Printed in England

February 1979

TSD 4200

Section G14m

Gas springs and Suspension struts

Introduction

The rear suspension struts are mounted between the rear of each suspension trailing arm and the car body and are situated beneath each rear wheel arch. A gas spring is bolted to the top of each strut.

With the exception of Corniche Convertible cars the gas springs and top mounting of the suspension struts are situated in the luggage compartment of the car.

On Corniche Convertible cars access to the gas spring and upper mount of the strut is in the hood storage compartment.

The gas spring and suspension strut combine to perform the functions of car height levelling and suspension damper. The suspension strut is similar in design to a conventional damper but is supplied with pressurised mineral oil from its respective hydraulic system accumulator. The gas spring consists of a sphere similar to that fitted to the hydraulic accumulator devided into two chambers by a rubber diaphragm. Nitrogen gas at a pressure of 14,21 kg/sq.cm. (203 lb/sq.in.) is applied and retained on one side of the diaphragm. Mineral oil fills the other half of the sphere and the suspension struts.

When the road wheel hits a bump the piston of the suspension strut is forced upwards. This action forces mineral oil into the gas spring sphere compressing the gas behind the diaphragm. Conversely when the road wheel travels over a hollow the piston is forced down by the expansion of the gas.

Holes machined into the suspension strut piston allow a restricted mineral oil flow from one side of the piston to the other thus acting as a shock damper

Height control is achieved by increasing or decreasing the amount of mineral oil in the suspension strut and gas spring assembly. If extra load is applied to the car the height control valves will actuate and allow extra mineral oil to flow into the suspension strut. This increase in the volume of mineral oil, within the suspension strut, forces the piston down, effectively raising the body height of the car to the correct levelled height position. When load is removed from the car, the height control valve is actuated in the opposite direction, allowing the excess mineral oil to exhaust from the suspension strut to the respective reservoir, thus lowering the height of the car body.

Gas spring spheres and suspension struts are both non-serviceable items, therefore in the event of failure a new component must be fitted.

No attempt should be made to charge a gas spring sphere. All spheres are charged to the correct pressure prior to despatch from the manufacturer.

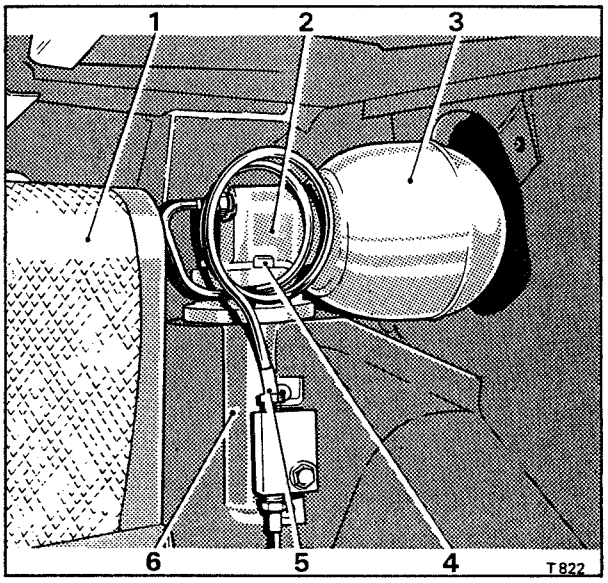

Fig. G27m Gas spring sphere

1 Fuel tank
2 Adapter
3 Sphere
4 Mounting setscrew
5 Pressure supply pipe
6 Car body strut tower

Note

Although zero kg/sq.cm. to 210 kg/sq.cm. (zero lb/sq.in. to 3 000 lb/sq.in.) pressure gauges are quoted for the testing of the gas spring sphere and suspension strut in this section it is essential that the gauges give correct readings in the 7 kg/sq.cm. to 28 kg/sq.cm. (100 lb/sq.in. to 400 lb/sq.in.) range. If gauge protection valves are used zero kg/sq.cm. to 70 kg/sq.cm. (zero lb/sq.in. to 1 000 lb/sq.in.) are preferable.

Gas spring sphere - To remove (see Fig G27m)

1. Depressurise the hydraulic system as described in Section G2m.

2. Cars other than Corniche Convertible

Remove the screws retaining the sealing panel at the forward end of the luggage compartment. Remove the panel to expose the fuel tank and gas spring spheres.

