the Front Wheel	203-01-3
Diagnosis and Test	
Disc Type Brake of the Front Wheel	203-01-04
Disassembly and Installation	
Brake Disc	(12 234 0) 203-01-05
Brake Caliper	(12 243 0) 203-01-07
Brake Disc	(12 223 0) 203-01-09
Disintegration and Assembly	
Brake Caliper	(12 001 0) 203-01-11

Specifications

Grease, Oil Fluid, Sealant and Bonding Agent

Name	Model
Braking fluid	HZY 4

Specifications of the Disc Brake of the Front Wheel

	mm
Diameter of the brake disc	236
Thickness of the brake disc	12.5
Disabled thickness of the brake disc	9.7
Maximum run-out amount of the brake disc (Installed)	0.1
Maximum thickness variation value of the brake disc	0.015
Piston diameter of the brake distributing pump	48
Minimum thickness of the brake disc	3

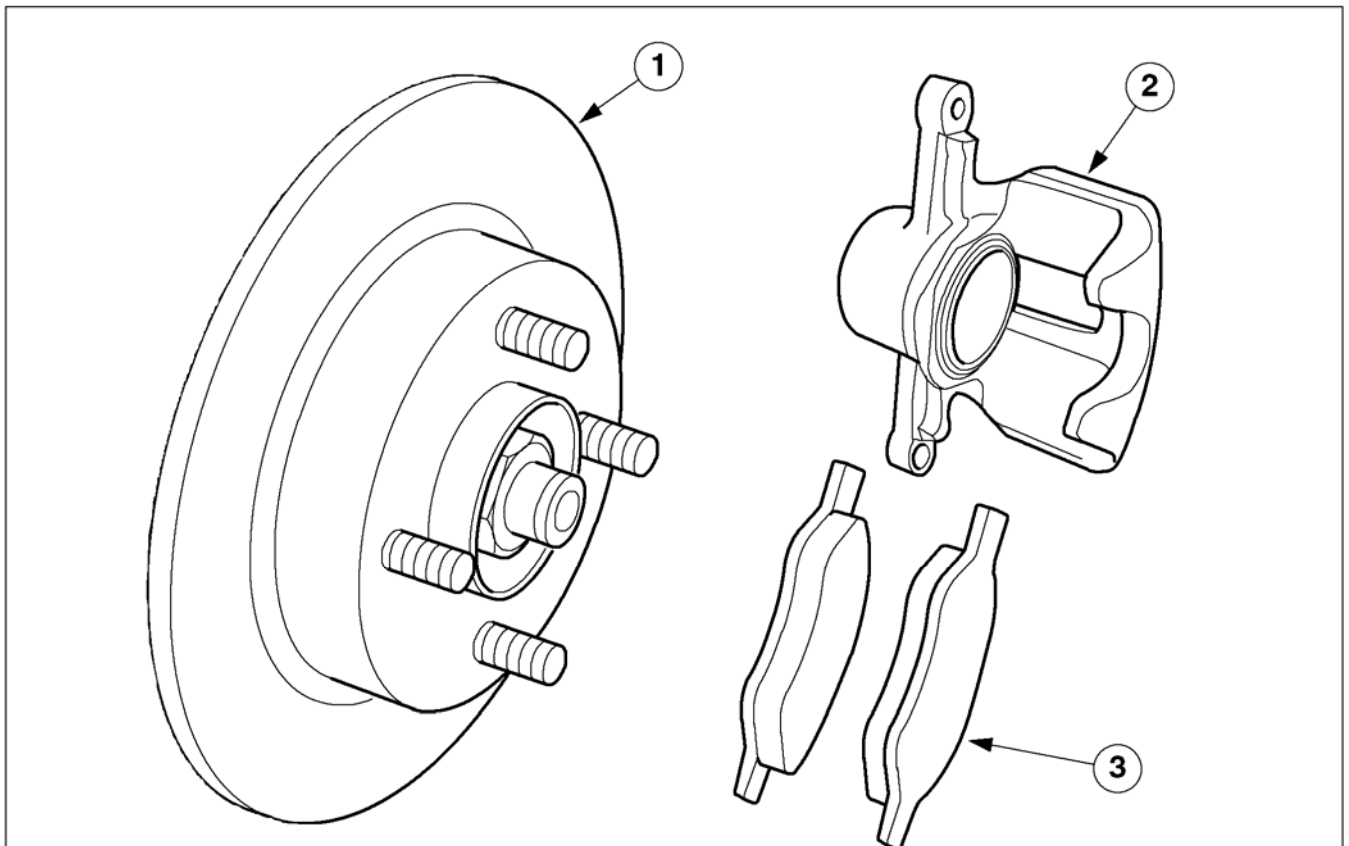
- * When thickness of the brake disc reaches the disabled value, the brake disc has to be replaced. When the brake disc which does not meet the disabled standard is processed, make sure the disabled value is not exceeded.

Torque Specification

Description	Nm
Tyre nuts	85
Piston housing bolts of the brake distributing pump	27
Bracket fixing bolt of the brake caliper	83
Connector of the parking hose	23

Instruction and Operation

Disc Type Brake of the Front Wheel



Serial Number	Parts Number	NAME
1		Brake disc
2		Brake caliper
3		Brake disc

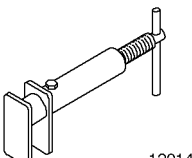
Diagnosis and Test

Disc Type Brake of the Front Wheel

See Section 203-01 for relevant information.

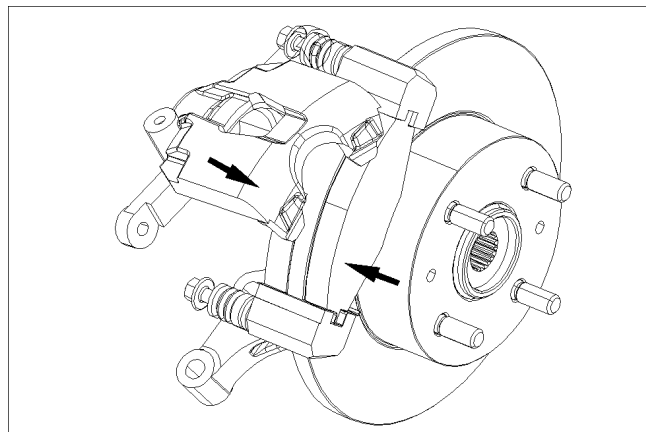
Disassembly and Installation

Brake Disc (12 234 0)

Special Tool	
	206-005 (12-014)
	Piston tractor of the brake distributing pump 206-005 (12-014)

Name	Model
Brake fluid	HZY4

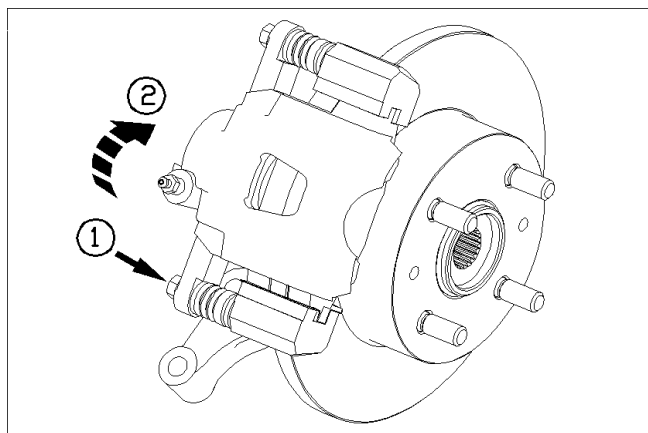
5. Disassemble the brake disc.



Disassembly

Warning: If braking fluid is splattered on the painted surface, use clean water to rinse the braking fluid immediately.

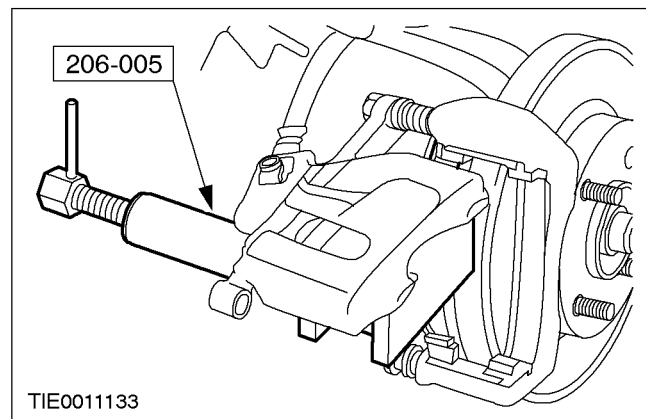
1. Loosen the tyre nuts.
2. Hoist the automobile. See Section 100-02 for relevant information.
3. Disassemble the wheel.
4. Remove the brake caliper.
 1. Disassemble the lower bolt of the brake caliper.
 2. Rotate the brake caliper upwards.

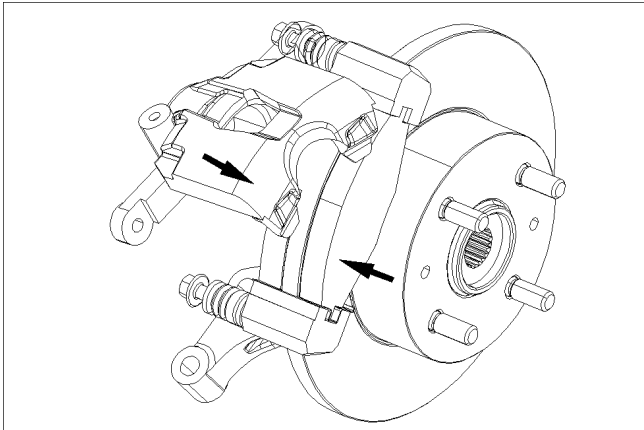
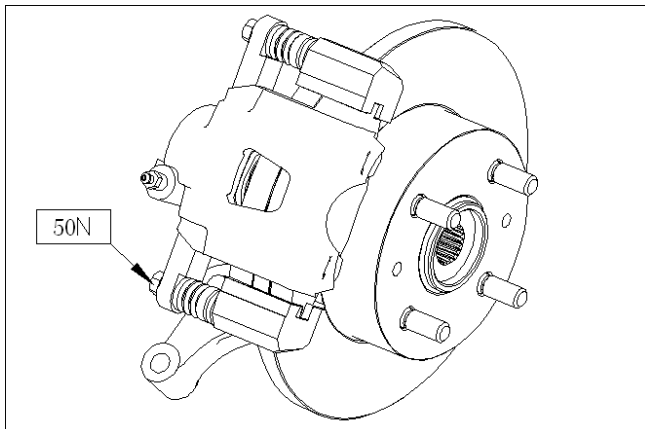
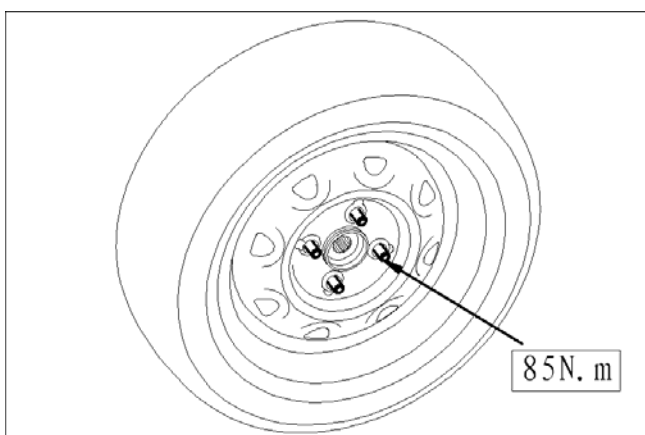


Installation

1. **Warning:** when tightly pressing the piston of the **brake distributing pump** into the piston cylinder, braking fluid may puff up from the master brake cylinder.

Use a special tool to compress the piston of the brake distributing pump.



Disassembly and Installation (Continued)**2. Install the **brake disc**.****3. Install the lower bolt of the brake caliper.****4. Install the wheel.****5. **Tread** the brake pedal twice.****6. Inspect the level of the braking fluid.**

•

Disassembly and Installation

Brake Caliper (12 243 0)

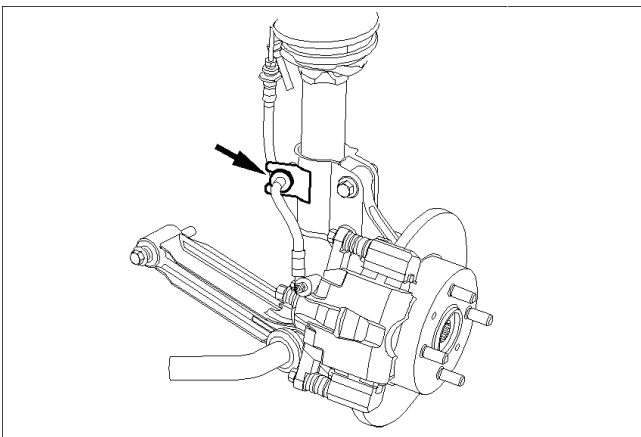
General Tool

Nip of the parking hose

Disassembly

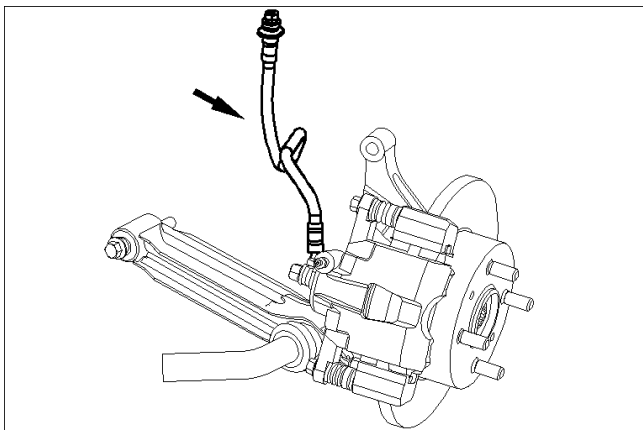
 **Caution:** If braking fluid is spattered on the **painted surface**, immediately use cold water to rinse the region.

1. Disassemble the **brake disc**. See the Part of brake disc in this section for relevant information.
2. Remove the braking hose from the steering knuckle assembly.

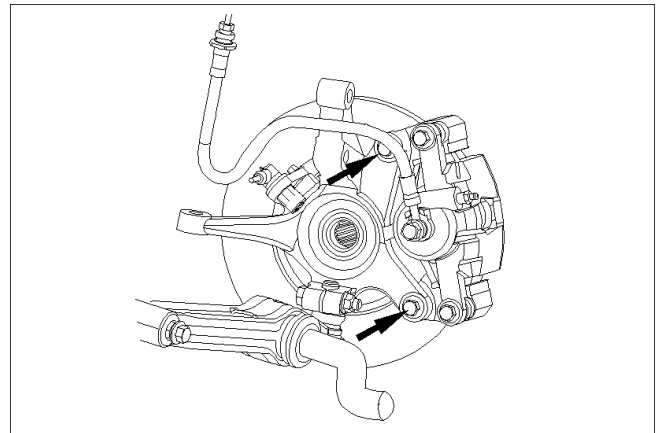


3. Loosen the braking hose from the brake caliper.

1. Use a suitable nip of the parking hose to clip the braking hose.
2. Loosen the braking hose.



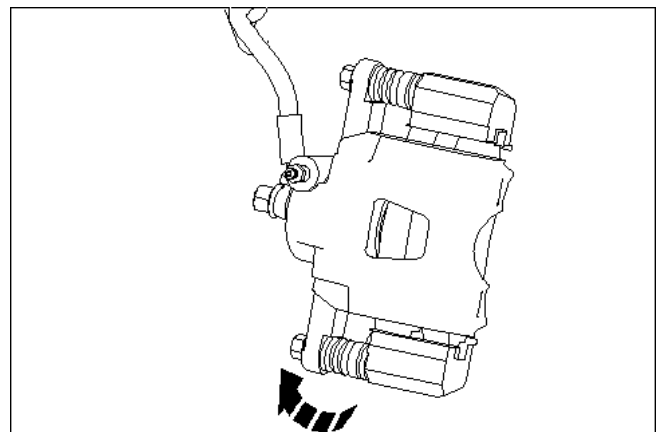
4. Remove the brake caliper.



5.  **Warning:** Seal the braking hose to prevent **oil fluid** from running off and dirt from entering into.

Disassemble the brake caliper.

