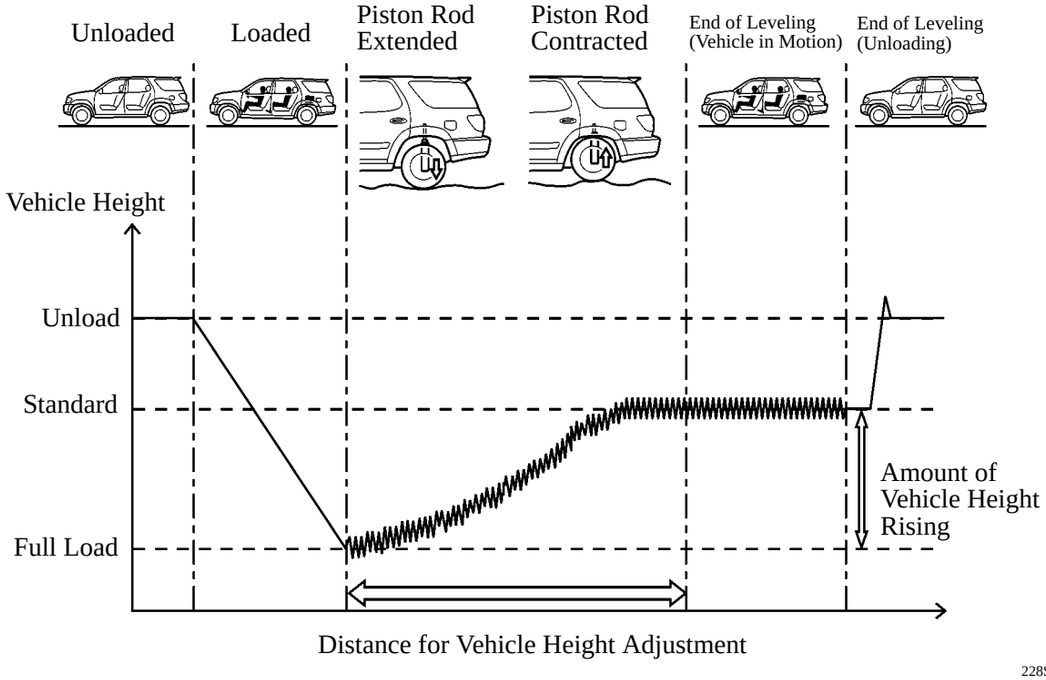
NEW FEATURES

■REAR LOAD LEVELING SUSPENSION

1. General

- The rear load leveling suspension utilizes the pumping action from the sliding movement of its piston rod while the vehicle is in motion, in order to mechanically adjust the rear vehicle height in the shock absorber to the target height. This inhibits the reduction of the shock absorber stroke, which is associated with the dipping of the rear end while the vehicle is carrying a load or towing. As a result, excellent driving stability and ride comfort have been achieved.
- The target vehicle height of the rear load leveling suspension is set to the standard vehicle height. Because it is set only to a predetermined target vehicle height value, the vehicle height cannot be adjusted to a position as desired.
- Because the self-leveling function uses the pumping action of the piston rod, it does not operate when the vehicle is stopped.



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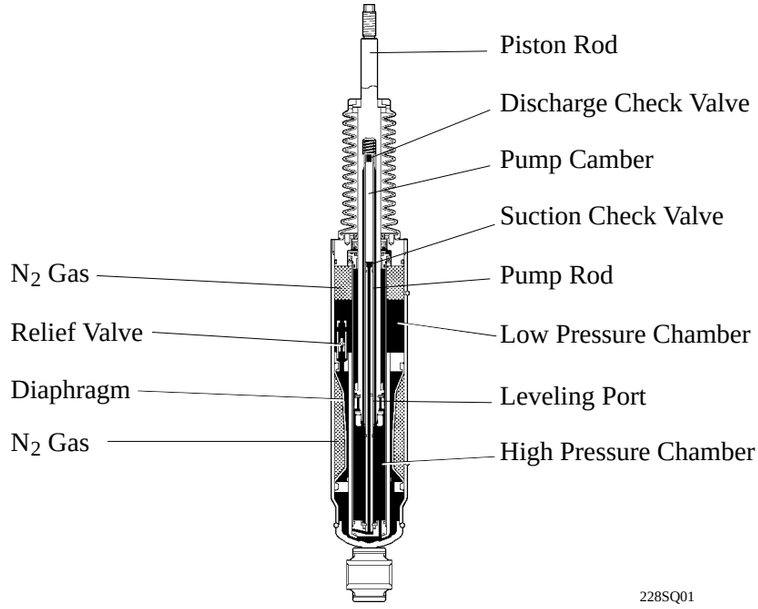
2. Construction and Function of Main Component



