

CHAPTER II STEERING SYSTEM

SECTION I INSTRUCTION AND OPERATION

I. SAFETY REGULATIONS ON POWER STEERING SYSTEM

If the risk of electrical short circuit exists in the operation process, the earthing lead should be cut off; the negative pole connector of the storage battery should be covered; internal screw threads should be recut onto the bolts using locking glue and the external threads should be cleaned up; and locking glue should be used in the case of bolt insertion and locknut should be regularly replaced.

Heat treatment should not be carried out on the components of steering system; otherwise, the possible variation of material feature shall impact a negative influence on the operation safety of vehicles.

Only approved special steering fluid can be used and the discharged steering fluid should not be reused.

In the wake of accident occurrence, not only the chassis alignment shall be inspected (chassis alignment should be inspected at any circumstance), but also other chassis components should be carried out visual inspection to see whether there is curve or bull crack.

II. INSTRUCTION ON POWER STEERING PUMP

Power steering pump is a vane pump, which shall provide hydraulic pressure to the system. Power steering pump consists of components as follows:

Drive shaft

Steering pump body

Steering pump ring

Pressure plate

Thrust plate

Flow control valve

Rotor

Vane

The aperture at the rear part of the steering pump body should include components as follows:

Steering pump ring

Pressure plate

Thrust plate

Rotor

Vane

End plate

The small aperture at the flank of the steering pump body should consist of components as follows:

High-pressure hose connector

Flow control valve

Spring

Flow control orifice is an integral part of high-pressure hose connector. The pressure relief valve in the flow control valve shall control the pressure of steering pump.

III. INSTRUCTION ON POWER STEERING GEAR

The movement of steering wheel shall play functions as follows:

1. The movement of steering wheel shall be passed to the pinion.
2. The movement of pinion shall be passed to the gear.

3. The gear of pinion mesh with that of the gear rack. Multi-functional driving handle controls components as follows:
4. This shall make the gear rack move.
 - Headlight high beam
 - Windscreen wiper and washer

Pinion and rack power steering system is furnished with a rotary valve type control valve, which facilitates the steering fluid to flow toward the rack piston. Monoblock rack piston is connected with gear rack and its functions as follows:

1. Rack piston converts hydraulic pressure into linear force.
2. Linear force makes the rack under side-to-side movement.
3. Linear force is passed to the internal and external steering tie rod and steering knuckle.
4. Steering knuckle rotates vehicle wheel.

Note: if there is no hydraulic power system, bigger steering force shall be needed.

IV. INSTRUCTION ON STEERING WHEEL AND STEERING COLUMN

The steering column components shall play the functions except for steering. The depicted functions shall be achieved by the steering column components as follows:

1. Steering column

Steering column absorbs energy. When frontal collision occurs, the steering column shall retract in order to reduce the probability of hurt to the driver.

2. Ignition switch and steering lock on the steering column.

The ignition switch and steering lock installed onto the steering column can lock the vehicle in an effort to prevent the vehicle from being stolen.

3. Combination switch

Steering column disassembly and reassembly adopt specified screws and bolts to ensure energy absorption to give an effect on the external force existing on the steering column. During the conveying after dismantling it from vehicle, special caution should be taken.

SECTION II SPECIFICATIONS OF ASSEMBLY TORQUE

Tightening Torque	Number Of Vehicles	Affiliated Assemblies
25±3	3	Bracket And Low Right Bracket Of Secure Steering Column
25±3	1	Connection Universal Connector And Steering gear
10±1	4	Secure steering sleeve bracket
10±1	1	Secure Clamp A21-3406423
10±1	1	Secure Clamp Bracket I
10±1	2	Secure Clamp Bracket II
10±1	2	Secure Heat shield of Steering gear
35±3	2	Tie rod end And Steering Knuckle
75±5	4	Secure Steering gear And Subframe
75±5	2	Secure Steering gear And Subframe
25±3	2	Secure Steering oil reservoir
25±3	1	Secure clamping sleeve
25±3	1	Secure Steering Oil Pump
180±15	2	Subframe Front And Vehicle Body Connections
80~90	2	Subframe Rear And Vehicle Body Connections
80~90	2	Ball Pin Of Control Arm And Steering Knuckle
25±2	4	Stabilizer Bar Clamp
50±3	2	Connect Stabilizer Bar with Extension Bolts
60±5	2	Connect Rear Mounting with Transmission
70±5	4	Connect Rear Mounting with Subframe