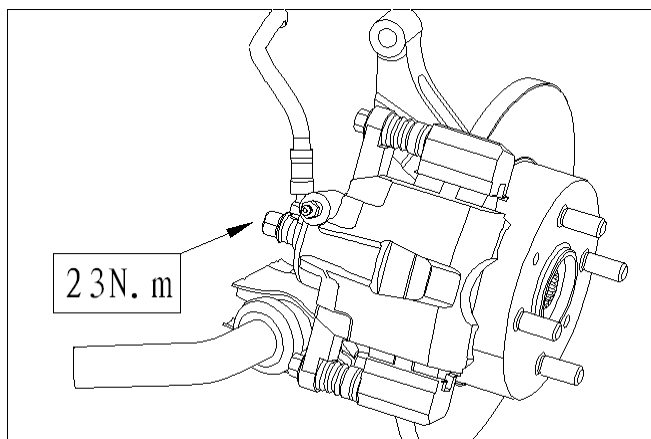
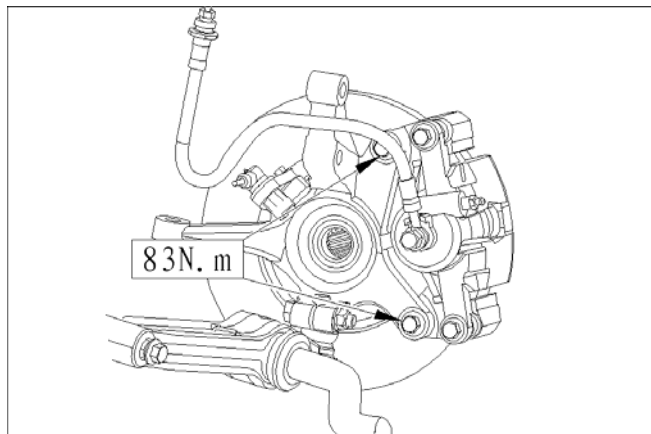
- Rotate the brake caliper assembly.



Disassembly and Installation (Continued)

Installation

1. Reverse the disassembly sequence for installation.



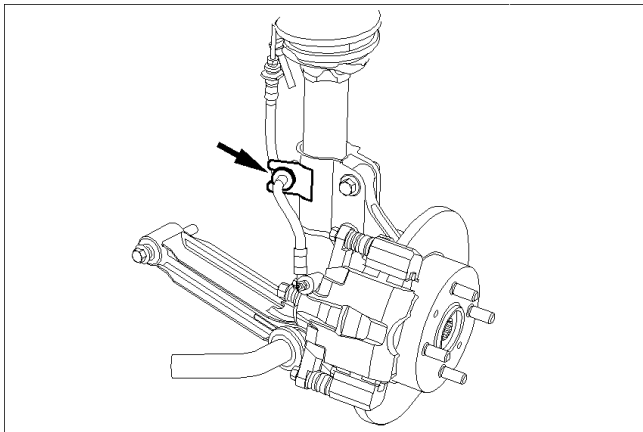
2. Exhausting of the braking system. See Section 203-00 for relevant information.

Disassembly and Installation

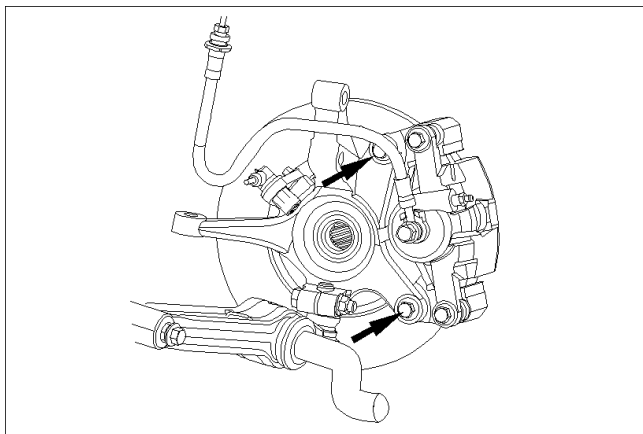
Brake Disc (12 223 0)

Disassembly

1. Disassemble the brake disc. See the Part of brake disc in this section for relevant information.
2. Remove the braking hose from the steering knuckle assembly.

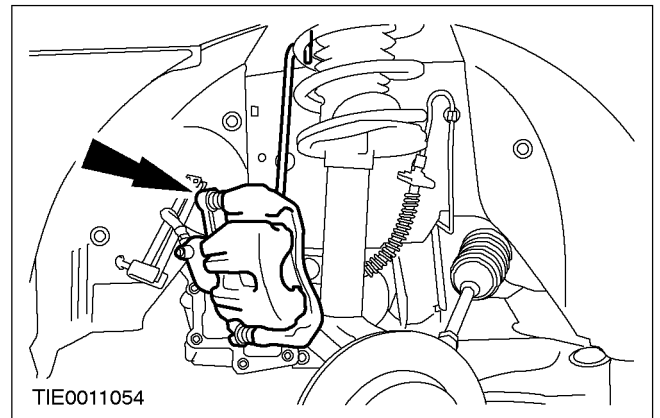


3. Remove the brake caliper.

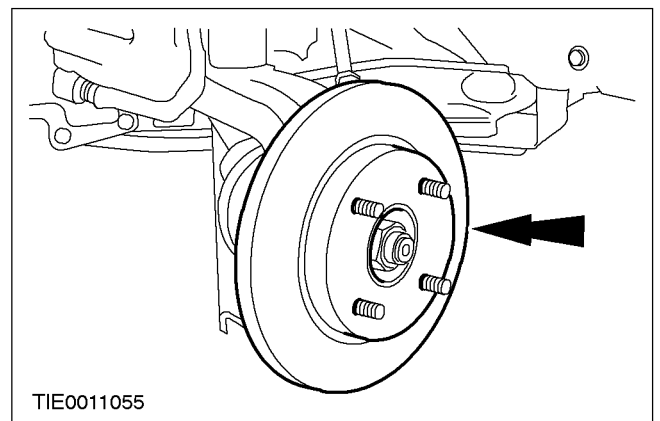


4.  Caution: hang up the brake caliper, to prevent the braking hose from being stretched.

Suspend the brake caliper.



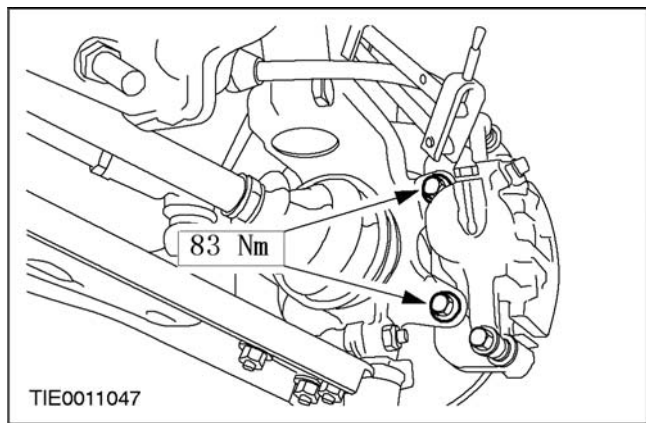
5. Disassemble the brake disc.
 - If installed, disassemble and throw away the fixing clip.



Disassembly and Installation

Installation

1. Reverse the disassembly sequence for installation.



Disassembly and Installation

Brake Caliper (12 001 0)

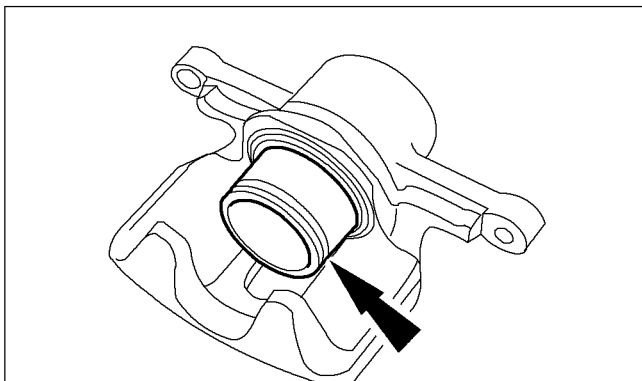
Name	Model
Brake fluid	HZY4

Disintegration

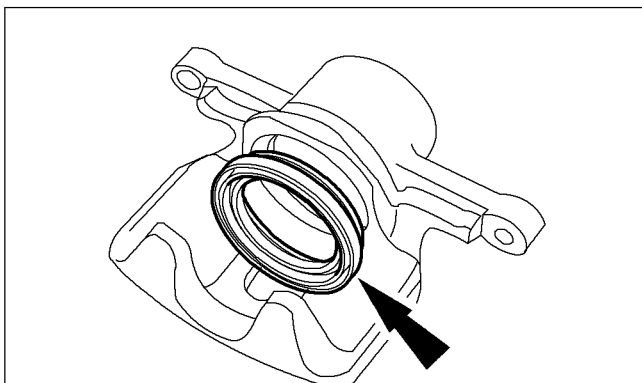
 **Warning:** If braking fluid is spattered on the painted surface, immediately use cold water to rinse the region.

-  **Warning:** Place wood blocks (or stow wood) or some pieces of wiping cloth between the piston of the brake distributing pump and the brake caliper housing to avoid damaging the brake distributing pump.

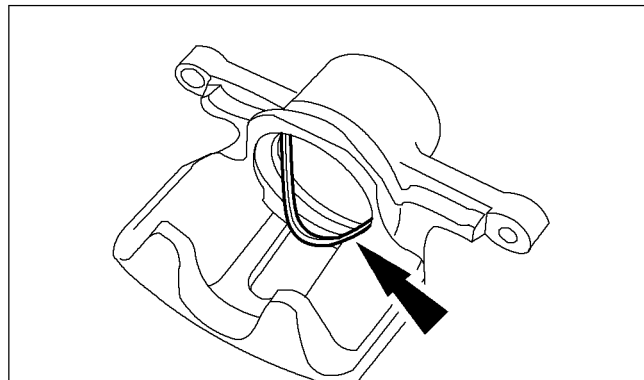
Use compressed air to remove the piston of the brake distributing pump from the brake caliper housing.



2. 拆卸并丢弃防尘油封。.



3. Disassemble and throw away the piston oil seal.

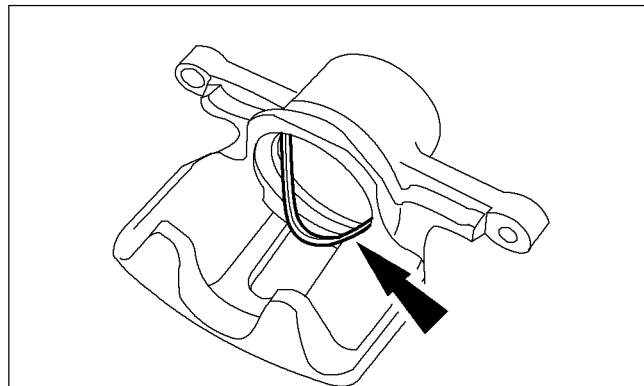


4. Inspect the piston and the piston hole for damage and abrasion. Replace the brake caliper if necessary.

Assembly

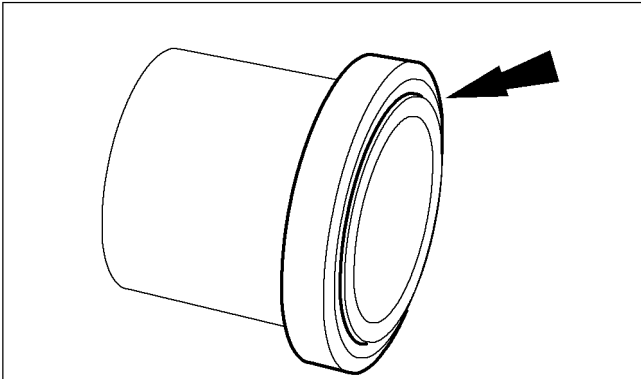
1. Use braking fluid to lubricate the piston hole, the piston oil seal and the brake caliper.
2. Note: the piston oil seal must be installed in the groove of the piston hole.

Install a new piston oil seal into the piston hole.



Disassembly and Installation

3. Install a new dust-proof oil seal onto the piston of the brake distributing pump.



4.  **Caution:** Do not scratch the piston while assembling the piston into the piston hole.

Assemble the piston of the brake distributing pump into the piston hole.

5. Install the dust-proof oil seal.

Section 203-02 Drum Type Brake

Applicable Vehicle Model:BENNI MINI

Contents	Page
Specifications	
Specifications	203-02-2
Instruction and Operation	
Drum Type Brake	203-02-3
Diagnosis and Test	
Drum Type Brake	203-02-4
Disassembly and Installation	
Brake Drum	(12 275 0) 203-02-05
Brake Shoe.....	(12 285 0) 203-02-07

Specification

Grease, Oil Fluid, Sealant and Bonding Agent

Name	
Name	Model
Braking Fluid	HZY 4

Specifications of Drum Type Brake

	mm
Diameter of the new brake drum	180
Disabled diameter of the brake drum	182
Width of the brake shoe	30
Hole diameter of the brake distributing pump	17.46 (ABS) 15.87 (NO ABS)
Thickness of the leading shoe lining of the new brake	4.5
Disabled thickness of the lining sheet of the brake shoe	1.5

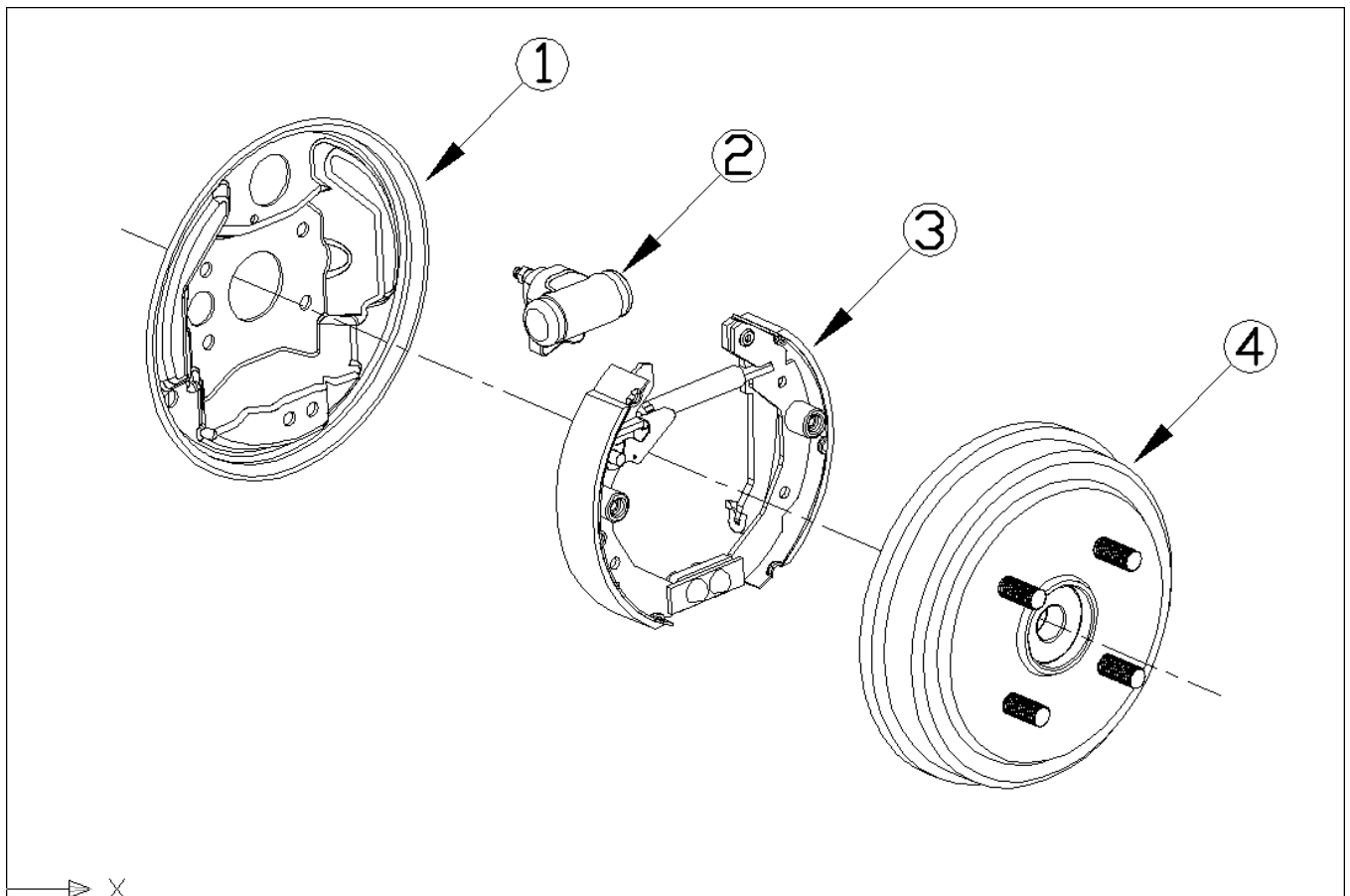
* When the diameter of the braking drum is up to the disabled standard, the brake drum should be replaced. When the brake drum is not up to the disabled standard, the brake drum should be processed with caution.