Component	Function
Pump Chamber	The sliding movement of the piston rod causes the oil to be sent from the low-pressure chamber to the high-pressure chamber.
High Pressure Chamber	Stores the oil that has been sent from the pump chamber through the sliding movement of the piston rod.
Low Pressure Chamber	Filled with N_2 gas and oil that is used for vehicle height adjustment control.
Suction Check Valve	Opens and closes in accordance with the internal pressure of the pump chamber in order to control the oil passage from the low-pressure chamber to the pump chamber.
Discharge Check Valve	Opens and closes in accordance with the internal pressure of the pump chamber in order to control the oil passage from the pump chamber to the high-pressure chamber.
Relief Valve	During vehicle height adjustment, this valve prevents the internal pressure in the high-pressure chamber from rising abnormally.
Leveling Port	Prevents the vehicle height from rising abnormally upon the completion of the loading condition.

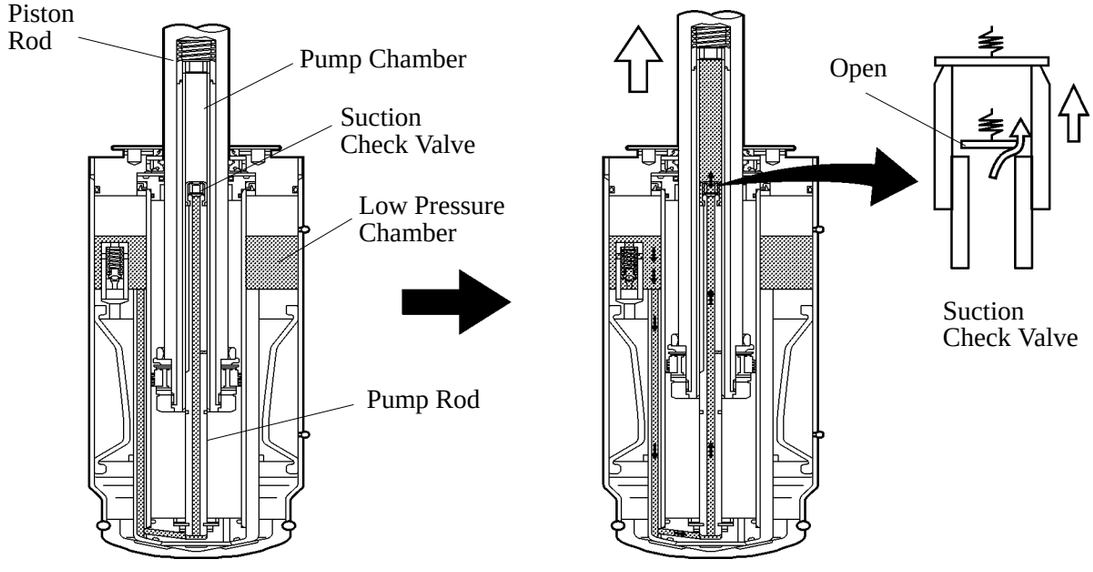
Service Tip

To prevent hazardous conditions, make sure to empty the gas from the shock absorber before discarding a N_2 gas sealed shock absorber. For details, refer to the 2003 Sequoia Repair Manual (Pub. No. RM959U)

3. Operation

Piston Rod Extended

Because the capacity of the pump chamber in the piston rod increases when the piston rod is extended, the internal pressure of the pump chamber becomes lower than the internal pressure of the low-pressure chamber (oil tank), which is separated by the suction check valve. As a result, the suction check valve opens, allowing the oil in the low-pressure chamber to flow through the oil passage in the pump rod, and enter the pump chamber.

