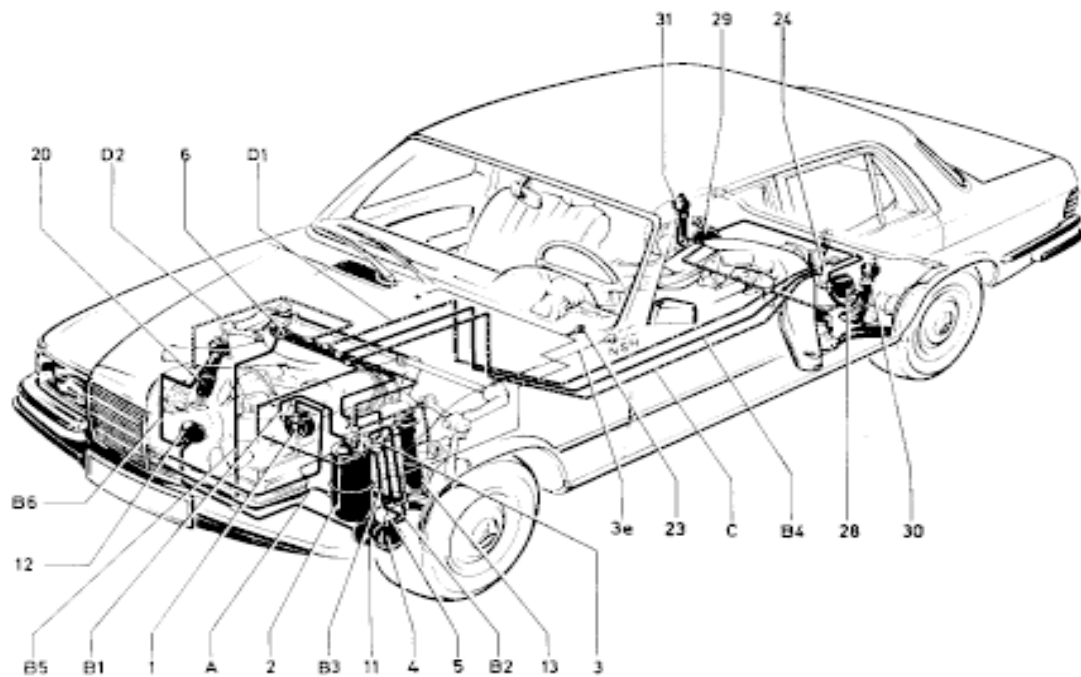


# Star Motors

Specializing in 300 SEL 6.3's, 450 SEL 6.9's &  
600 Limousines

## Hydraulic Suspension Trouble Shooting



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This “Schwarz” black 6.3 was one of the first off the production line in 1968.



This “Astralsilber” silver 6.3 represents the most frequently requested exterior color. Interestingly, it is also associated with the renowned Mercedes-Benz racing team.

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# Quality New & Rebuilt Mercedes-Benz Parts

## Specializing in 300 SEL 6.3's, 450 SEL 6.9's and 600's

### Why buy from Star Motors?

Our business is dedicated to the maintenance and troubleshooting of the 300 SEL, 450 SEL and 600 Limousine. Whether you're an automotive professional or enthusiast, Star Motors has the new, rebuilt or hard-to-find components you are looking for. We have an intimate working knowledge of the W100, W109 and W116 chassis and M100 drivetrain. An extensive parts inventory, superior knowledge, and the right price ensure an excellent value for you, the customer.

### 300 SEL 6.3

Star Motors rebuilds virtually every mechanical component for the Mercedes-Benz 300 SEL 6.3, which was manufactured from 1968 through 1972. This classic is renowned for its impressive power and unique air suspension.

### 450 SEL 6.9

The 450 SEL 6.9's hydraulic suspension is one of our specialties. The 6.9 was produced from 1975 through 1980. This descendant of the 6.3 differs in its amenities and hydraulic suspension.