Torque Specifications

Descriptions	Nm
Wheel hub fixing nut	220
Tyre nuts	85
Fixing bolt of the brake distributing pump	10
Connector of the barking hose	15

Instruction and Operation

Drum Type Brake



Serial NO	PARTS NO	NAME
1		Base Plate
2		Brake Distributing Pump
3		Brake Shoe
4		Brake Drum

Diagnosis and Test

Drum Type Brake

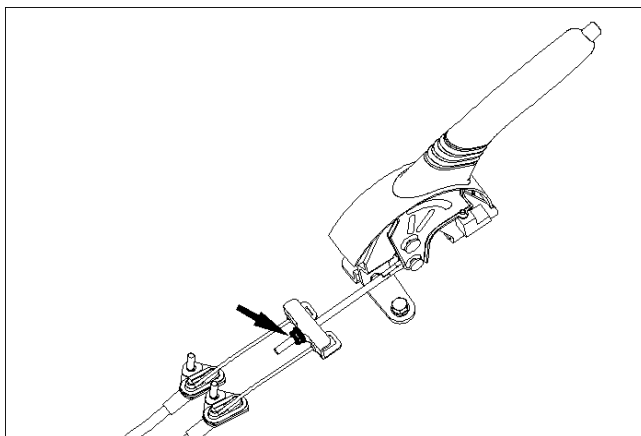
See Section 203-00 for relevant information.

Disassembly and Installation

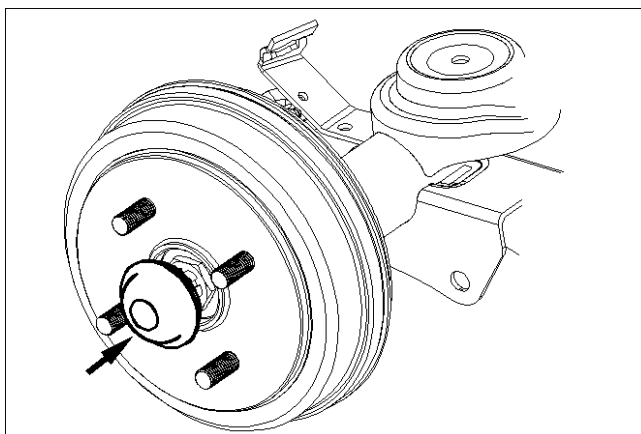
Brake Drum (12 275 0)

Disassembly

1. Disassemble the decorative plate of the controlling rod of the parking brake See Section 501-05 for relevant information.
2. Dismount the controlling rod of the parking brake and loosen the adjusting nut.

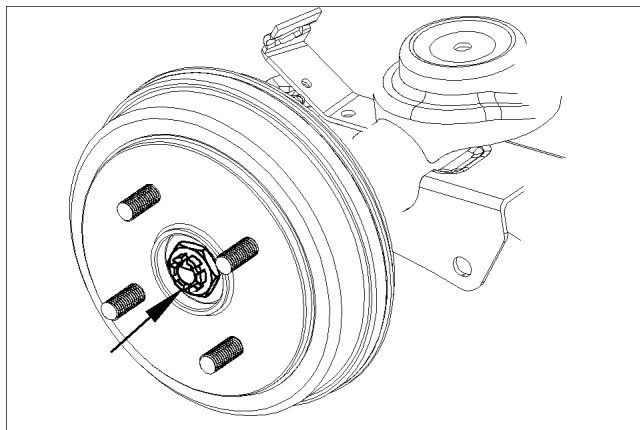


3. Loosen the wheel nuts.
4. Hoist the automobile. See Section 100-02 for relevant information.
5. Disassemble the wheels.
6.  **Cautions:** If the sealing cover of the grease cap is damaged, replace it during the installation.
Disassemble the grease sealing cover.



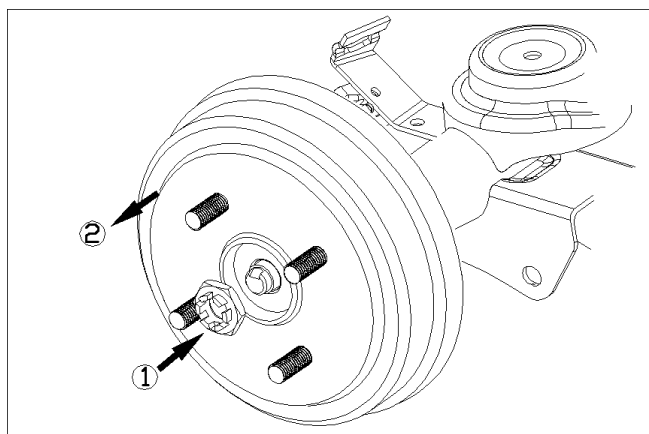
Disassembly and Installation (continued)

7. Loosen the fixing nuts of the brake drum



Disassemble the brake drum.

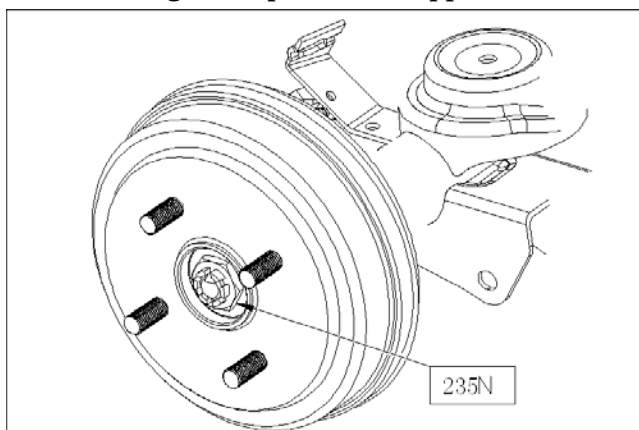
1. Disassemble the nuts.
2. Disassemble the brake drum.

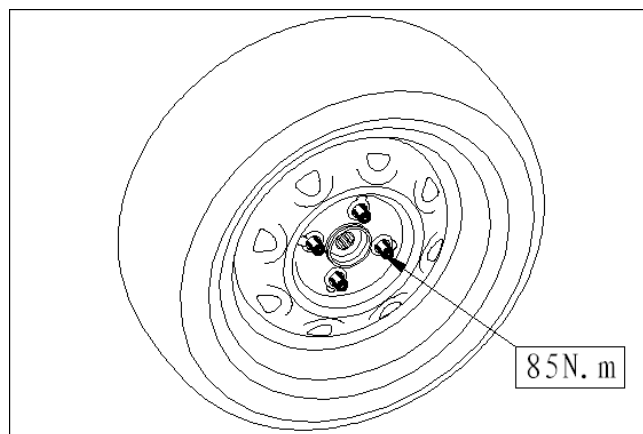


Installation

⚠ Caution: If the wheel hub fixing nut is screwed, do not loosen it any longer. If the torque adjustment is required, the wheel hub fixing nut must be screwed after being loosened for two circles.

1. The installation is performed according to the procedures opposite to the disassembly procedures.



Disassembly and Installation (continued)

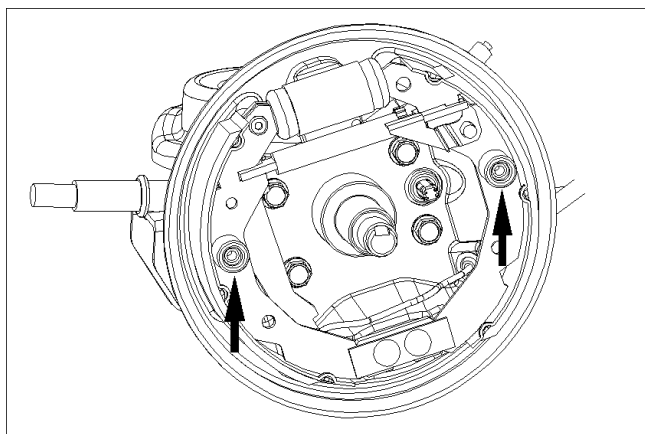
2. Adjust the parking braking dragline. See Section 203-03 for relevant information.

Brake shoe (12 285 0)

NAME	Model
Grease	SAM1C-9107-A

Disassembly

1. Disassemble the brake drum, wheel axle and wheel hub assembly. See Brake Drum in this Section for relevant information.
2. Disassemble the fixing spring of the brake shoe.



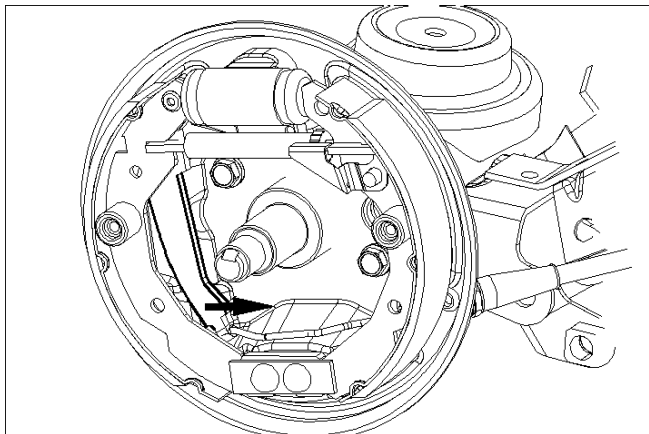
3. Fix the piston of the brake distributing pump with the rubber belt.
4.  **Caution:** When the brake shoe is dismounted, do not damage the dust shield of the brake distributing pump.

Disassembly and Installation (continued)

5. Dismount the brake shoe from the connection supporting frame

6. Dismount the parking braking dragline.

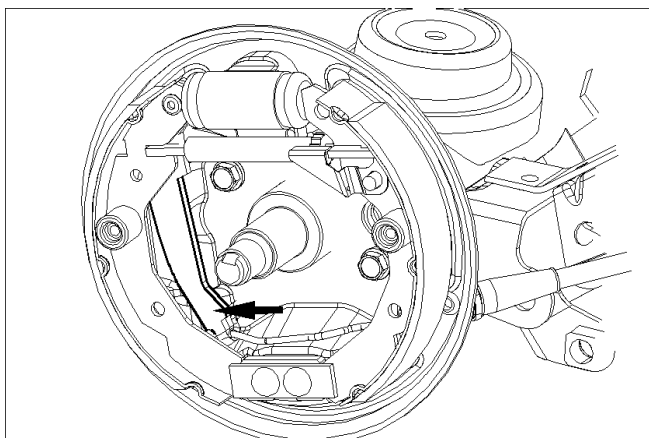
1. Push the trailing shoe backwards.
2. Dismount the dragline from the trailing shoe.



Installation

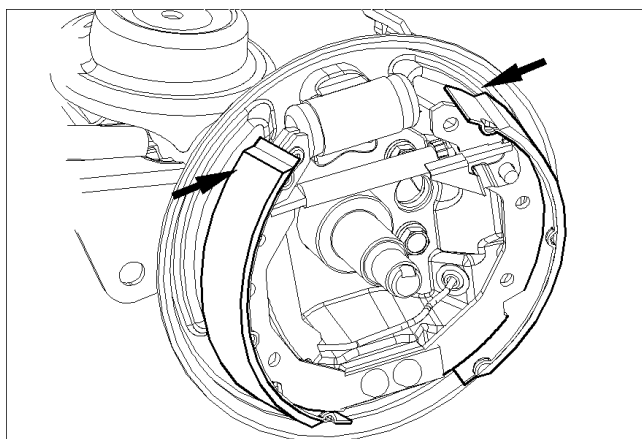
1. Install the parking braking dragline.

1. Connect the parking braking dragline.
2. Push the trailing shoe pushing rod forwards.



3.  **Cautions: Do not damage the dust shield of the brake distributing pump.**

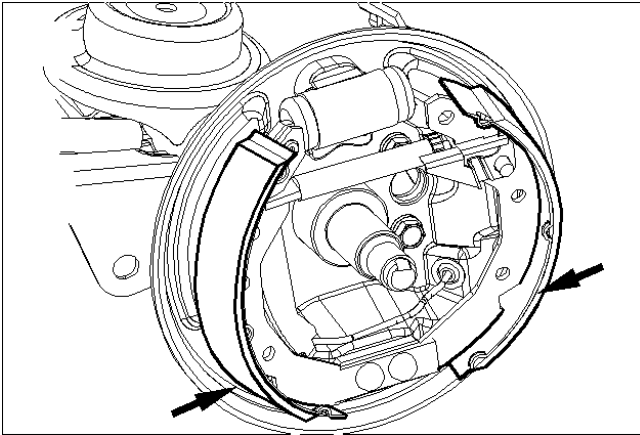
Install the brake shoe to the brake distributing pump.



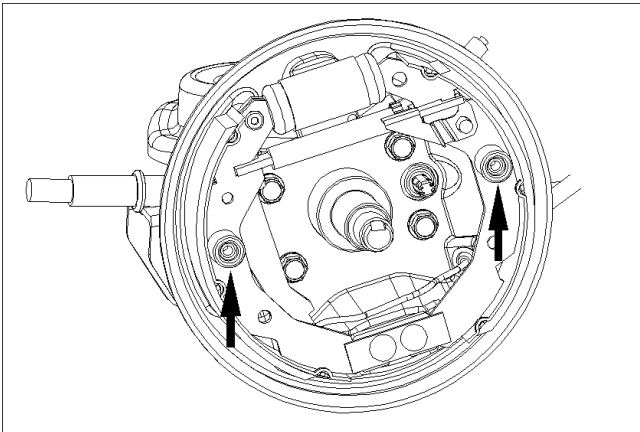
2. Disassemble the rubber belt.

Disassembly and Installation (continued)

4. Install the brake shoe to the special bottom supporting pin of the base.



5. Install the spring of the brake shoe.



6. Installation of the brake drum, the wheel axle and the wheel hub assembly.
7. Adjust the parking braking dragline. See Section 203-03 for relevant information.

Section 203-03 Parking Brake

Applicable Vehicle Model: BENNI MINI

Contents	Page
Specifications	
Specifications	203-03-2
Instruction and Operation	
Parking Brake	203-03-3
Diagnosis and Test	
Parking Brake	203-03-4
Inspection and Confirmation	203-03-4
Failure Inspecting Table	203-03-4
Common Procedures	
Adjustment of the Parking Brake Dragline (12 662 0)	203-03-7
Disassembly and Installation	
Control Rod of the Parking Brake	203-03-8
Parking Brake Dragline..... (12 675 0)	203-03-9
Warning Lamp Switch of the Parking Braking (33 546 0)	203-03-9

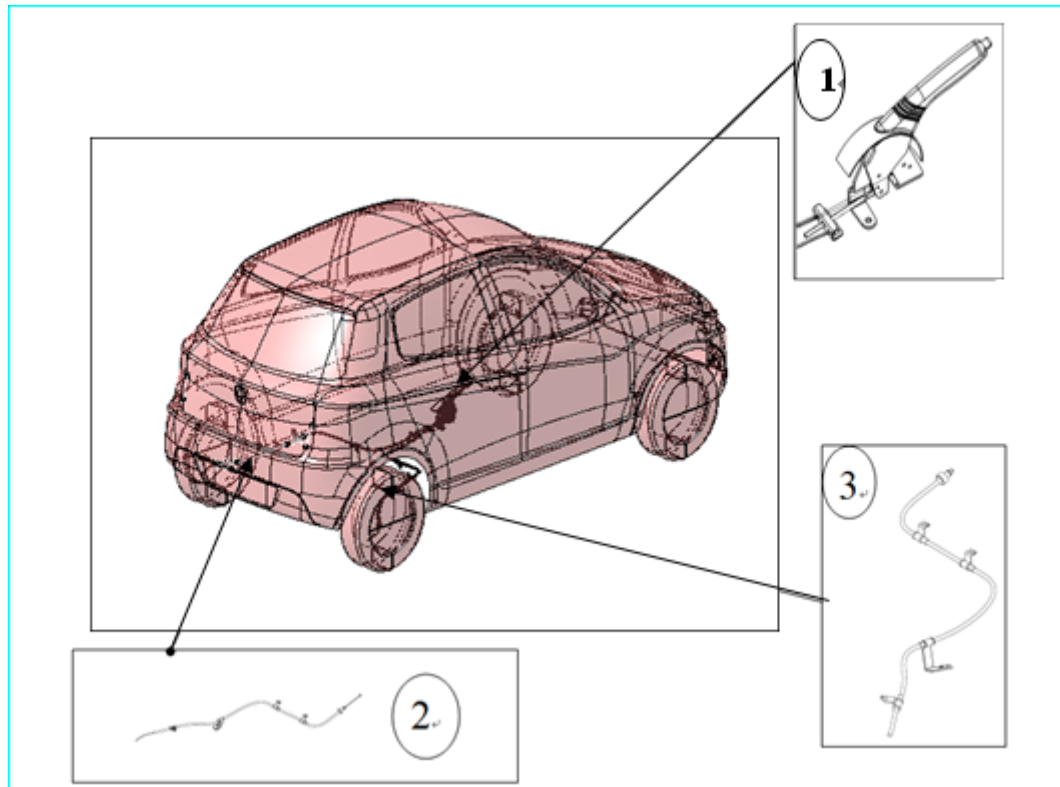
Specifications

Torque Specifications

Description	Nm
Adjusting Nut of the Parking Brake Dragline	4
Controlling Nut of the Parking Brake Dragline	23±2

Instruction and Operation

Parking Brake



NO	NAME
1	Parking Braking Rod Assembly
2	Parking Brake Dragline Assembly (Left)
3	Parking Brake Dragline Assembly (Right)

Diagnosis and Test

驻车制动器

The Parking Brake

Inspection and Confirmation

1. Confirm the failure described by the customer through the operation of the parking braking system.
2. Check whether machinery or electric appliance has obvious damage.