SECTION III DISASSEMBLY AND ASSEMBLY OF STEERING SYSTEM

DISASSEMBLY OF STEERING GEAR

DISASSEMBLY:

I. DISASSEMBLE UNIVERSAL CONNECTOR OF STEERING SHAFT

1. Loosen the fastening bolts of universal connector.



II. DISMOUNT SUBFRAME ASSEMBLY

1. Discharge the power steering system (Refer to steering system fluid)
2. Disassemble the power steering system pipeline.
3. Hoist the vehicle and dismount the two front wheels.
4. Loosen the fixed nuts of left and right tie rod ends.



5. Loosen the fixed bolts at the both ends of left and right lower links.



6. Loosen the ball bolts on the left and right lower links.



7. Loosen the fixed bolts of subframe.



8. Loosen the fixed bolts of subframe.



9. Loosen the fixed bolts of transmission's rear mountings.



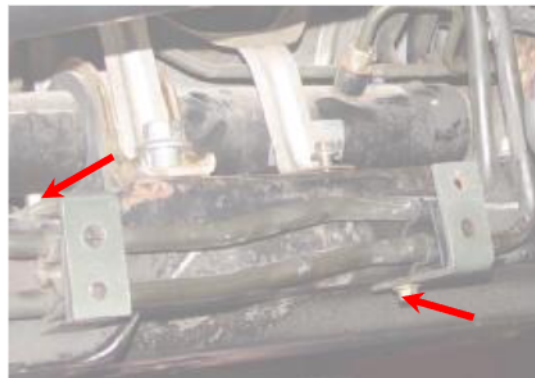
10. Dismount the frame assembly.



III. DISMOUNT THE STEERING GEAR ASSEMBLY FROM THE SUBFRAME.

1. Dismount the fuel pipes of steering gear.

Loosen the fixed bolts of pipe clamp.



Loosen the fixed bolts of pipelines on steering gear.

Dismount high-pressure oil pipe and oil return pipe.



2. Dismount stabilizer bar.

Loosen the extension bolts connecting the stabilizer bar to the lower link.

Note: Before disassembly, please pay attention to observing the relative positions of all washers and rubber cushions in order to carry out installation smoothly.

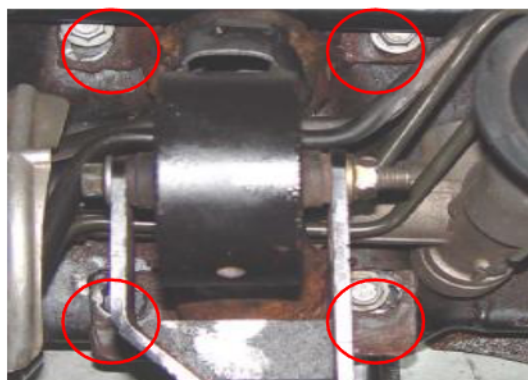


Loosen the fixed rubber sleeve bolts of stabilizer bar.

Dismount the stabilizer bar assembly.



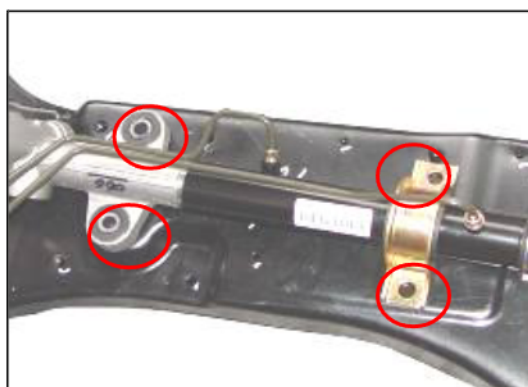
3. Dismount the rear mounting bracket of engine.



4. Dismount thermal shield.



5. Remove the fixed bolts of steering gear.
Remove the steering mechanism assembly.



Assembly:

The installing steps are reverse to those for removal.

SECTION IV MAINTENANCE MANUAL

LIQUID FILLING

LIQUID FILLING

Type: ATF-III

Filling volume: 1L

First of all, fill steering fluid to the Max position when the engine stops operating.