### 600 Limousine

The 600 Mercedes-Benz limousine, produced from 1964 through 1981, is the most technologically advanced vehicle of its time. Star Motors has the special tools and technical information required to meet your immediate needs.

### Extensive Inventory

We use only original Mercedes-Benz parts for rebuilding and repairing your vehicle. A large inventory of cores enables you to place an order and have the part rebuilt and shipped with minimum down time. Star Motors carries a complete line of new interior, exterior and mechanical parts, and an extensive library of technical literature and owner's manuals. We also stock more rubber and decal 6.3 parts than anyone in the USA. *Special Order Parts:* Star Motors can special order direct from

Germany and have your part within five business days.

### Customer Service Policy

Nearly every part that you purchase from Star Motors comes with a 2-year unlimited mileage warranty. We warrantee your rebuilt axle for one-year. Electronic ignitions come with five full years of coverage.

### New Pickup Service

Star Motors has a unique and convenient pickup service to better serve you. If you are located in the Northeastern United States within 500 miles of our facility and have scheduled major repairs (motors, transmissions, front and rear ends), we will pickup and drop off your vehicle for a nominal fee. Please call for more details if you are interested in this service.

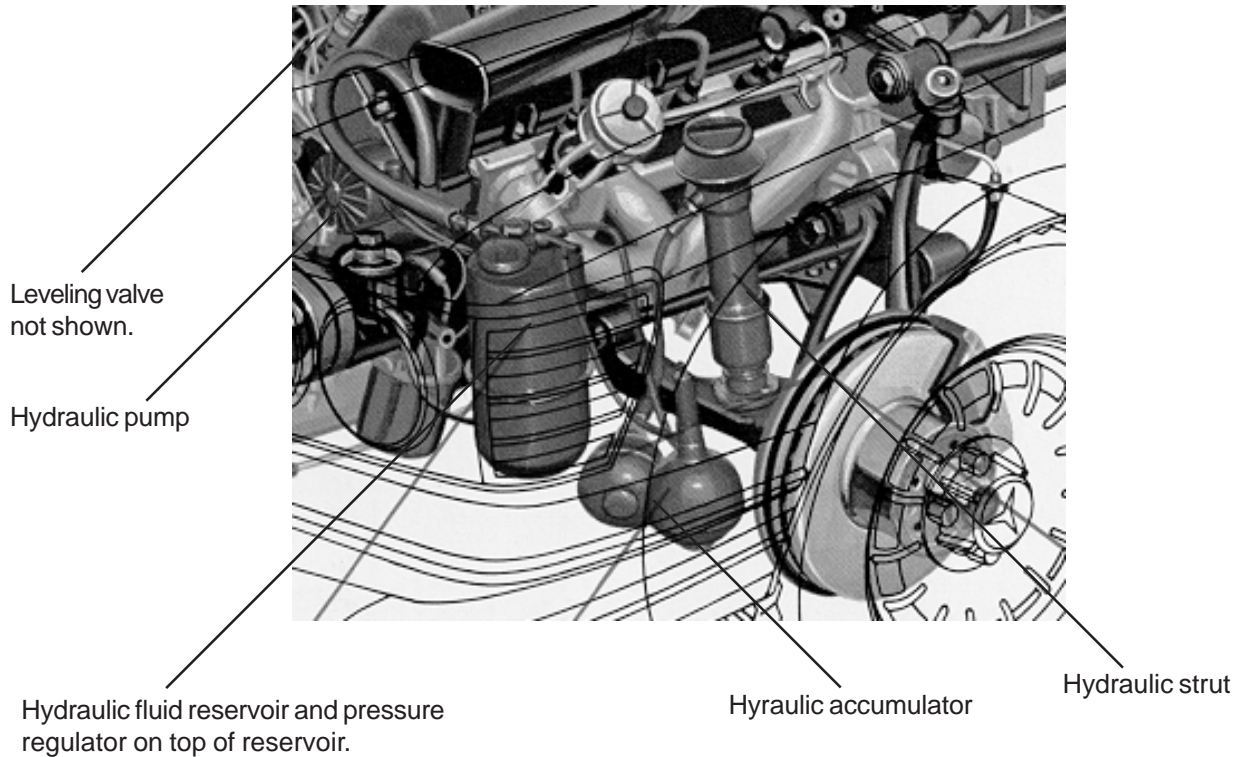
Let our expertly trained staff ensure that your vehicle is maintained to the original standards set forth by Mercedes-Benz.