Machinery	Electric Appliance
– The Controlling Rod of the Parking Brake – The parking braking dragline	– Warning Circuit of the Parking Braking. See Section 403-01.

Visual Inspection Table

3. If the reason which caused the found or proposed problem is found, the failure shall be eliminated before next step (if possible).
4. If the problem can not be found through visual inspection, confirm the failure and consult the Failure Phenomenon Table for reference.

Failure Inspecting Table

Phenomenon	Possible Failure	Measures
• The parking brake does not work.	• The control rod of the parking brake • The parking brake dragline	• Turn to the fixed point inspection A.
• The parking brake can not be loosened.	• The control rod of the parking brake • The parking brake dragline	• Turn to the fixed point inspection B.

Fixed Point Inspection A: The parking brake does not work.

Phenomenon	Contents/Results/Measures
A1: Check whether the rear dragline of the parking brake is well adjusted.	
-	1 Operate the control rod of the parking brake several times to adjust the dragline. • Is the parking braking in good condition? Yes The vehicle is normal. No Turn to A2
A2: Check the abrasion status of the rear wheel brake shoe.	
	1 Check the excessive abrasion of the brake shoe. See Section 203-00. • Are the brake shoe and the the inner lining intact? Yes Turn to A3 No Replace the brake shoe. See Section 203-02. Test and operate the system to see whether it is normal.

诊断和测试 (续)

Phenomenon	Contents/Results/Measures
A3: Check the damage of the parking brake dragline.	
	1 Check the damage and rustiness of the parking brake dragline. Is the brake dragline intact? Yes Check the reason of loosening of the control rod of the parking brake or components of related braking system. See Section 203-00. No Repair or replace when necessary the parking brake dragline. Test and operate the system to see if it is in the normal condition.

Fixed Point Inspection B: The parking braking can not be loosened.

Phenomenon	Contents/Results/Measures
B1: Check the parking braking dragline	
	1 Loosen the parking braking dragline tightener. - Manually rotate the rear wheel. - Does the rear wheel rotate freely? Yes Replace the control rod of the parking brake. Please see Section of the control rod of the parking brake. Test and operate the system to see if it is in the normal condition. No Turn to B3
B2: Check the control rod of the parking brake.	
	1 Hoist the automobile. Tighten the parking braking. See Section 100-01 for relevant information. - Drag upward the control rod and press down the releasing button to release the parking brake. - Is the parking braking released? Yes Check other reasons, such as components of the common braking systems. Repair or replace component when necessary. See Section 203-00. No Turn to B1

DIAGNOSIS AND TESTING (Continued)

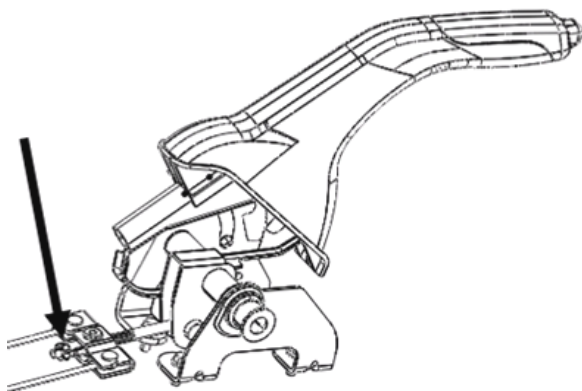
Phenomenon	Contents/Results/Measures
B3: Check the front dragline of the parking brake.	
	1 At the position of balancer, take off the front dragline of the parking brake from the rear dragline of the parking brake. - Manually rotate the rear wheel. • Does the rear wheel rotate freely? Yes Replace the front dragline of the parking brake. Please see the section of the parking braking dragline. Test and operate the system to see if it is in the normal condition. No Turn to B4
B4: Check the rear dragline of the parking brake.	
	1 Take off the rear wheel parking braking dragline from the rear brake. - Manually rotate the wheel on which the parking braking dragline is taken off. • Does the wheel rotate freely? Yes Replace the parking braking dragline. Please see the section of the parking braking dragline. Test and operate the system to see whether it is normal. No Check other reasons, such as components of the common braking systems. Repair or replace components when necessary. Please see Section 203-00.

Common Procedures

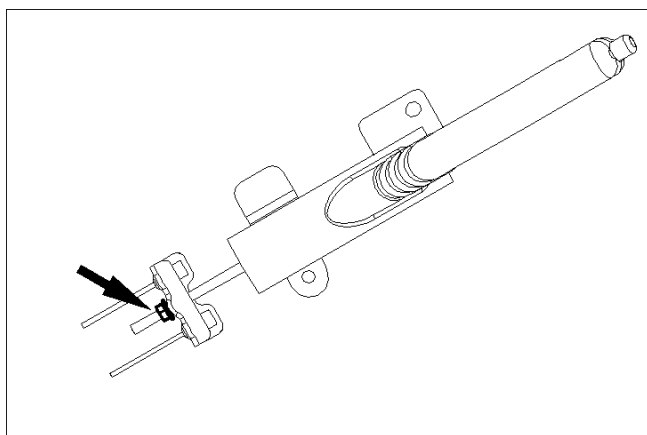
The adjustment of the parking brake dragline

Adjustment

1. Disassemble the control cover plate of the parking brake.
2. Put down the control rod of the parking brake.



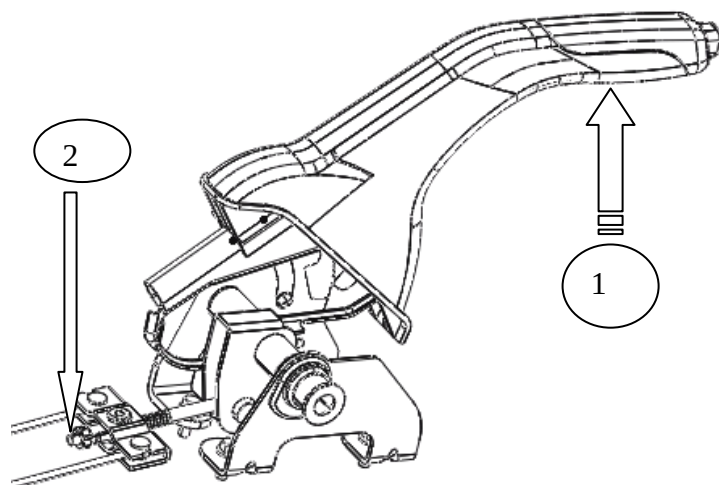
3. Loosen the adjusting nut.



4. Step on the brake pedal for six times.

5. Adjust the parking braking dragline.

1. Lift the control rod of the parking brake until presenting six ratchet sounds.
2. Firmly fix the adjusting nut.



6. Test the parking brake to see whether it works normally.

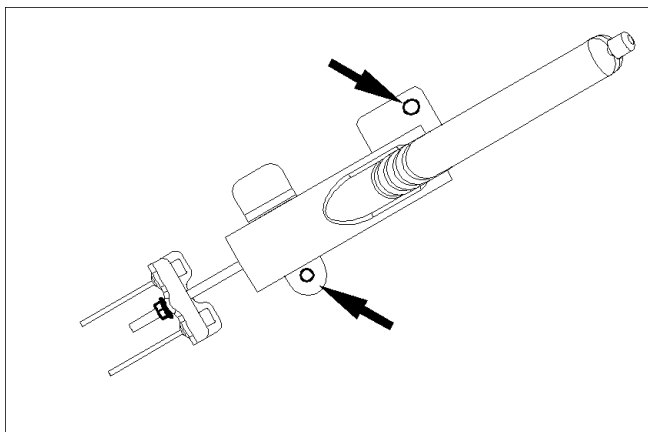
7. Install the cover plate of the parking brake

Disassembly and Installation

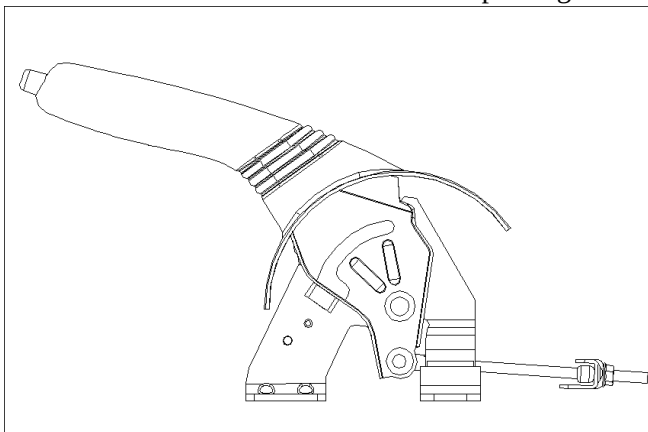
The control rod of the parking brake

Disassembly

1. Disassemble the cover plate of the control rod of the parking brake.
2. Put down the control rod of the parking brake.
3. Disassemble the adjusting nut.
4. Disassemble the nut of the control rod of the parking brake.

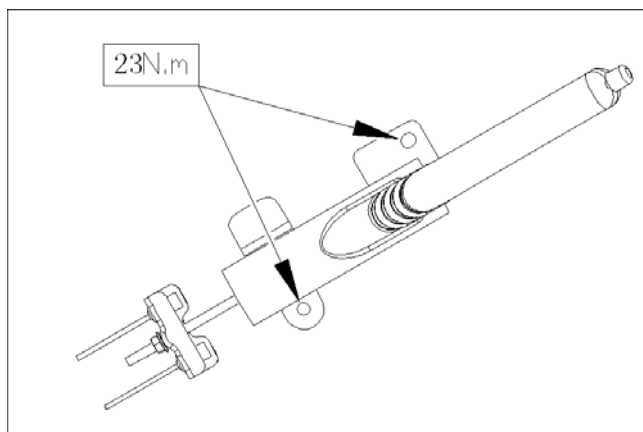


5. Take out the dragline from the control rod of the parking brake.
6. Disassemble the control rod of the parking brake.
 1. Disconnect the switch connector of the warning lamp of the parking braking.
 2. Disassemble the control rod of the parking brake.



Installation

1. The installation procedures are opposite to the disassembly sequence.



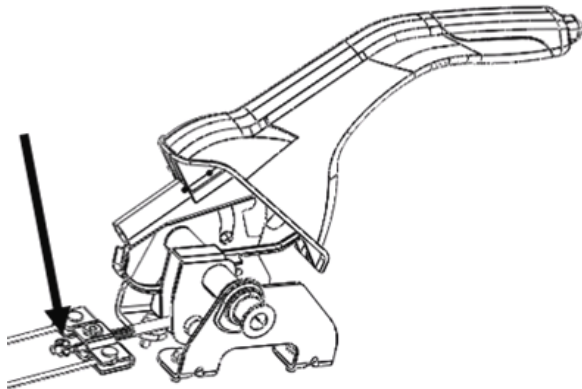
2. Adjust the parking braking dragline. For the relevant information, please see the section of the parking braking dragline.

Disassembly and Installation

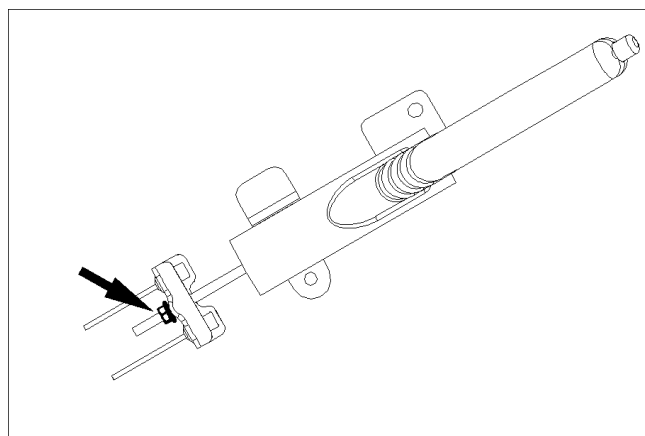
The parking brake dragline (12 675 0)

Disassembly

1. Disassemble the cover plate of the control rod of the parking brake.
2. Put down the control rod of the parking brake.



and loosen the adjusting nut.

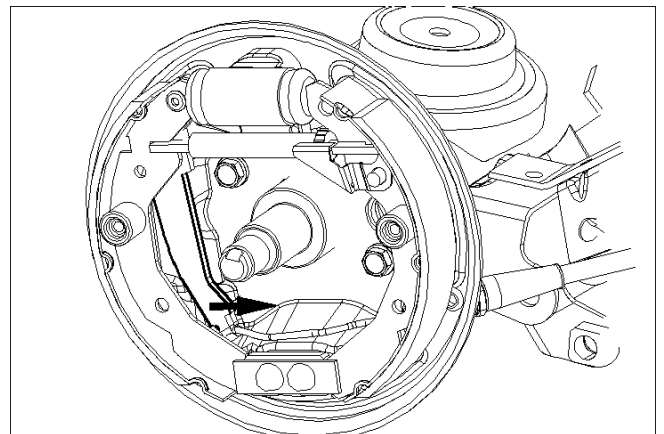


3. Loosen the nuts of the rear wheel tyre.
4. Automobile hoisting.
5. Take off the left and right parking dragline from the balancer of the front dragline of the parking brake

6. Take off the rear dragline of the parking brake from the vehicle body (both sides)
7. Disassemble the brake drum. For the relevant information, please see section 203-02.

9. Take off the parking braking dragline.

1. Push backward the trailing shoe rod.
2. Take off the dragline from the braking trailing shoe.



Installation

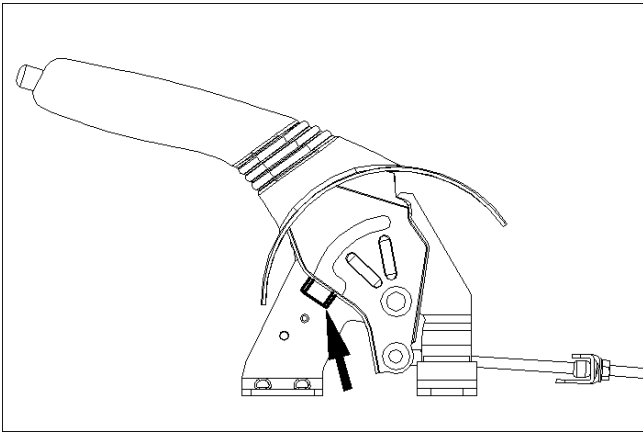
1. The installation procedures are opposite to the disassembly sequence.
2. Adjust the parking braking. For the relevant information, please see the section of the parking braking dragline.

Disassembly and Installation

The warning lamp switch of the parking braking (33 546 0)

Disassembly

1. Disassemble the control rod of the parking brake.
For relevant information, please see the section of the control rod of the parking brake.
2. Disassemble switches.