Start up the engine and fill steering fluid to the middle position between Max and Min.

Important Note:

Steering fluid pump is not allowed to operate when there is no steering fluid.

Slowly rotate the steering wheel to 45° to the left and to the right for 2-3 times, and then rotate to the largest extent for 2 times.

Modify the liquid level of the steering fluid in the liquid reserve bank.

Shut down the engine and check the liquid level.

The steering fluid shall approach to the Max position when the operating temperature is about 80°C.

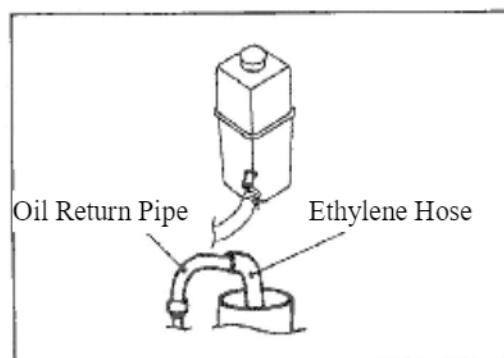
LIQUID DISCHARGE

1. Uplift the front part of the vehicle in the air in order to ensure that the front wheels can rotate freely, that the power steering oil return pipe can be dismounted from the power steering liquid reservoir.
2. Put the oil return pipe into the large container that can contain the discharged steering fluid.
3. Start up the engine and make it under idle operation.
4. Rotate the steering wheel to the largest extent to the left and right direction.

5. Ensure all old power steering fluid to be cleaned out from the power steering system.
6. Turn the ignition switch to the OFF (shut off) position.
7. If power steering fluid is polluted, the power steering system should be flushed out.
8. Reconnect to the power steering oil return pipe.

FLUSHING SYSTEM

1. Uplift and uphold the vehicle in the air to ensure the front wheels can rotate freely.
2. Siphon out the polluted power steering fluid from the power steering liquid reservoir.
3. Remove the power steering oil return pipe from the power steering liquid reservoir.
4. Put the power steering oil return pipe into the large container that contains the discharged power steering fluid.
5. Start up the engine and make it under idle operation, and instruct the assistant to fill power steering fluid into the power steering liquid reservoir.
6. Rotate the steering wheel to the largest extent to the left and right directions.
7. About 1L power steering fluid should be needed until the liquid reservoir is rinsed clean.



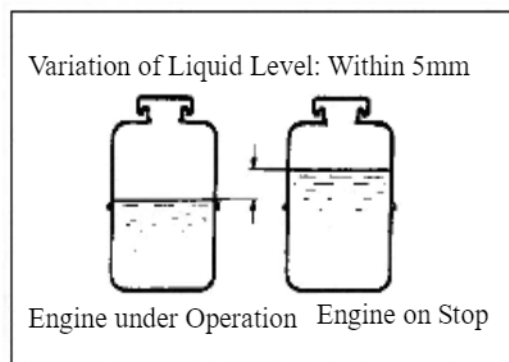
Inspection Method for Power Steering Oil

On the power steering system, you should take advantage of the engine power to drive the power steering oil to rotate, so that the pressure of power steering oil can generate steering driving force. If power steering oil is deficient, enough steering driving force cannot be obtained.

It is a very simple process to inspect the power steering oil volume. You only need to check the oil level of steering oil reservoir. If you are puzzled about anything, please refer to the operation manual of this vehicle. If the oil is found deficient, specified fuel must be filled. Note: A21power steering system adopts ATF-3 automatic transmission fuel.

The process for checking power steering oil is very simple, you only need to inspect this steering oil reservoir, but you should remember that the oil level is in close connection with the oil temperature. When the oil temperature is relatively high, the oil level shall approach to the "MAX" position. On the contrary, when the oil cools down, the oil level may approach to the "MIN" position.