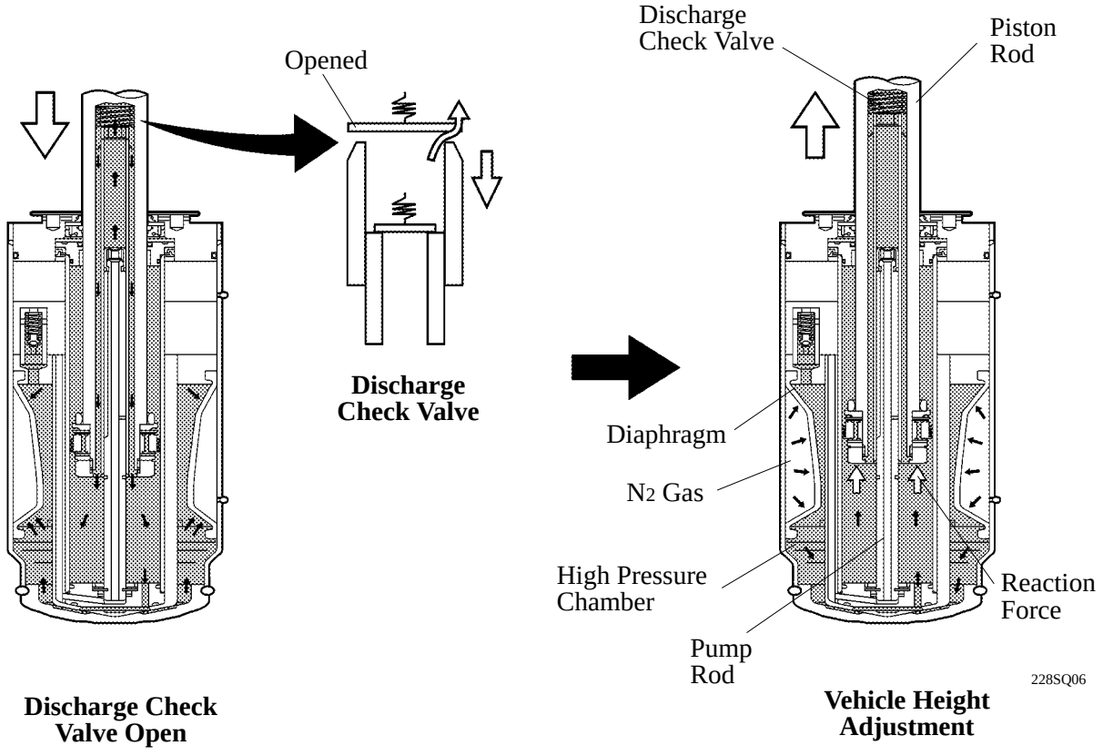


▶ **Oil Flow** ◀

Low Pressure Chamber → Pump Rod → Suction Check Valve → Pump Chamber

Piston Rod Contracted

- The oil that was drawn into the pump chamber during the extension of the piston rod becomes compressed during the contraction of the piston rod, due to the reduction of the pump chamber capacity. Thus, the internal pressure of the pump chamber becomes higher than the internal pressure of the high-pressure chamber, which is separated by the discharge check valve. As a result, this pressure opens the discharge check valve, allowing the oil in the pump chamber to flow through the oil passage in the piston rod, and enter the high-pressure chamber.
- The oil that is sent to the high-pressure chamber compresses the N_2 gas via the diaphragm in the high-pressure chamber. At the same time, a force to push it back (reaction force) is generated in the high-pressure chamber. This reaction force acts on the piston via the oil, to push the piston and piston rod position upward. This action is repeated, and the vehicle height that had dipped due to a load or towing returns to the standard vehicle height.