Installation

1. The installation procedures are opposite to the disassembly sequence.

Chapter 203-04 Hydraulic Braking System Operating Mechanism

Applicable vehicle model: BENNI MINI

Contents	Pages
Specifications	
Specifications	203-04-2
Instruction and Operation	
Hydraulic braking system	203-04-2
Disassembling and Installation	
Master braking pump..... (12 343 0)	203-04-错误! 未定义书签。
The fluid can of braking fluid..... (12 341 0)	203-04-5

Specifications

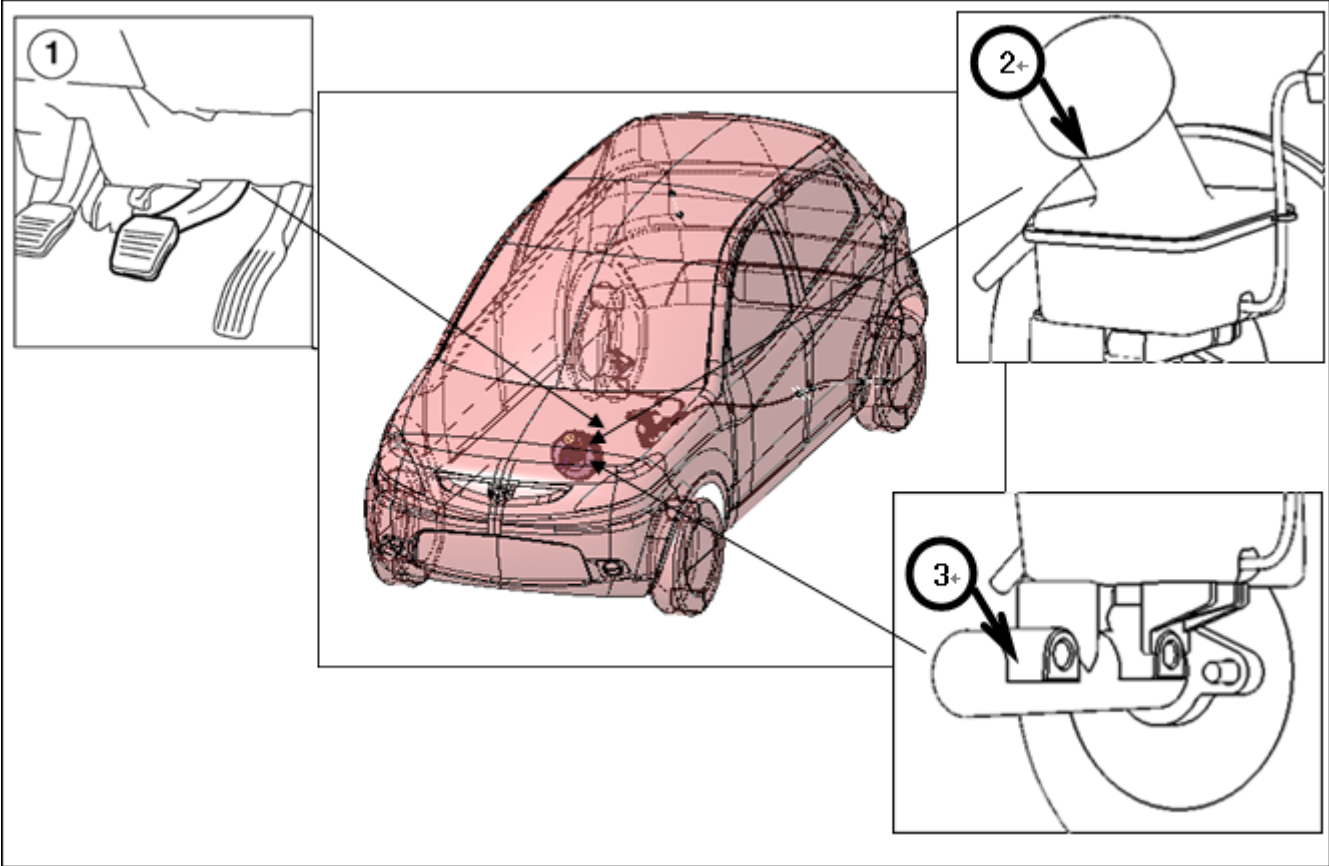
lubricating oil, grease, sealing component and binder

Items
HZY 4 braking fluid

Torque Specifications

Description	Nm
Joining of the master braking pump and the oil pipe	16±2
Fixing nut of the master braking pump	20~30
Fixing nuts of the joining axle of the brake pedal	20~30

Hydraulic Braking System



NO	Parts Number	NAME
1		Brake pedal
2		Oil storage can of the braking fluid
3		Master braking pump

Disassembling and Installation

Master braking pump

Disassembling



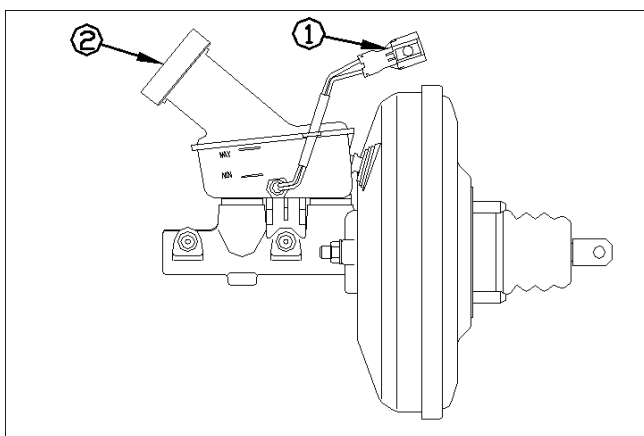
Notes: If braking fluid is carelessly splashed onto the painting surface, clean with clean water immediately.

1. **Notes:**

The fluid storage can shall not be polluted.

Take off the cover of the fluid storage can.

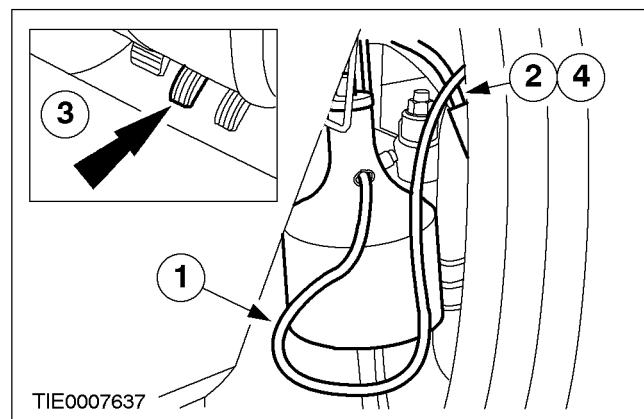
1. Disassemble the warning lamp switch plug for low braking oil level.
2. Take off the cover of the fluid storage can.



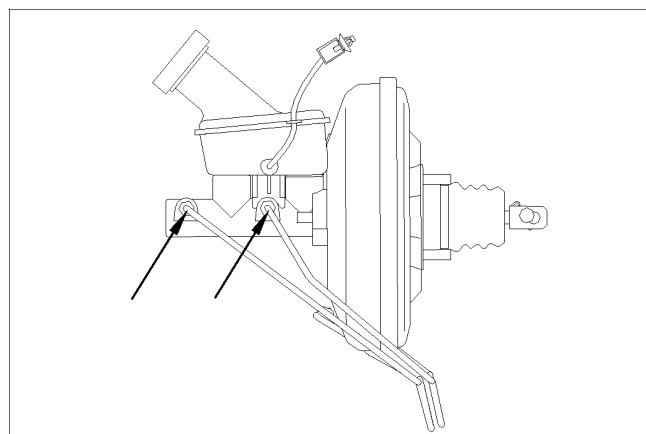
2. 注意: Notes: this procedure should be performed on both sides to completely discharge all the braking fluid in the fluid storage can.

Discharge the braking fluid of the fluid storage can.

1. Use a proper clean plastic pipe with one end connected to the system exhausting nozzle, and the other end communicated into a proper container.
2. Loose the exhausting nozzle.
3. Repeatedly step the brake pedal until all the braking fluid in the fluid storage can is completely exhausted.
4. Screw the exhausting nozzle tightly.

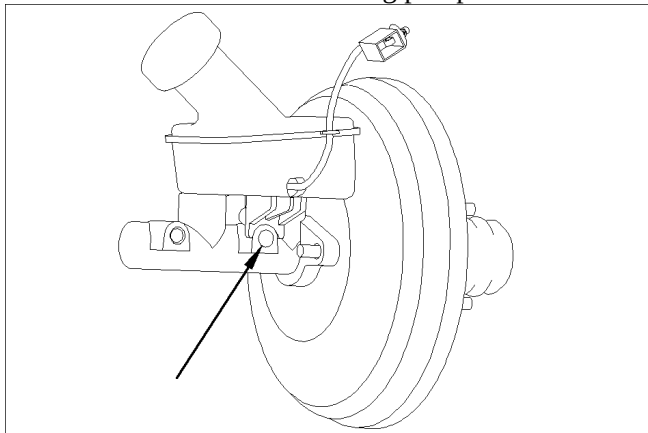


3. Disassemble the oil pipe of the master pump.



Disassembling and Installation (Continued)**4. Disassemble the master braking pump and the brake fluid storage can assembly.**

1. Disassemble the fixing nut.
- 2 Take off the master braking pump.

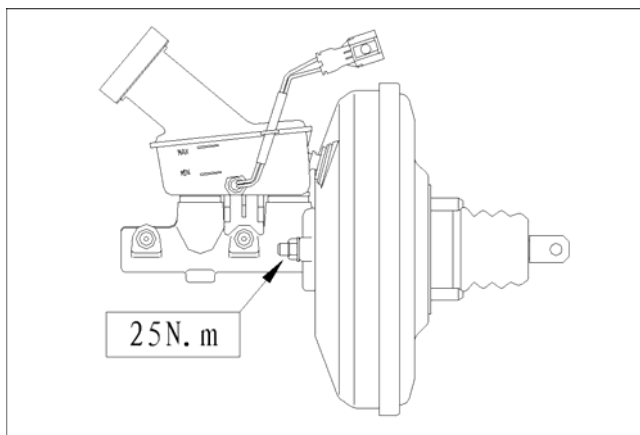
**Installation**

Warning: please confirm the pulling rod of the brake booster is placed at the right position before installation.



Warning: please confirm the vacuum sealing component of the master braking pump is placed at the right position before installation.

The installation process is the reverse of the disassembling sequence.



2. Refer to the chapter 203-00 for the relevant information of exhausting the gas of the braking system

Disassembling and Installation

Braking fluid storage can (12 341 0) Disassembling

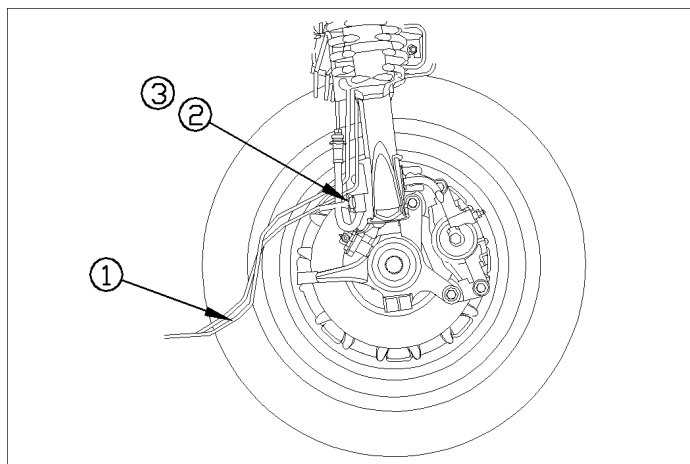
 **Warning:** if the braking fluid is carelessly splashed onto the vehicle paint surface, clean it with clean water immediately.

1.  **Warning:** ensure the cover of the oil filler of the fluid storage not to be polluted

1. Disassemble the switch connector of the warning lamp of the braking level.
2. Take off the oil filler cover.

2. Exhaust the braking fluid.

1. Use one end of a flexible pipe to connect with the right front exhausting nozzle, and the other end to connect into a proper container.
2. Loosen the exhausting nozzle, repeatedly step the brake pedal until all the oil fluid exhausted out.
3. Screw the exhausting nozzle tightly.
 - Perform the same operation on the left front exhausting nozzle.



3. Disassemble the braking fluid storage can.

- Disassemble the fixing clips on both sides.

Installation

1. Notes: if necessary, replace with a new O-shaped ring.

Install according to the adverse sequence of the disassembling sequence.

2. Please refer to the chapter 203-00 for the relevant information about exhausting of the braking system

Disassembling and Installation

Section 203-05 Booster Braking System

Applicable Vehicle Model: benni-mini

contents	page
Specifications	
Specifications	203-05-2
Instruction and Operation	
Brake booster	203-05-3
Diagnosis and Test	
Booster braking system	203-05-4
Disassembly and Installation	
Brake booster (12 451 0)	203-05-5

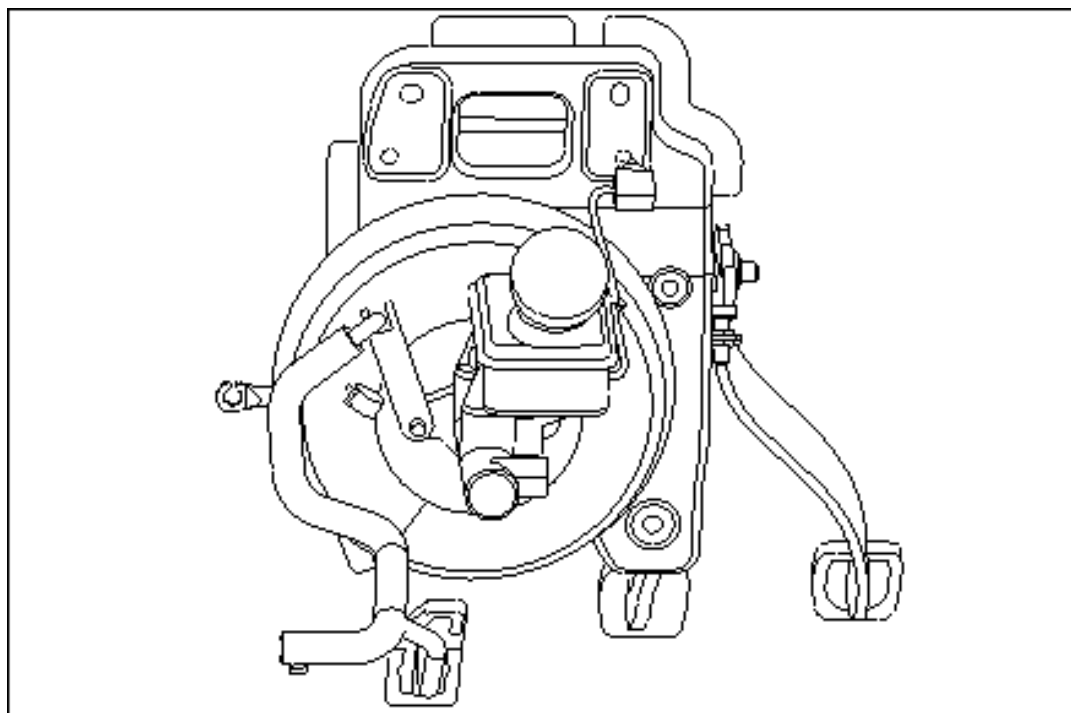
specification

Torque Specifications

Description	Nm
Brake booster fixing bolt	20~30
Fixing bolt of the master braking pump	20~30

Instruction and Operation

Brake Booster

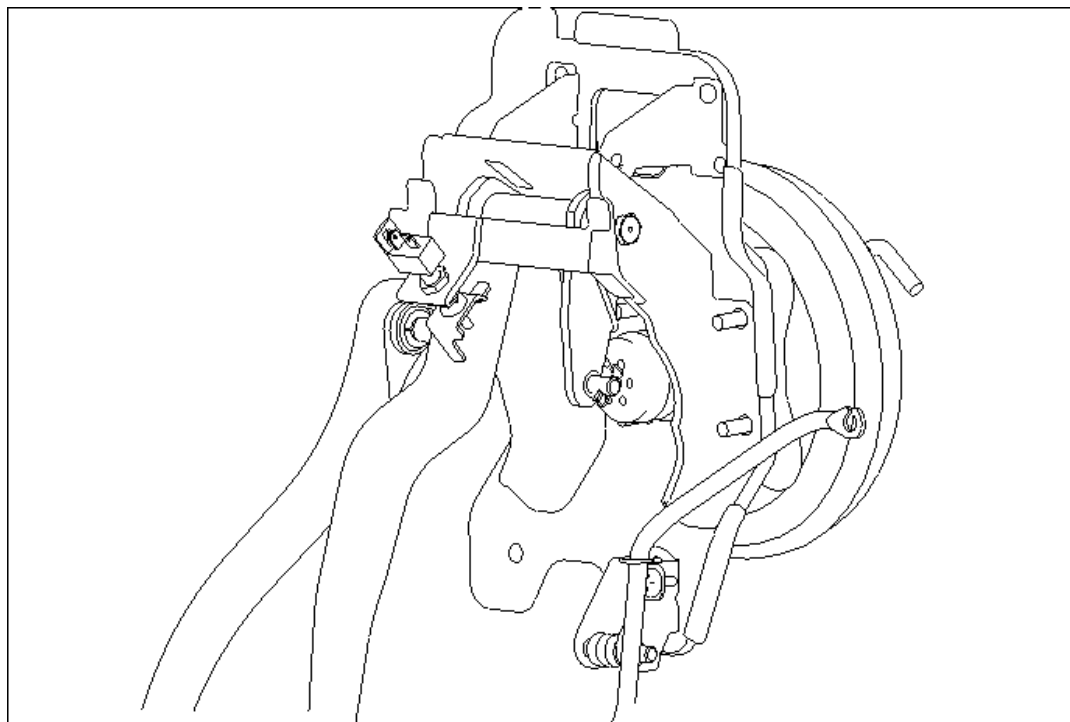


Serial Number	Parts Number	Name
1	-	Brake Booster

Diagnosis and test

Brake Booster

Refer to Section 203-00



Disassembly and Installation

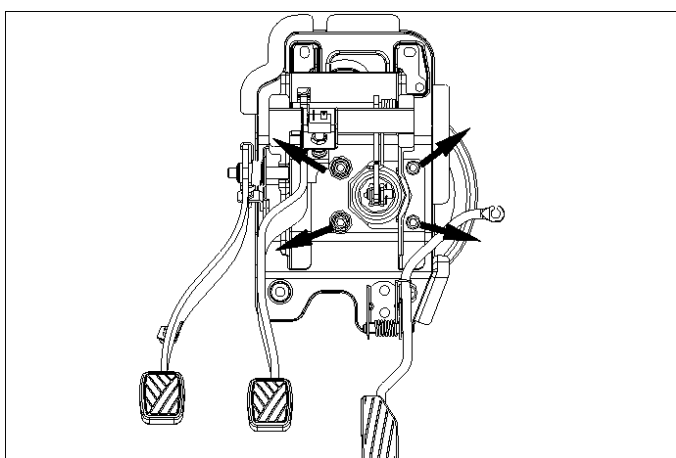
Brake Booster (12 451 0)

Disassembly



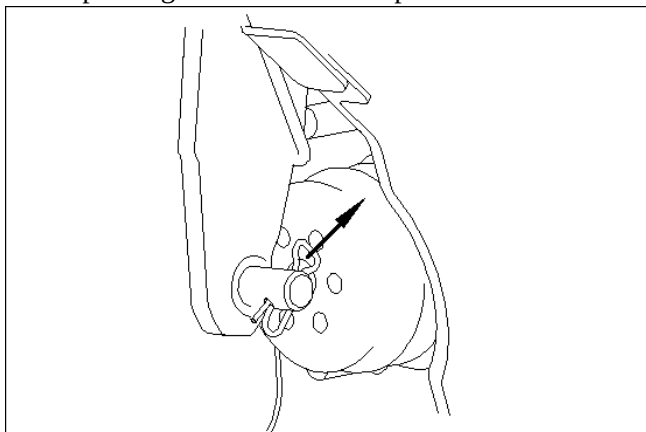
Warnings: If the braking fluid is splashed on the lacquer finish of the vehicle body carelessly, the braking fluid should be flushed with the clean water.