**Extensive Parts  
Inventory  
Expert Technical  
Support  
Affordable Prices...**



**Star Motors**

# TROUBLE SHOOTING THE HYDRAULIC SUSPENSION



Left side of a 450SEL 6.9 (W126 cars are similar.)

Please review the following information for an understanding of the Mercedes-Benz hydraulic system. For additional information, see the following sections located in their respective service manuals.

- Section 32-501-32-671 for W123 & W126 USA specification cars
- Section 32-515-32-675 for European cars
- Section 32.4-600/2 and 600/3 for a system schematic

This simple troubleshooting guide is designed to pinpoint about 99% of the problems associated with hydraulic suspensions. Most of the problems occur with the valves or struts. The hydraulic pump rarely fails. Struts and valves have a service life of approximately 10 years.

PROBLEM	CAUSE	REMEDY
Car does not lose level within 24 hours, but warning lamp is constantly on (even after struts and shocks have been replaced).	Push-pull button or lever is not in correct position.	Adjust cable, push lever or button to correct position.
	Electric pressure indicator on accumulator is defective or leaking.	Replace switch.
	Line to central reservoir or other line is leaking.	Replace line and check for leaks.
	Hydraulic pump is defective. Not reaching the minimum pressure shut-off the electric switch.	Replace pump (32-640).
Warning light appears after shutting off the car.	System pressure is adequate while driving. Pressure is lost when car is shut off due to struts or valves leaking.	First check for struts leaking per section 32.4-515/1. If struts are leaking externally or internally, replace struts. If struts are OK, replace leveling valves.
Car level is too low in front left and right sides.	Front struts or valve are defective.	First check for struts leaking per section 32.4-515/1. If struts are leaking externally or internally, replace struts. If struts are OK, replace leveling valves.
Car is too low in rear. Front level is OK.	Valve or rear struts are defective.	First check for struts leaking per section 32.4-515/1. If struts are leaking externally or internally, replace struts. If struts are OK, replace leveling valves.
Car level equally too low in front and rear.	Struts or valves are defective.	First check for struts leaking per section 32.4-515/1. If struts are leaking externally or internally, replace struts. If struts are OK, replace leveling valves.
Car level is unequal on one side.	Strut is defective.	Replace defective strut.
Car ride is bouncy in front or rear.	All accumulators are defective.	Replace the accumulators.
Hydraulic fluid is black.	Filter is clogged on pressure regulator.	Replace the filter.
	Hydraulic flexible lines to accumulator are worn.	Hydraulic lines are made with black rubber and are internally degrading. Replace the lines.
Car goes to high level automatically in front or rear.	Level valve in front or rear is defective.	Replace the valve.
Car fails to reach high level after the pull knob or lever is moved into the high position.	There is low supply pressure in the central reservoir.	Replace the central reservoir.
	The pressure regulator is defective.	Replace the pressure regulator.
	The cable cannot be adjusted.	Replace the cable.
	The car is a USA version.	Due to federal bumper height regulations, the high level option was disabled on USA cars.
Car lowers while being driven.	The pressure regulator is defective.	Replace the pressure regulator.