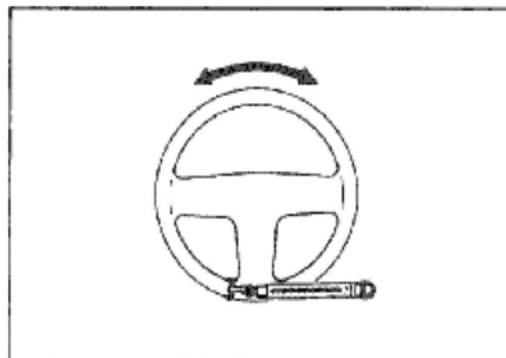
If the power steering fluid is found deficient, you should firstly check the connection hose of the steering oil reservoir prior to the filling of power steering fluid, and inspect whether there is crack and oil leakage in the pipe or not. In addition, you should check whether there is oil leakage or oil impregnation in other positions.



Inspection on Static Steering Force

1. Park the vehicle on the flat pavement, and rotate the steering wheel to the right ahead. Start up the engine and regulate the engine's rotation rate to $1000 \pm 100 \text{ r/min}$.

Note: After checking the rotation rate of the engine, you must have it return to the standard idle speed.



2. Connect a spring balance to the circle outside the steering wheel, and measure the steering force for rotating the steering wheel to the left and right sides of the ahead position (within 1.5 turns). Moreover, you also need to check whether there is apparent fluctuation in the requiring steering force.

Normalized value: 25N

Allowed fluctuation: less than 5.9N

3. If the measured force exceeds the normalized value, please inspect and regulate in accordance with the "steering heaviness" specified in the "troubleshooting".

Precautions in System Utilization:

1. Do not confuse the power steering fluid and the brake fluid, otherwise the system shall malfunction.
2. When the steering wheel rotates to the maximum steering position, the holding period should not preserve too long, namely, should not exceed 5 seconds. Otherwise, an extremely high system pressure shall result in the life shortening of steering oil pump.
3. Even the engine does not operate (drive by dragging), the power steering mechanism can still play steering

function, but steering force must be boosted.

4. Since the power steering oil also serves as the lubricant of the system, therefore you are not allowed to drive your car when the liquid level is very low or there is no hydraulic oil in the liquid reservoir; driving at this time shall not only do serious damage to the steering oil pump and other spare parts, but may also lead to the malfunction of the steering system.

SECTION V REGULAR TROUBLESHOOTING OF POWER STEERING SYSTEM

Atmosphere	Trouble Reason	Troubleshooting Method
Steering Heaviness	1. The tire pressure of steering wheel is very low.	1. Inflate the tire to normalized value.
	2. All connecting linkages and button heads are short of lubrication.	2. Fill lubricant grease to the suspension system and connecting linkages.
	3. Front wheel alignment distortion.	3. Check and regulate the front wheel alignment.
	4. The connecting linkages of steering system bend.	4. Check and calibrate the curving connecting linkages.
	5. Balls are worn.	5. Replace the seriously worn balls.
	6. The oil pump belt of the power steering mechanism is very loose or short of oil.	6. Regulate the tightness or refill hydraulic oil.
	7. The power steering mechanism is air-filled.	7. Discharge the air from the power steering mechanism.
	8. The oil pressure of power steering mechanism is extremely low.	8. Repair the power steering mechanism and regulate the system pressure.
UnsuitableBad Wheel Alignment	1. The tire pressure of steering wheel is deficient.	1. Inflate the tire until it reaches to the normalized value.
	2. Front wheel alignment distortion.	2. Check and regulate front wheel alignment.
	3. The gears of steering gear are improperly regulated or damaged.	3. Regulate the steering gear or replace the damaged gears.
Overlarge Gap Between Steering Wheels	1. The front wheel bearings are worn or improperly regulated.	1. Replace the bearing or regulate the tightness degree of bearing.
	2. Connection balls are worn or loosened.	2. Replace balls.
	3. The gears of steering gear are improperly regulated or worn.	3. Regulate the gap between gear meshes or replace gears.
Noise Generates When The Power Steering Mechanism Operates.	1. The power steering mechanism is lack of oil.	1. Fill hydraulic oil until it reaches to the normalized height.
	2. The power steering oil pump belt creeps.	2. Regulate the tightness degree of oil pump belt.

	3. The power steering mechanism is air-filled.	3. Discharge the air from the power steering mechanism.
	4. Hydraulic oil emulsion or thickening	4. Replace hydraulic oil
	5. Abrasion and damage of redirector gear	5. Replace the redirector gear