1. Disassemble the master brake pump
2. Disassemble the brake booster installing bolts

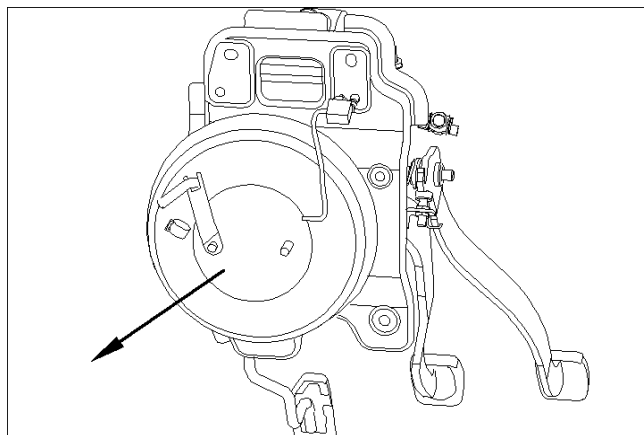
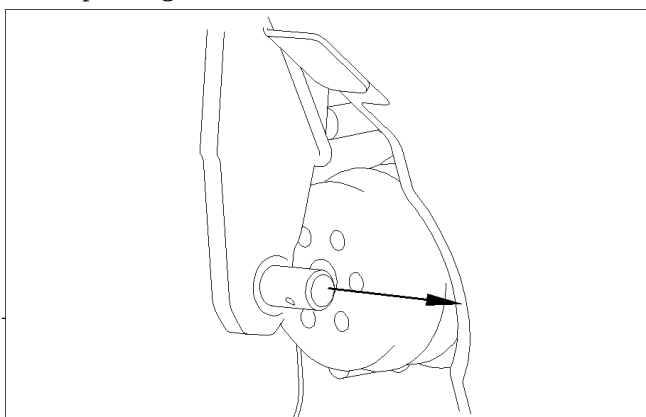


3. Disassemble the brake booster.

1. Dismount the connecting pins between the brake pushing rod and the brake pedal arm.

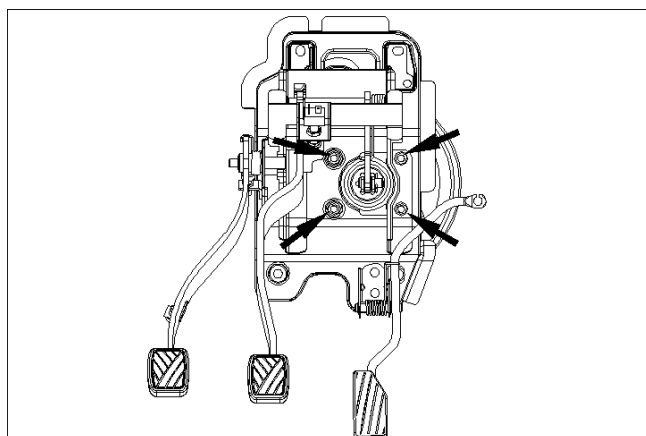


2. Dismount the fixing pin and the fixing clip of the pushing rod.



Installation

1. The installation is performed according to the procedures opposite to the disassembly.



2. For the exhausting of the braking system is operated, refer to Section 203-00.

Section 203-06 Anti-lock Braking System

Applicable Vehicle Models: BENNI MINI

Contents	Page
1 Anti-lock braking system	203-06-2
Specification	
specification	203-06-2
Instruction and Operation	
Anti-lock brake control	203-06-3
General	203-06-3
Function.....	203-06-3
Anti-lock brake control	203-06-5
MK70 Anti-lock Braking System (ABS)	203-06-5
Diagnosis and Test	
Anti-lock Brake Control	203-06-7
Inspection and Confirmation	203-06-7
Disassembly and Installation	
Hydraulic Control Module	203-06-8
Anti-lock Braking System Module	203-06-8
Rear Rack of Speed Sensor of Wheel (12 788 0)	203-06-10
Proportioning Valve	203-06-11
Specifications	
Specifications	203-06-11
Instruction and Operation	
function.....	203-06-11
Malfunction insepection	
malfunction inspect and malfunction diagnose	203-06-12

Specification

一、 Anti-lock braking system

Lubricating oil, lubricating fat, sealing parts and binder

Name	Model
Brake fluid	HZY 4

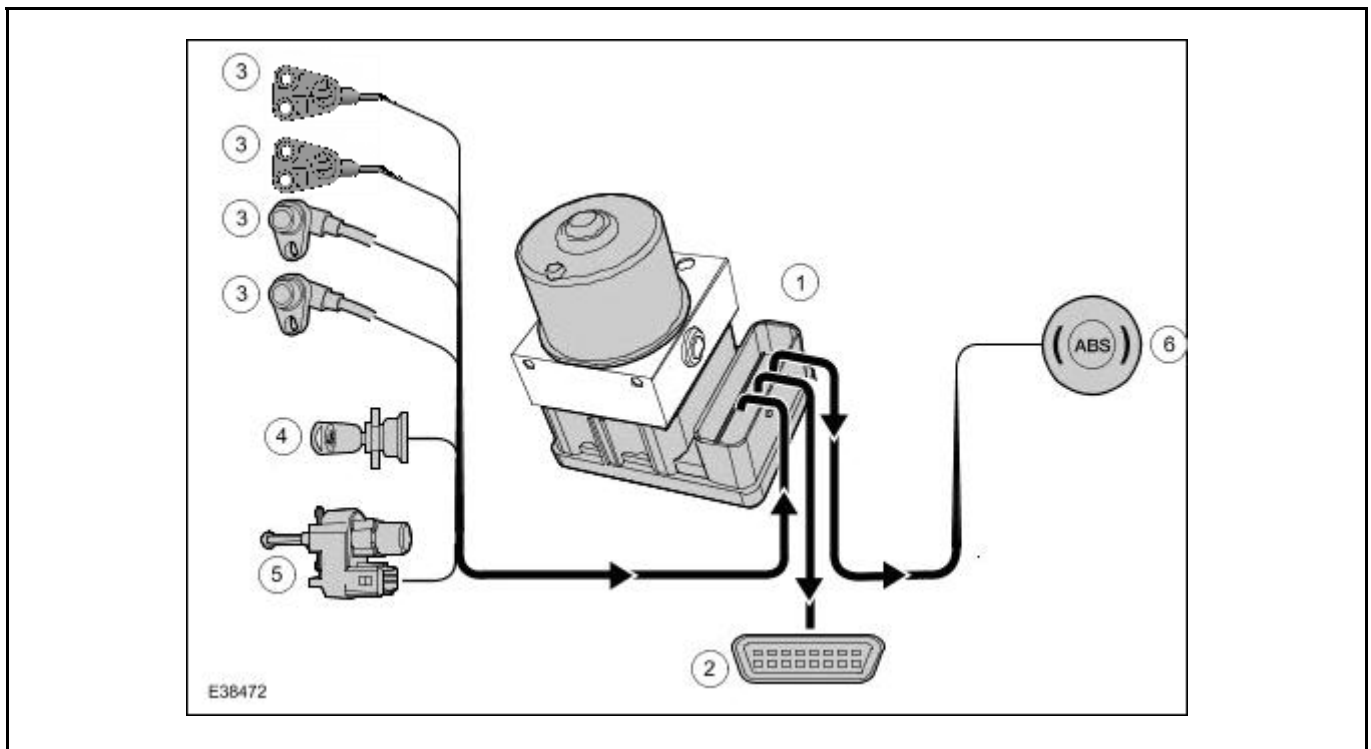
Torque specifications

Description	Nm
Fixing bolts of the hydraulic controlling module	8~10
Braking oil pipe leading to the hydraulic control module	M10:16±2
	M12:18±2
Fixing bolts of the wheel speed sensor	Front: 22~25
	Rear : 8~10

Instruction and operation

Anti-lock Braking Control

General



serial number	Parts number	Description
1	-	Hydraulic device of the anti-lock Braking System
2	-	Data interface (DLC)
3	-	Wheel speed sensor
4	-	Ignition switch
5	-	Brake lamp switch
6	-	ABS warning lamp inside the instrument panel

Except the conventional loop of the diagonal independently arranged braking system, the ABS also includes a hydraulic device, four wheel speed sensors and an ABS warning lamp inside the instrument panel

The controlling software in ABS control module controls the distribution of the braking force, and continuously adjusts the braking force of each front and rear wheel to accord with the changes of the driving condition

.Function

As the closed loop controlling system in the braking system, ABS aims to prevent the failure of non-serviceable steering and driving performance when the wheel braking is locked.

ABS Control Module

The ABS control module continuously compares the self-stored pressure reducing limit value with the pressure reducing value detected by the speed sensor of each wheel, and thus the locking trend of each wheel can be detected.

If the ABS control module detects that certain wheel is tended to be locked, the relevant hydraulic valve inside the valve body shall be opened or closed.

The ABS control module also detects that the signal of the wheel speed sensor is transmitted to the power controlling module

Instruction and Operation

When the ignition switch is turned on, the ABS control module shall turn on the warning lamp inside the instrument panel. The warning lamp shall not extinguish until the ABS finishes the system

Valve Assembly

The valve assembly contains four oil filling valves and four oiling discharging valves. An oil filling valve and an oiling discharging valve are arranged on one wheel. The oil filling valve is opened and the oiling discharging valve is closed in the no-power state.

The valve assembly also contains a low pressure fluid storage can and a noise reducing chamber.

ABS Pump

The ABS pump provides sufficient pressure for the master braking pump to ensure the independent adjustment of each channel when ABS exerts effects.

ABS Adjusting Cycle

One ABS adjusting cycle includes three stages:

First stage-- Pressure maintaining stage

The oil filling valve is closed, and the pressure on the wheel brake (sub-pump) remains the same, which means that the pressure of the sub-pump shall not change when the brake pedal is stepped down again.

Second stage-- Pressure reducing stage

The oil discharging valve is opened temporarily, and the pressure on wheel brake (sub-pump) is gradually reduced according to controlling method

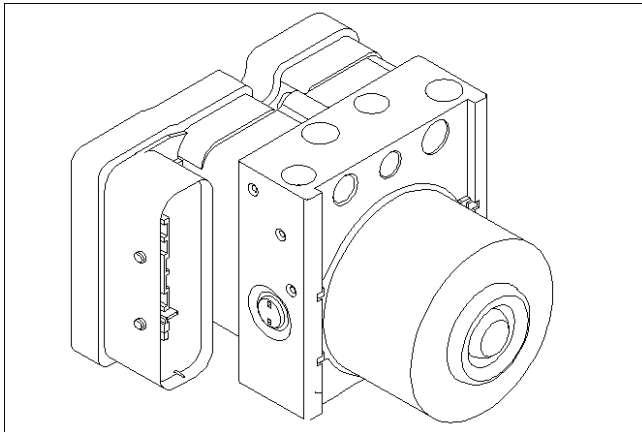
Third stage-- Pressure rising stage

- The oil filling valve is gradually opened, and the braking pressure is increased according to the controlling method so as to realize the most ideal braking effect.

Instruction and Operation(continued)

Anti-lock Braking Control

MK70-M Anti-lock Braking System(ABS)



Serial number	Parts NO.	Name
1	-	pump
2	-	valve
3	-	ABS control model

The MK70 ABS is specially designed for medium- and small-scale vehicles. Compared with the MK20 ABS system, the MK70 ABS greatly decreases the size of electric controlling and hydraulic controlling mechanisms (such as the hydraulic valve and the electromagnetic valve) and the housing size.

Therefore, the weight of the whole ABS hydraulic controlling mechanism is greatly reduced.

The hydraulic controlling mechanism comprises pumps, valves (including 8 hydraulic valves) and electric controlling units.

The ABS control module controls the lighting and extinguishing of the ABS warning lamp inside instrument panel through Wire K.

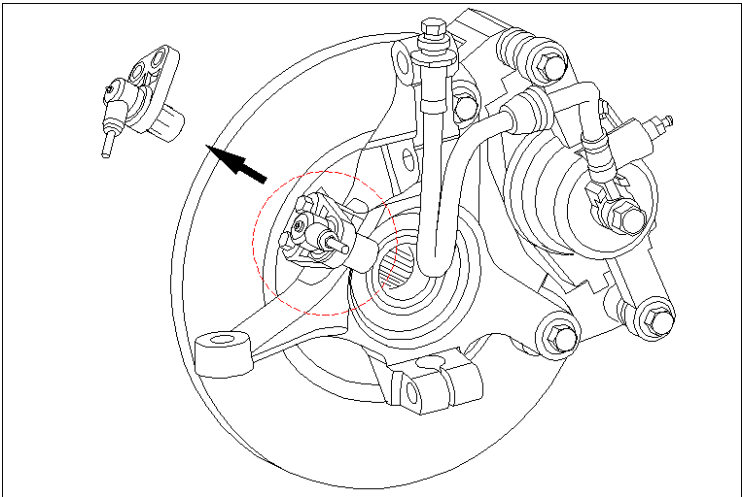
The MK70 ABS is a system called “4/4”, which means that the wheel speeds of four wheels are separately measured (using four wheel speed sensors).

The ABS separately controls the four wheels.

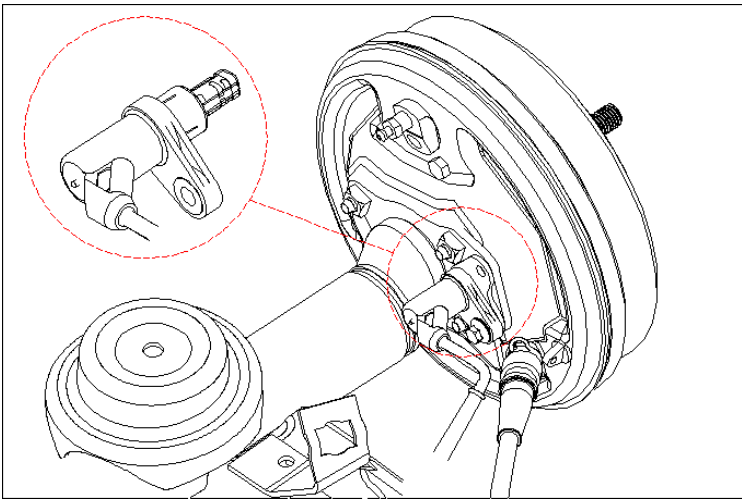
Instruction and Operation (continued)

Wheel Speed Sensor

Front Wheel Speed Sensor



Rear Wheel Speed Sensor



Serial number	Parts number	Name
1	-	Sensor
2	-	Installatin location

The wheel speed sensor is a passive sensor

The sensor receives pulse signals from gear rings. The gear rings of the front wheels are fixed on and

integrated with the driving axle. The gear rings of the rear wheels are fixed on the core shafts of the rear wheels.

The received wheel speed signal is converted into the digital signal through the integrated circuit inside the sensor and then sent to the ABS control module.

The sensor signal is transmitted to the ABS control module through two wire cables.