### **HYDROPNEUMATIC STRUTS:**

The four-hydropneumatic struts that are part of the 450SEL's 6.9 suspension are an item that has a life span of approximately 10 years or 100,000 miles. The struts key failure areas are the nylon seals and the 70 durometer rubber o-rings. These items fail due to heat and contamination. As the strut moves up and down tremendous heat is generated and the rubber o-rings are literally baked and unbaked. Overtime these o-rings lose their elasticity and start to collapse, thus causing the oil leaks. The oil leaks show up in two ways; external and internal oil leaks. The external oil leaks are visible at the bottom of the strut. Internal oil leaks are distributed back through the return tube (D2) and into the reservoir tank. This leak is less apparent but can be measured by removing the D2 line connection, plastic tube, from the strut. A measurement of 2cc's in a 4 hour period or 6cc's in 12 hours. For simplicity, if you get a considerable amount of fluid in a short time the struts are leaking and should be replaced to prevent further problems. Contamination in the strut occurs from the rubber boots being torn and exposed to the elements. The nylon seals (wipers) trap the road debris that enters the strut. Since the gap between the strut cylinder is infinitesimal, very little dirt is exposed to the seal. The main culprit is time and eventually the seals wear out. The rubber boots on the struts should never be comprised. Inspect and wash them regularly, replace if they are torn. This will improve the longevity of the strut. The struts can be rebuilt.

### **ACCUMULATORS:**

The accumulators act as the coil spring for the car, in that they contain the nitrogen charge to supplement the struts. The accumulator life span is the same as the struts. There are 2 types of accumulators used: Front ones are charged at 75 bars, red color. Rear ones are at 60 bar and colored blue. The main failure is that the rubber bladder that separates the oil and the nitrogen collapses and the nitrogen is displaced in the oil. The ride quality becomes hard or bouncy and all the accumulators should be changed. I do not recommend testing the accumulators since they can be purchased inexpensively. The accumulators can not be rebuilt.

### **HYDRAULIC VALVES AND PRESSURE REGULATOR.**

The self leveling valves again have the similar fate of the struts, in that the o rings fail due to age. Longevity can be up to 10-20 years since the o-rings used are very small. Heat is not a factor in the rear valve since it is adequately cooled but the front valve is exposed to engine heat and fails more often than the rear valve. The valves can be checked for external leaks by a visual check of hydraulic oil leaking from the shaft area. As for internal leaks Mercedes recommends attaching a plastic line to the (d1) or marked R on the valve and measuring the fluid loss. If the leaks are 8cc's in 4 hours or 24 cc's in 12 hours then the valve should be replaced. This is only true if it is leaking only through the return port. Any other internal leaks can not be diagnosed and if the valve is giving problem then it should be replaced accordingly. The pressure regulator, which sits on the top of the supply tank, can only be checked for external leaks. The valves can be rebuilt.

### **HYDRAULIC PUMP:**

The hydraulic pump is a radial piston pump. The maximum delivery pressure for the pump is 200 bars at 2000 rpm. The pump volume can be checked and should yield .2 liters in 30 seconds and 1000 rpm. Very rarely do the pistons fail since the bore and pistons are lubricated with hydraulic fluid. If the tank runs dry these components can be damaged. The main failure in this pump is the rear radial seal. When this fails the pump leaks hydraulic oil back into the engine oil. This can dilute the engine oil and cause damage. Mercedes has added a suspension warning light in the dash and strict attention must be paid to this.

## General

The hydropneumatic suspension is a gas pressure suspension system with hydraulic level control. The vehicle load is supported by four **suspension elements**, which are simultaneously serving as shock absorbers. The suspension elements comprise one gas pressure shock (13, 20, 30 and 31) each and one pressure reservoir (11, 12, 28 and 29), which are connected to each other by means of a hose line (Fig. 1 and 2). The vehicle load is hydraulically transmitted to the pressure reservoirs by way of the gas pressure shocks. Suspension is effected by the compression and decompression of the gas cushion in the pressure reservoirs.