Discharge Check Valve Open

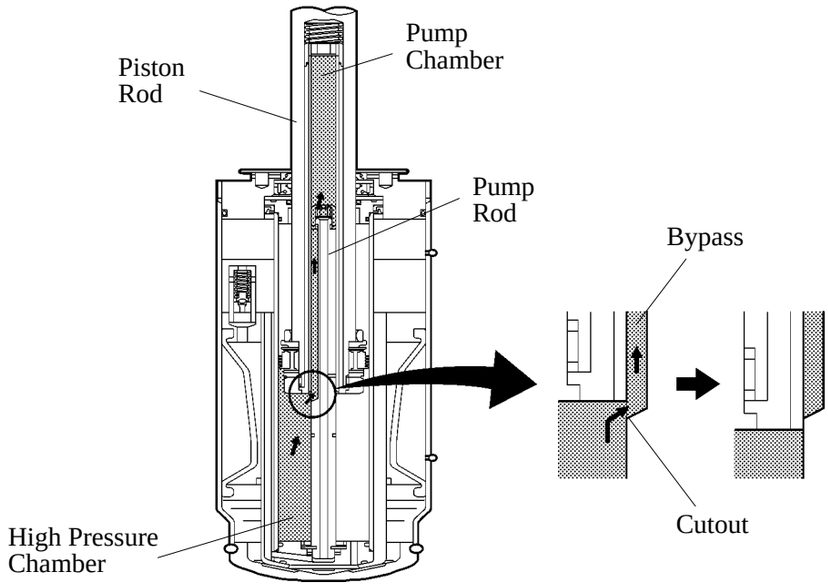
Vehicle Height Adjustment

▶ Oil Flow ◀

Pump Chamber → Discharge Check Valve → High Pressure Chamber

Vehicle Height Adjustment Completion (Vehicle in Motion)

When the position of the piston rod reaches the standard vehicle height, the lower end of the pump cylinder reaches the cutout in the pump rod, thus forming a bypass between the pump chamber and the high-pressure chamber. Thus, the oil that is sent from the pump chamber to the high-pressure chamber during the contraction of the piston rod flows through the bypass and returns to the pump chamber. Therefore, the internal pressure in the pump chamber and the internal pressure in the high-pressure chamber become equal, thus preventing the vehicle height from increasing further.



Cutout Open

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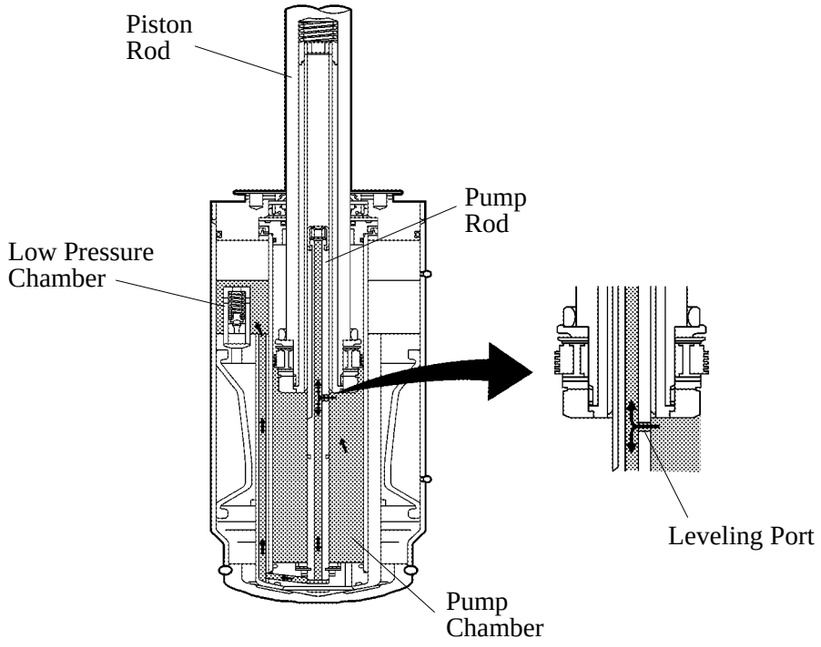
▶ Oil Flow ◀

High Pressure Chamber → Cutout → Pump Chamber

Vehicle Height Adjustment Completion (Unloading)

- After the occupants exit the vehicle, or the unloading of cargo or towing is completed, the piston rod initially moves up in an attempt to raise the vehicle height. However, because the upward movement of the piston rod causes the leveling port in the pump rod to connect to the high-pressure chamber, the oil in the high-pressure chamber flows through the leveling port and returns to the low-pressure chamber. As a result, the vehicle height is prevented from rising.
- When the piston rod moves downward along with the lowering of the vehicle height, thus closing the leveling port, the oil in the high-pressure chamber will not return to the low-pressure chamber. Therefore, the vehicle height will not lower further.



Leveling Port Open

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▶ Oil Flow ◀

High Pressure Chamber → Leveling Port → Low Pressure Chamber