The ABS control module calculates the vehicle speed according to the signal of the wheel speed sensor and

DESCRIPTION AND OPERATION (Continued)

sends the signal to the power controlling module (PCM).

The failure of the ABS control module can be diagnosed through the data interface (DLC).

The hydraulic unit shall be refilled after repair.

Diagnosis and Test

Anti-lock braking control

Refer to the relevant wiring diagram in Section 203-06A for relevant structure and connection.

Inspection and Confirmation

- Confirm the problems described by customers.
2. Visually measure the obvious mechanical or electric failure.

Visual Inspection Table

Mechanical	Electric
- wheel speed sensor - Gear ring of the wheel speed sensor	- Insurance - Connector - Wiring harness

3. If the failure cause is obvious, repairing work shall be performed as possible before the next operation.
4. If the failure cause is not obvious, confirm the failure symptom and refer to WDS for failure cause.

Disassemble and Installation

Hydraulic Control Mechanism (HCU)

Name	Model
Brake fluid	HZY4

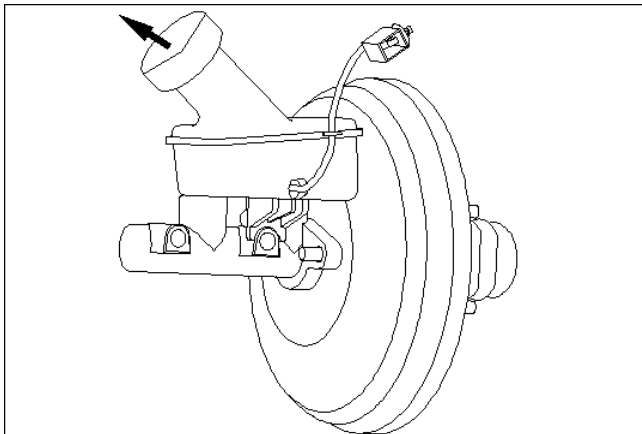
Disassembly



Caution: If the brake fluid is inadvertently spilled on the paint surface of the vehicle body, rinse it immediately with clean water.

1. Remove the negative electrode wire of the battery. Refer to Section 407-00.
2. **Caution:** the oil filler cover of the fluid can of the braking fluid can not be contaminated.

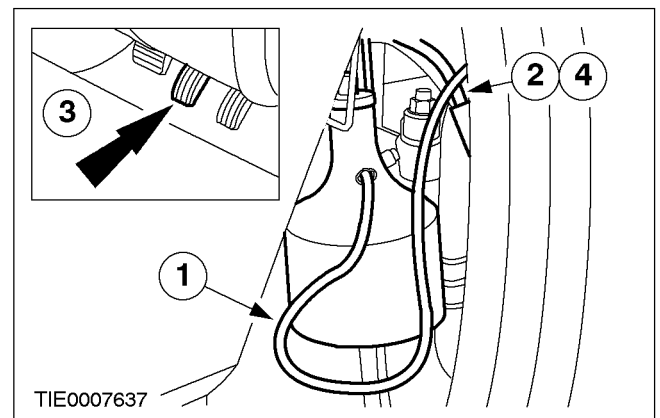
Take down the oil filler cover.



3. **Notes:** thoroughly discharging the braking fluid in the fluid storage can is extremely necessary for the operation at both sides.

Discharge the braking fluid in the fluid storage can.

1. Select a proper clean plastic hose, one end is connected with the exhaust valve and the other end put in a suitable container.
2. Release the exhaust valve.
3. Continuously step the brake pedal until all the braking fluid is discharged.
4. Tighten the exhaust valve.



4. Install the cover of the brake fluid storage can.
5. Remove the anti-lock (ABS) module connector
6. **Warning:** cover the braking oil pipe to prevent the braking fluid from flowing out or the dirt from entering.

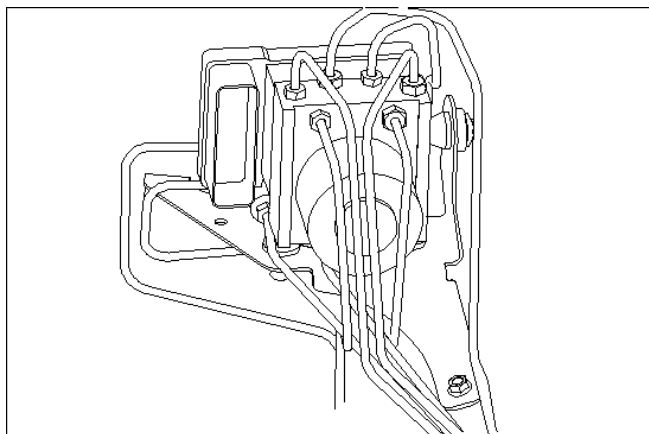


Warning: block the hydraulic control module (HCU) to prevent the braking fluid from flowing out or the dirt from entering.

Notes: please mark down the position of the braking oil pipe for installation.

Disassemble the braking oil pipe (HCU) from the hydraulic control module.

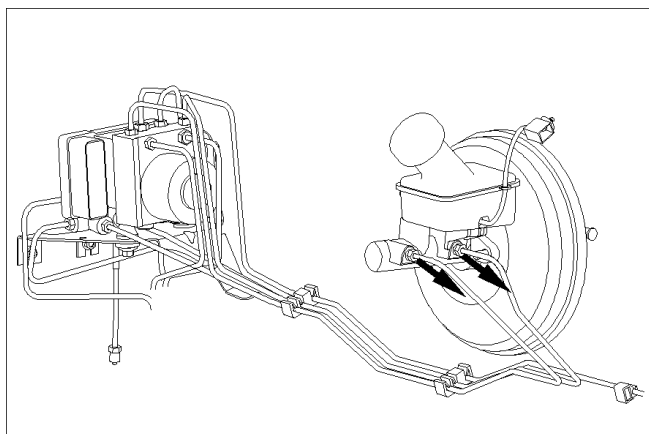
Disassemble and installation (continued)



7.  **Warning:** cover the braking oil pipe to prevent the braking fluid from flowing out or the dirt from entering.

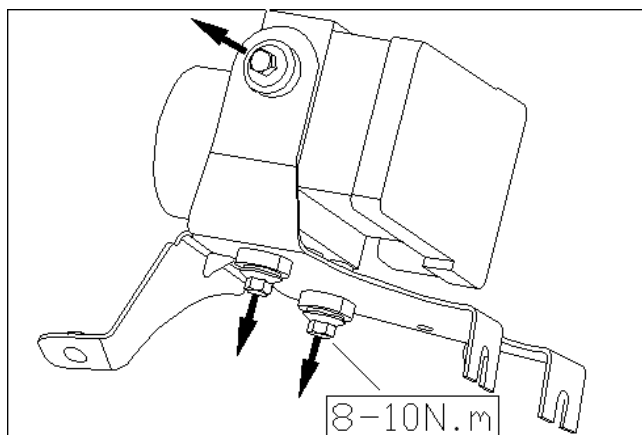
Note: please mark down the position of the braking oil pipe for installation.

Disassemble the braking oil pipe (HCU) connected with the hydraulic control module from the master braking pump.

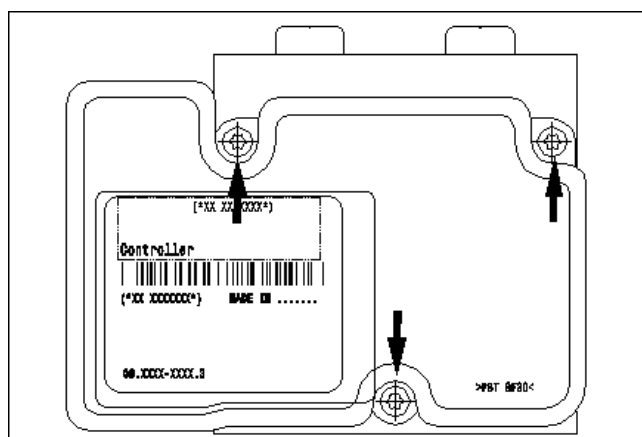


8. Remove the braking oil pipe.

Remove the fixing bolts at the lower part of the hydraulic control module.



Remove the fixing bolts of the hydraulic control module and the ABS module.



12. Remove the hydraulic control module.

Installation

1. Install in sequence adverse to the disassemble procedure.
2. Exhaust the system. Refer to Section 203-00.

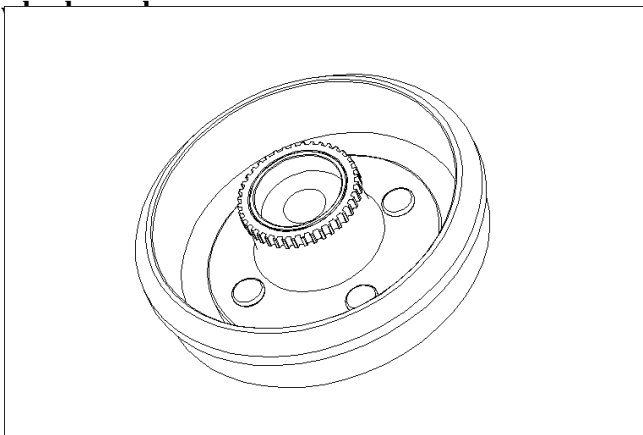
Disassemble and installation (continued)

Gear ring of the Rear Wheel Speed sensor (12 788 0)

Common Devices
Oil Hydraulic Press

Disassembly

1. Remove the brake drum. Refer to Section 203-02.
2. Remove and abandon the gear ring of the rear



Installation

-  **Warning:** make sure that the gear ring will not be knocked, damaged or stuck with metal scraps in the operation process.
-  **Warning:** place a protective flat plate without metal material to prevent damage.
-  **Warning:** make sure that the brake drum is sufficiently supported and not allowed to be stuck on the wheel bolt.
-  **Warning:** the force is applied slowly and even until the brake drum is completely seated in the installation process.
-  **Warning:** the force can not be more than 10KN.

Install new wheel speed gear rings with an appropriate hydraulic machine.

2. Install the brake drum. Refer to Section 203-02.

Malfunction Inspection

一、Proportioning Valve

Lubricating Oil, Lubricating Grease, Sealing Parts and Binder

3 、 Remove the installing bolts of the proportioning valve.

Name	Model
Brake fluid	HZY 4

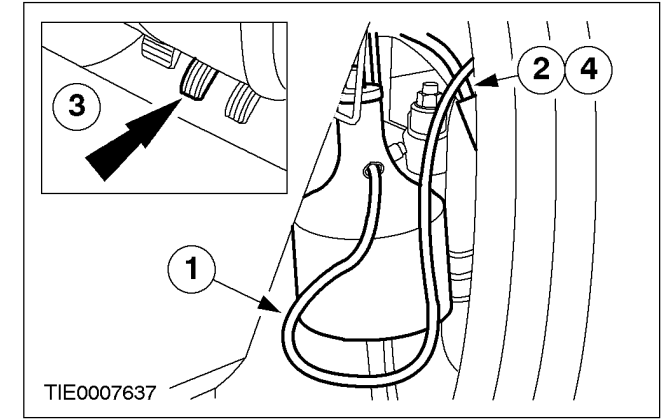
Torque Specifications

Description	TorqueN. m
Installing Bolts of the Proportioning Valve	20±2
Connector of the Braking Oil Pipe	16±2

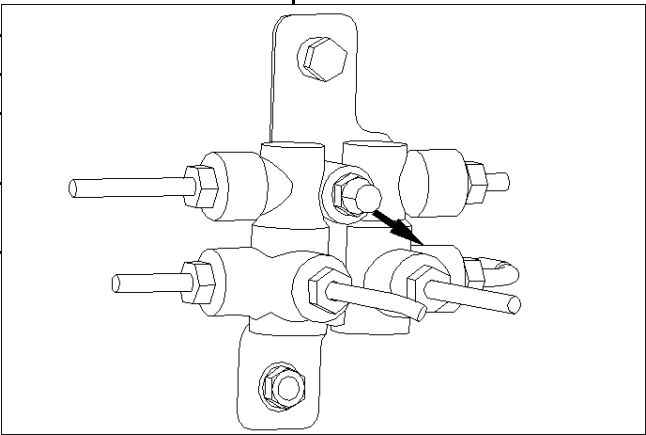
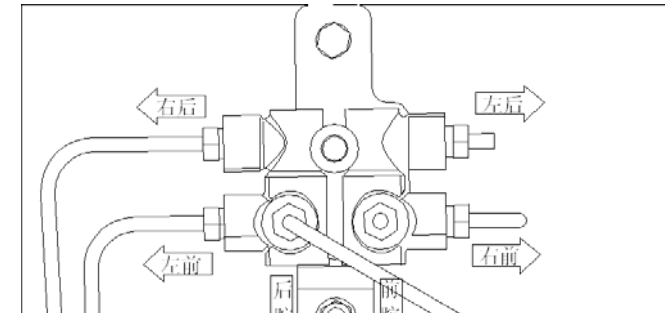
Disassembly

Discharge the braking fluid in the fluid storage can.

- 1. Select a proper clean plastic hose, one end is connected with the exhaust valve and the other end is put in a suitable container.
- 2. Release the exhaust valve.
- 3. Continuously step the brake pedal until all the braking fluid is discharged.
- 4. Tighten the exhaust valve.



2、Screw off the connector of the braking oil pipe.



Installation

Installation is adverse to disassembly.

Disassembly and installation(Continued)

Malfunction Inspection

Malfunction Inspection and Malfunction Diagnose

A、Malfunction Inspection

The malfunction inspection methods just as the same with the air bag inspection section 405-00

b、Malfunction diagnose

Through the diagnostic instrument, the current malfunction record and the history malfunction record of the ABS can be output directly. the belowing cable are the malfunction description and the malfunction model:

NO.	Malfunction Description	Malfunction model
1	Controller fault	Mechanical fault
2	Controller, RAM fault	defect
3	Controller outside RAM fault	defect
4	Controller, EEPROM fault	defect
5	Controller inspect fault	defect
6	Controller, self-inspection fault	defect
7	Controller, program fault	defect
8	Controller, electric fault	defect
9	Controller, function fault	defect
10	Controller, timing	defect
11	Controller ,inside-sensor fault	defect
12	the controller code does not exit	No display
13	Controller code not correct	No display, mechanical fault, unbelievable signal
14	Battery voltage KL30 fault	above the max limited level, below the mini limited level, unbelievable signal
15	ABS abnormal work	no display, unbelievable signal
16	data bus abnormal work	defect
17	L,F wheel speed sensor fault	mechanical fault, unbelievable signal, electric fault
18	R,F wheel speed sensor fault	mechanical fault, unbelievable signal, electric fault
19	L,R wheel speed sensor fault	mechanical fault, unbelievable signal, electric fault
20	R,R wheel speed sensor fault	mechanical fault, unbelievable signal, electric fault
21	Brake lamp switch fault	unbelievable signal
22	Hydraulic pressure fault	unbelievable signal, electric fault, defect
23	tire pressure warning	No display

Disassembly and installation(Continued)

Section 204-00: Steering System-General

Applicable Vehicle Model: BENNI MINI

Contents	Page
Specification	
specification.....	204-00-2
Instruction and operation	
steering system	204-00-3
steering column	204-00-3
Steering Mechanism	204-00-3
Diagnosis and Test	
Steering System.....	204-00-4
Check and Confirmation.....	204-00-4
Failure Phenomenon Table.....	204-00-4
Element Test.....	204-00-5

Specification

General Parameters

	Specifications
Minimum turning diameter	10.0
column electronic power assistant steering	200W、35A、12V(DC)

Instruction and operation

Steering System

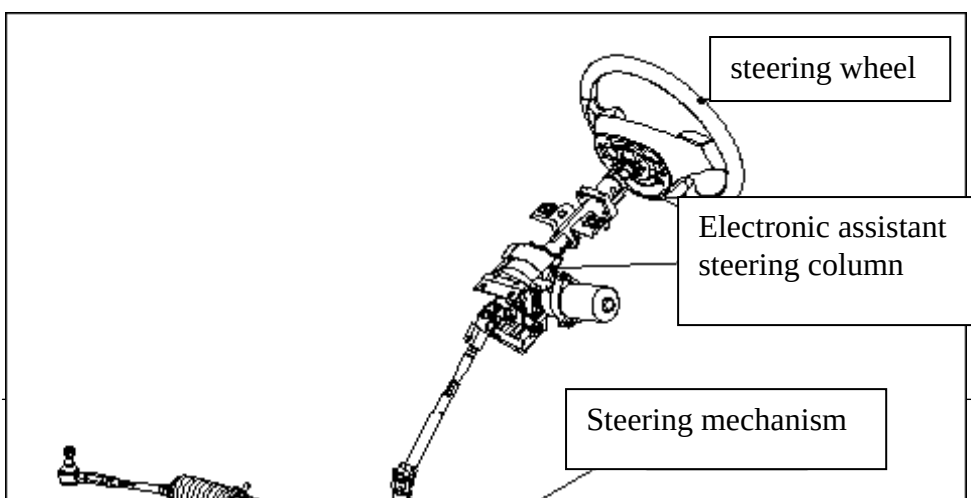
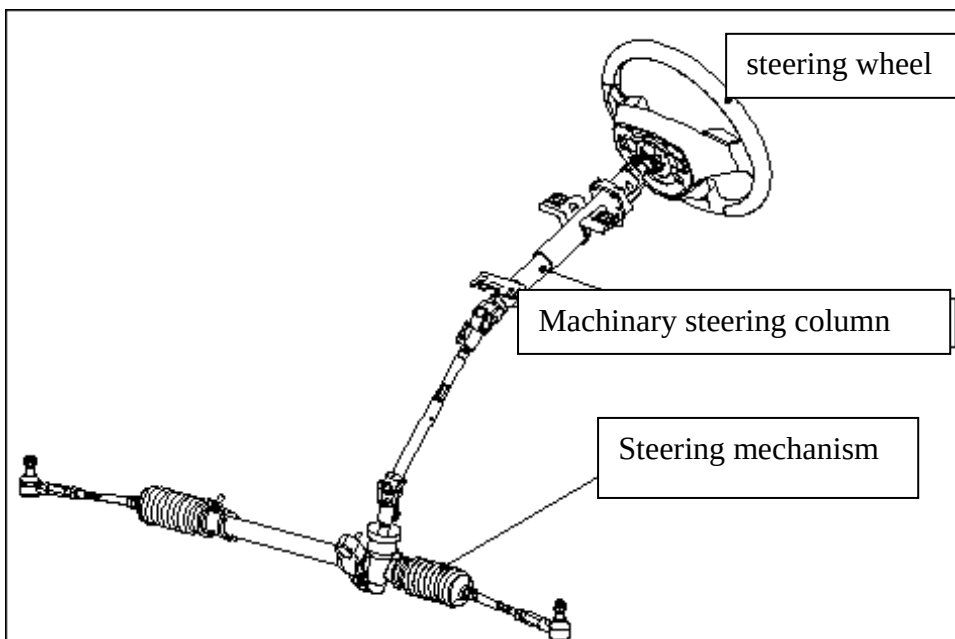
Steering Column

The steering column is equipped with a multi-direction steering wheel lock (or anti-theft lock) accepted the strict test, and the steering wheel lock is equipped with the lock core of the insurance degree. The steering column and the upper end are fixed on the periphery of an instrument panel.