To regulate the vehicle level, the oil volume in the gas pressure shocks is increased or reduced by means of a **pressure oil system**. The pressure oil system comprises the pressure oil pump (1), the pressure regulator (3a), the central pressure reservoir (4) and the oil reservoir (2). The pressure regulator (3a) and the adjusting switch (3b) of the control device are combined into one valve unit (Fig. 2)

The central pressure reservoir supplies the system when the engine is stopped.

**The control device** controls the oil volume by means of one level controller (6 and 24) each at front and rear axle and by the adjusting screw (3b) of the valve unit. The following adjustments of the system can be made by means of the adjusting switch:

### **N = Normal Level**

(Switch pushed-in or control disc at front stop)

### **S = Locking Position**

(Switch engaged in center position or control disc pulled in first detent)

### **H = Higher level**

(Switch completely pulled or control disc pulled in second detent)

### **M = Assembly Position**

Suspension system up to level controllers pressureless (control disc pulled against rear stop with pull knob released)

## Operation

The pressure oil pump driven by the engine delivers oil from oil reservoir to central reservoir via pressure regulator of valve unit.

When the max. oil pressure in central reservoir is attained, the pressure regulator of the valve unit will reverse the oil flow. The oil now delivered can flow back into the reservoir.

If the pressure in the central reservoir drops to minimum pressure as the result of consumption (lowering on level controller) the pressure regulator will reverse and oil will be pumped into reservoir until the max. pressure is again attained.

The pressure oil in central reservoir is connected to the adjusting switch of the valve unit and to the level controllers by means of pertinent lines.

If the vehicle level drops under the influence of a load, the level controller will open the passage to the suspension elements. The oil flowing into the suspension elements will lift the vehicle until the normal level is attained and the level controller has again closed the connection. If the vehicle load is relaxed, the level controller will permit oil to flow from suspension elements until the vehicle is back to its normal level. The oil flowing out of the suspension elements is returned to the oil reservoir through a filter