The steering wheel is fixed on the steering column assembly through a fixing nut, and the steering pinion gear is connected with the steering column through a flexibility universal joint. The flexibility universal joint is fixed on the pinion gear through a locking bolt, and is also fixed on the steering column through the fixing bolts of the maintaining frame and axle positioning device assembly. For the details, please refer to Section 204-04.

Steering Mechanism

The steering mechanism is the commonly-used gear rack and gear type, for the details, please refer to Section 204-02.



Diagnose and test

Steering System

Working Principles

The rotating motion of the steering wheel is transmitted to the steering mechanism through the steering column. The steering mechanism can convert the rotating motion into the straight line motion through the gear rack in the steering mechanism. The straight line motion is transmitted to the steering knuckle of the wheel through the steering tie rod and the external connector of the tie rod.

The steering oil pressure is applied to the steering mechanism through the power steering pump. When the steering wheel is rotated, the power steering oil shall open valve at one end of the double-way piston according to the rotating direction of the steering wheel, the piston is pushed to be moved by the oil pressure, to supply the auxiliary power required in the steering.

Failure Phenomenon Table

Check and Confirmation

1. Check the problems of the customer
2. Inspect the obvious-damaged parts visually, as shown in the following table:

visual inspection table

Mechanical Aspect	Electric Appliance Aspect
– tire and pressure – wheel and tire	– Controller harness – Motor

3. If the reason of the problem is obvious, the problem should be tried to be solved before the next operation is performed.

4. If the reason of the problem is not obvious, the reason should be found out according the failure phenomenon.

malfunction phenomenon	Possible Reasons	Measures
The steering is difficult or easy	• speed signal lost or interference	•check speed signal ,refer to 204-04
	•engine signal lost or interference	•check engine signal ,refer to 204-04
	•power bad connection	check power ,refer to204-04
	•the suspension ball joint inseparable	•test the suspension ball, refer to 201-00
	•steering mechanism damage	•Replace the steering mechanism
	•steering column damage	•Test the steering connect parts, refer to "steering connection test "part
	•steering motor damage	•Replace the power assistant motor ,refer to the 204-01
The steering is not sensitive (when the steering wheel is rotated, its direction is not changed)	• tie rod ball damage	• replace the tie rod if necessary, refer to the 201-01
	•front suspension bush damage	•inspect or replace, refer to 201-01
	•suspension ball damage	•check the suspension ball joint, refer to the 201-00
	•steering mechanism anti-dust cover damage	•inspect or replace it if necessary, refer to the 204-02

Diagnose and test (continued)

malfunction phenomenon	Possible Reasons	Measures
	•steering mechanism fixed bolt loose	•check it and replace the fixed bolt if necessary, refer to the 204-02
	•steering column fixed bolt loose	• replace a new fixed bolt if necessary
	•the fixed bolt which connect the steering column and the steering mechanism gear loose	•check it and replace the fixed bolt if necessary.
	•Steering mechanism gap are too wide	•Replace steering mechanism
•the steering wheel turning space is too wide	• block plug loose	•tight again
	• steering up bolt loose	•tight again
	• the ball bolt of the steering tie rod top defect or loose	•tight again ,replace it if necessary
•steering wheel is too heavy	• the power assistant does not work ,the EPS lamp light steady	•refer to 204-01
•hard to back to the positive	• the friction is too large of the tie rod ball joints	•replace
	• block plug is too tight	•tight again
	• the inside tie rod or the ball joint defect	•replace
	• steering and the vehicle bracket loose	•tight
	• steering bearing and the valve aging	•repair or replace
	• Curved rack	•replace
	• gear bearing damaged	•replace
•abnormal noise from the Rack and pinion	• fuel pipe and the chassis interference	•layout the new fuel pip
	• steering installation bolt loose	•tight
	• tie rod ball joint loose	•tight
	•tie rod ball joint wear or aging	•replace
•abnormal noise from the motor	•replace the motor	The torque of the motor fixed screw is 20-30N.M, in order to keep the motor working in a better position please make the screw in the right situation before tight it, then turn the steering wheel with right hand and hold the motor to see if it's swing. If not, tight the screw, if it swing, adjust the motor's position then tight it. when you cannot adjust it well ,repeat the operation above

Diagnose and test

Element Test

Steering Linkage Device

Check whether the dust shield of the steering mechanism is damaged, corroded or warped. The dust shield shall be ensured to be safe and reliable, and if necessary, replace the dust shield or the nip.

1. Stop the vehicle on a dry and smooth road, and pull up the manual brake. Turn the direction to the central position.
2. Flame out the engine, and hold the steering wheel tightly with both hands. Shake the steering wheel vertically and horizontally (don't rotate the steering wheel), check the wear of the steering column bearing, and check whether the steering coupling, the steering wheel or the steering column is loosened. If the loosening phenomenon is found, the torque of the fixing bolts of the coupling and the steering wheel shall be checked. The steering column can not be repaired, if necessary, replace the steering column. Please refer to Section 204-02.
3. If the steering linkage device is damaged, replace the steering linkage device if necessary. Please refer to Section 204-03. . The steering column can not be repaired, and if necessary, replace the steering column. Please refer to Section 204-01. The clearance of the steering mechanism can not be adjusted, and if necessary, replace the steering mechanism. Please refer to Section 204-02.

Chapter 204-01 Electric Power Assistant Steering Column

Applicable vehicle model: BENNI MINI

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Regulation

Torque Specifications

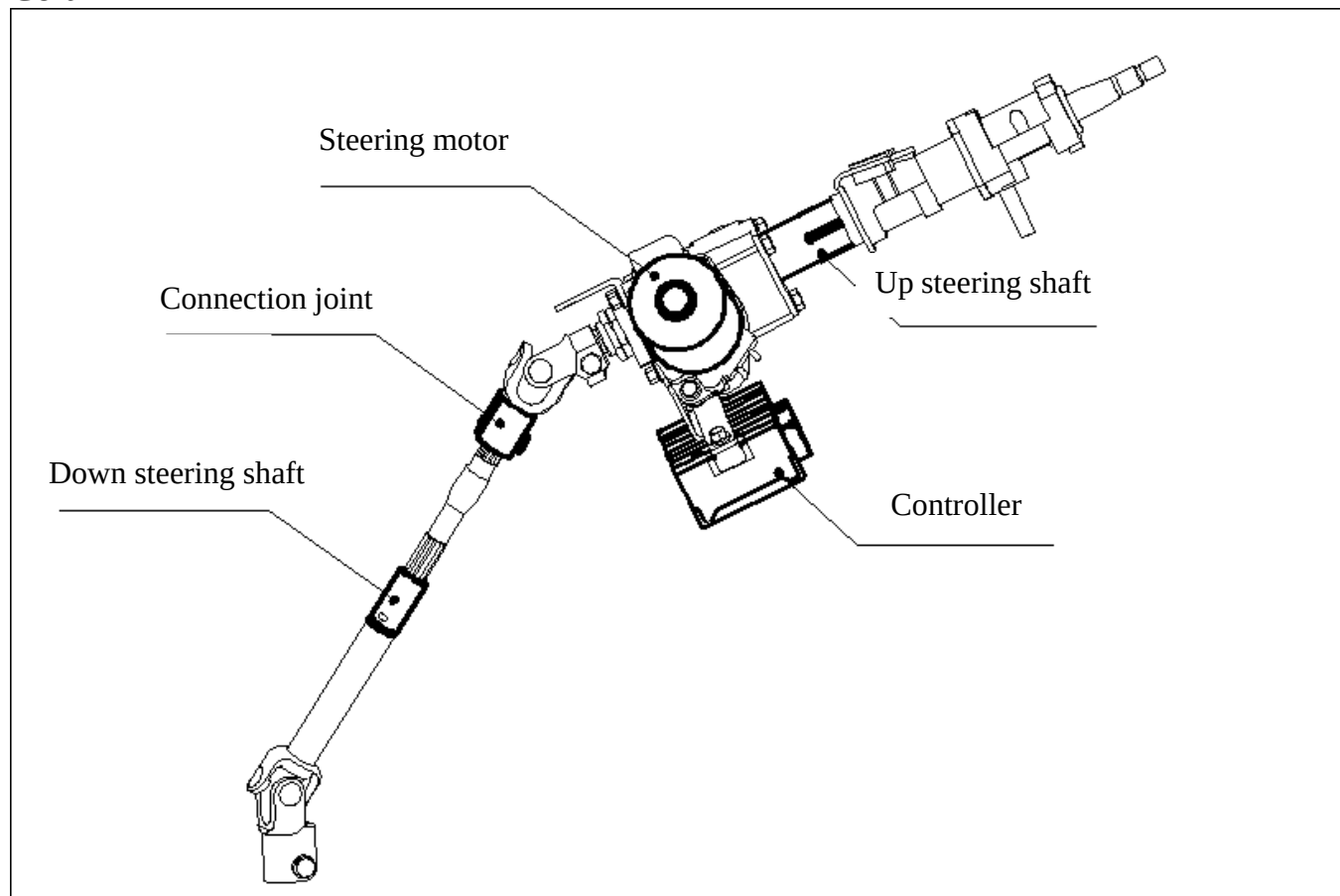
Description	Nm	lb-ft	lb-in
Fixing nut of the steering wheel	25-40		-
Fixing bolts of the steering column	24±3		-
Clamping bolt between the steering universal joint and the steering column	20-30		-

Basic technical parameters

description	parameters
work temperature	-40℃～+85℃
work voltage	9～16V（DC）
DC permanent magnet controller motor basic parameters	
rated work time	continue 3 min every single time
rated power	220W
rated work voltage	12V DC
rated motor speed	(1050r±300 r) /min
rated work current	35A±3A
rated output torque	1.8N・m±0.16N・m

Instruction and Operation

Electric Power Assistant Steering Column

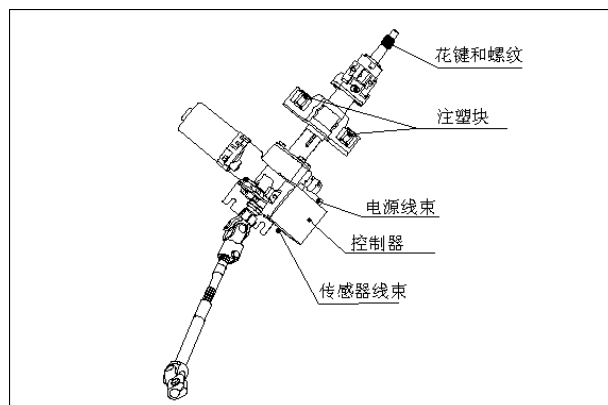


Disassembly and installation

REMOVAL AND INSTALLATION

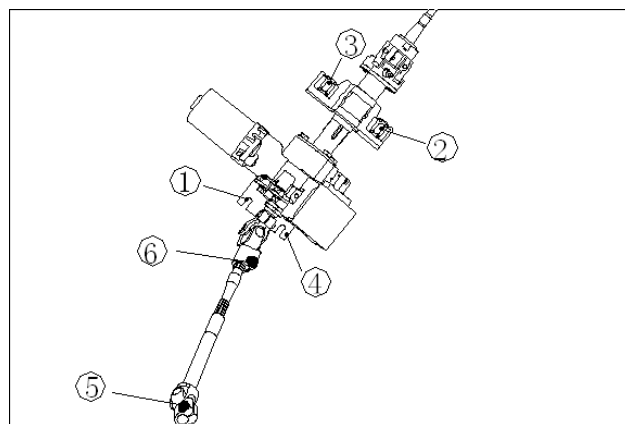
1. Notice before the disassembly

1. Do not fall off during carrying.
(If the component falls off, the component shall be abandoned)
2. Check whether the injection mold is loosened.
3. Check whether the thread and spline of the upper axle are damaged.
4. Check the controller, the sensor harness and the power harness if Damaged



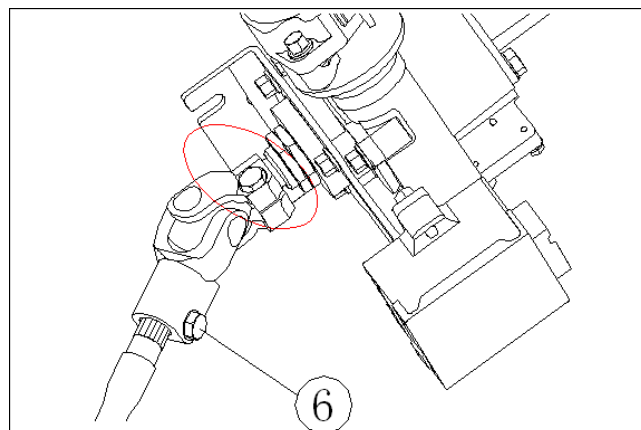
2. Notice during the disassembly

1. Fix the bolts according to the sequence of the first, second, third and fourth components.
2. Fix the bolts according to the sequence of the fifth to sixth components.
3. Screw down the bolts according to the sequence of the first, second, third and fourth components.
4. Screw down the bolts according to the sequence of the fifth to sixth components. Make sure the number sixth bolt was screwed down in the last to release the assemble stress.



Attention

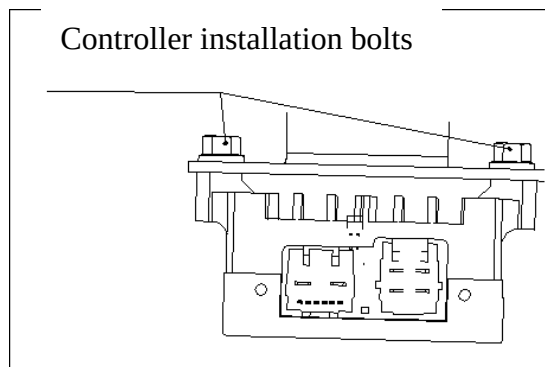
Above the number six bolt ,there is Another bolt, do not make mistake when disassembly The number six bolt can release the assemble stress False installation or disassembly would cause Un-smoothly when repair or rotate torque.



Controller instruction and inspection

1. Controller Maintenance Attention Issues

1. Remove the controller harness and make sure the controller in a open status, please shut down the vehicle and the power when removing the connector
2. Disassemble and installation of the EPS controller
 - 1) Take off the battery negative harness
 - 2) Loose the installation bolts of EPS controller
 - 3) Disassemble the connector
 - 4) Disassemble the EPS controller



Installation:

The installation process is opposite to the disassembly process

Controller instruction and inspection

1、Circuit Figure