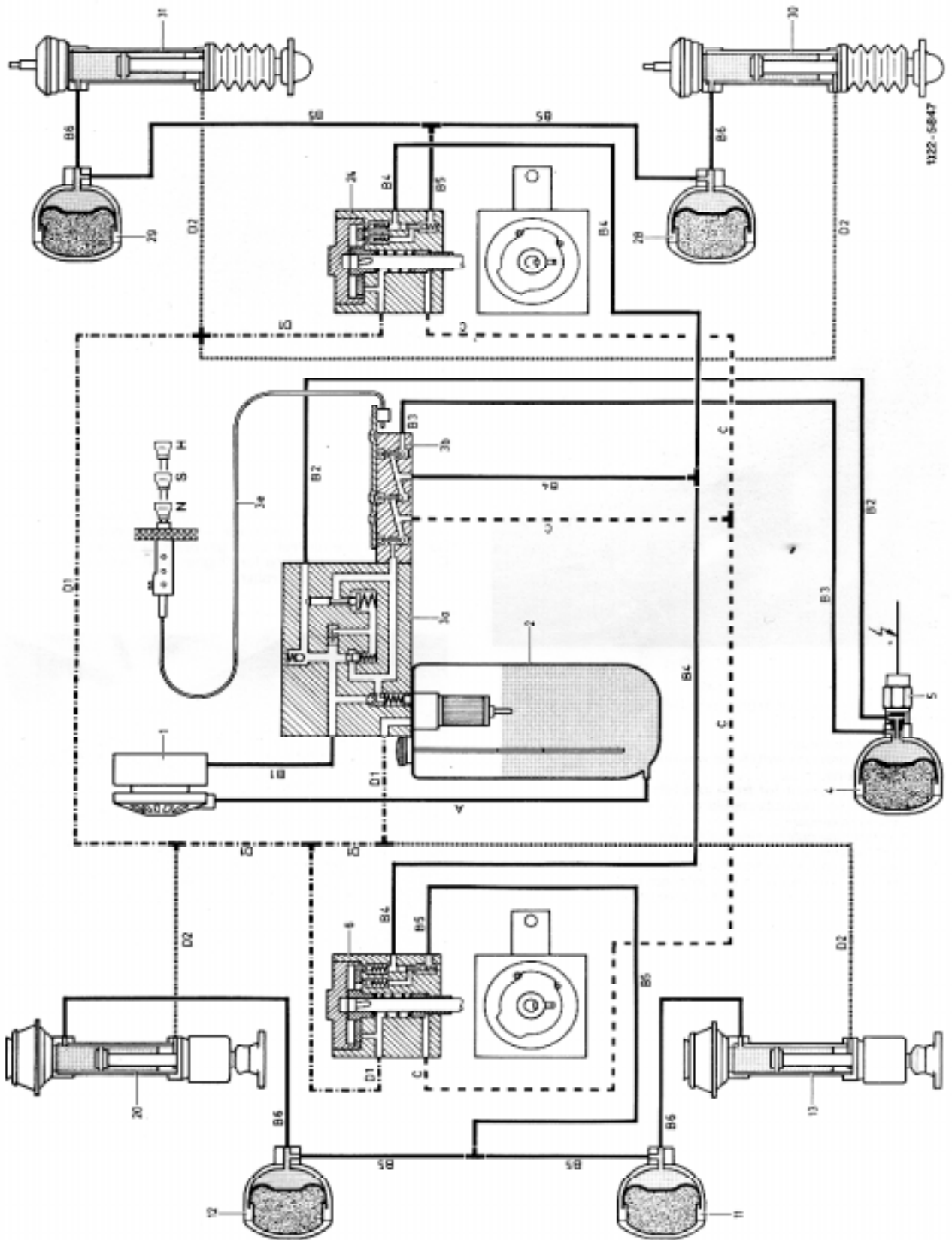


Fig. 2



# Hydropneumatic Suspension

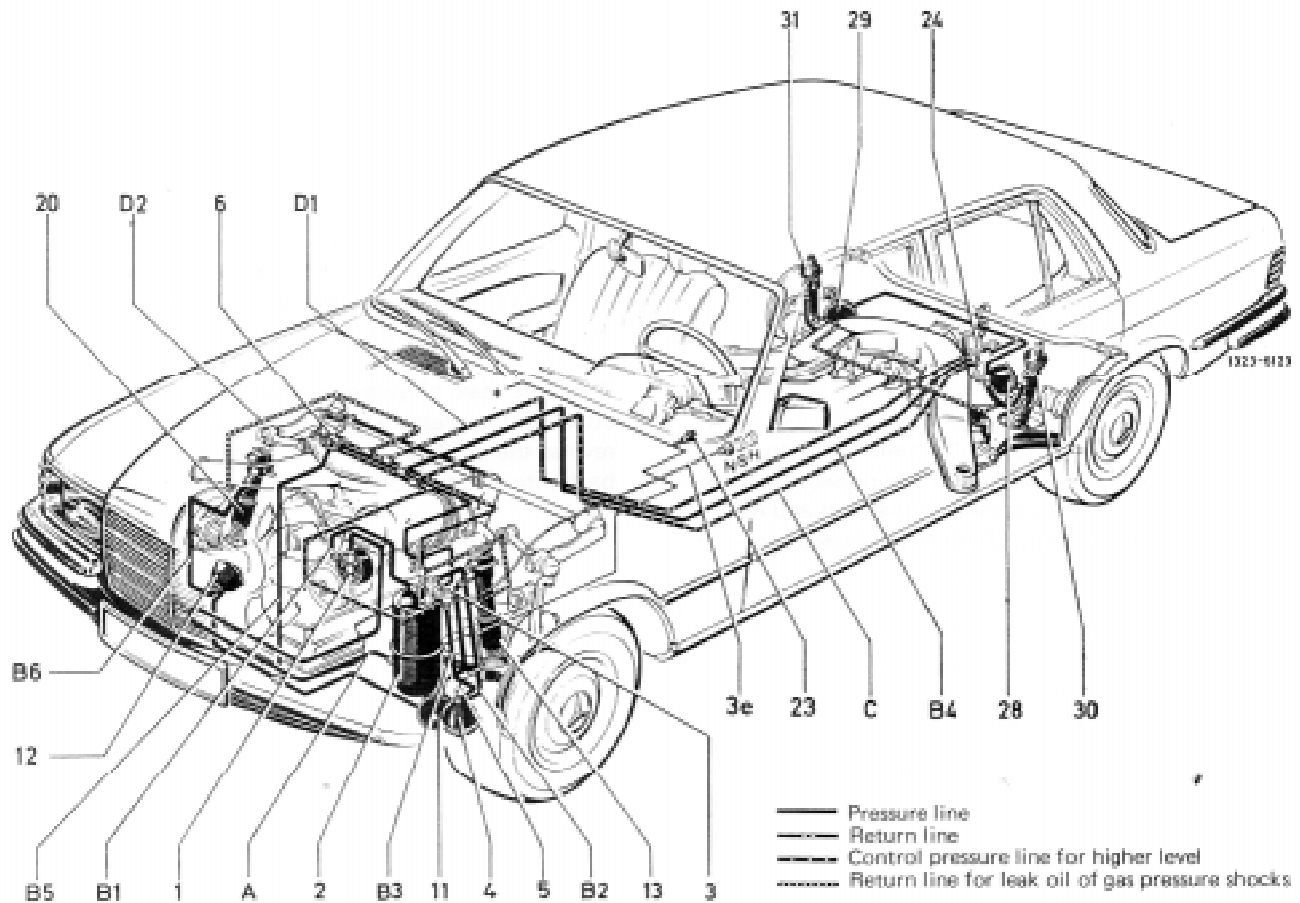


Fig. 1 Diagrammatic view of hydropneumatic suspension

Legend for Fig. 1 and 2

- |    |  |    |  |
|----|--|----|--|
| 1  | Pressure oil pump                                    | A  | Suction line oil reservoir – pressure oil pump   |
| 2  | Oil reservoir  | B1 | Pressure line pressure oil pump – pressure regulator of valve unit                     |
| 3  | Valve unit (pressure regulator and adjusting switch) | B2 | Pressure line pressure regulator of valve unit – central reservoir                     |
| 3a | Pressure regulator of valve unit                     | B3 | Pressure line central reservoir – adjusting switch of valve unit                       |
| 3b | Adjusting switch of valve unit                       | B4 | Pressure line adjusting switch of valve unit – level controller on front and rear axle |
| 3c | Pull knob for adjusting switch of valve unit         | B5 | Pressure line level controller – pressure reservoir                                    |
| 4  | Central reservoir                                    | B6 | Pressure line pressure reservoir – gas pressure shocks                                 |
| 5  | Electric pressure switch for warning light           | C  | Control pressure line for “higher level” adjusting switch – level regulator            |
| 6  | Level controller for front axle                      | D1 | Return line level regulator – pressure regulator                                       |
| 11 | Pressure reservoir for front axle left               | D2 | Return line for leak oil of gas pressure shocks  |
| 12 | Pressure reservoir for front axle right              |    |  |
| 13 | Gas pressure shock for front axle left               |    |  |
| 20 | Gas pressure shock for front axle right              |    |  |
| 23 | Warning light  |    |  |
| 24 | Level controller for rear axle                       |    |  |
| 28 | Pressure reservoir for rear axle left                |    |  |
| 29 | Pressure reservoir for rear axle right               |    |  |
| 30 | Gas pressure shock for rear axle left                |    |  |
| 31 | Gas pressure shock for rear axle right               |    |  |