Corniche Convertible

Remove the rear seat cushions, backrest and trims (see Chapter S) to expose the gas spring sphere at the rear of the hood storage compartment.

RROC (A) Editor's Note

Gas Spring Sphere Removal.

The gas spring spheres may best be removed WITHOUT removing the accumulator assembly from the vehicle as prescribed in this manual. This preserves the seal between the accumulator body and the suspension strut, and saves considerable time.

Once the sphere is accessed, simply use a suitable strap wrench such as a sturdy oil filter removal tool, or a chain wrench for very tight spheres. In some cases, in order to use a chain wrench it may be necessary to bend the body seam adjacent to the sphere slightly. This is a very minor procedure and the bend cannot be seen.

Sutable Tools for Sphere Removal

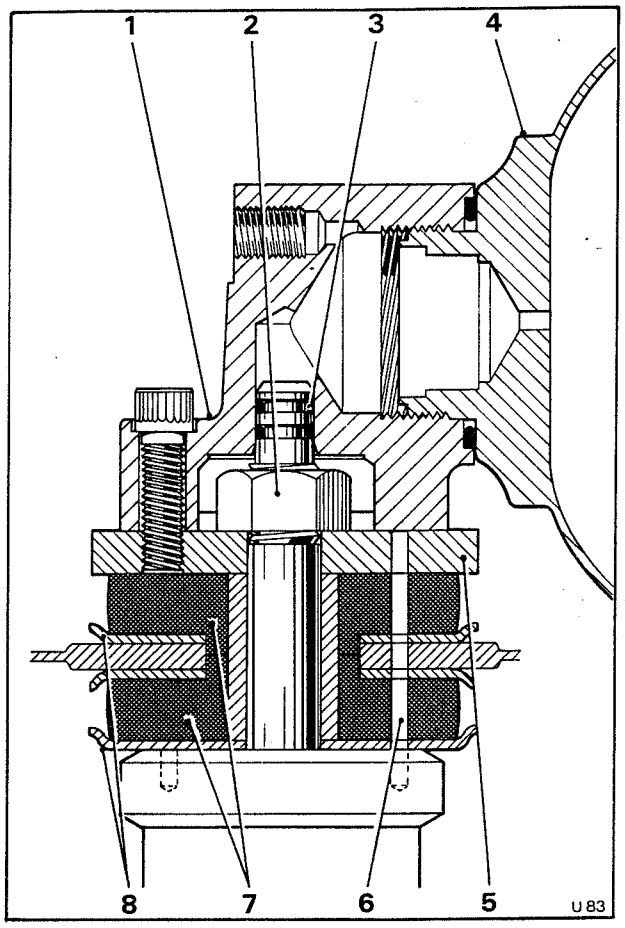

Fig. G28m Gas spring to suspension strut mounting

1 Adapter
2 Strut retaining nut
3 Sealing rings
4 Gas spring sphere
5 Gas spring mounting plate
6 Location peg holes
7 Rubber mounts
8 Cupwasher

3. Disconnect the coiled feed pipe from the gas spring, blank off the pipe and port.
4. Remove the three Allen screws from the gas spring adapter.
5. Carefully lift the adapter and sphere off the top of the suspension strut and remove it from the car. Discard the sealing rings.
6. Secure the sphere adapter in a soft-jawed vice and using a suitable strap spanner, unscrew the sphere from the adapter. Discard the sealing ring.

Gas spring sphere - To fit (see Fig. G28m)

Fit the sphere by reversing the procedure for removal noting the following points.

1. Ensure that the components are absolutely clean and free from burrs before assembly.
2. Lubricate the new sealing rings with clean hydraulic system mineral oil.
3. If a replacement sphere is being fitted, remove the blanking cover and allow any hydraulic system mineral oil to drain from the sphere.
4. Torque tighten all setscrew and pipe connections in accordance with the figures quoted in Chapter P.
5. On completion bleed the hydraulic system as described in Section G4m. Check all disturbed joints and pipe connections for leaks.
6. Fit the luggage compartment (other than Convertible cars) or interior trim (Convertible cars) as described in Chapter S.

Suspension strut - To remove

1. Place the car on a ramp and securely chock the front wheels.
2. Depressurise the hydraulic system as described in Section G2m.
3. Raise the rear of the car and place sill blocks under the rear end of the body sills. Support the trailing arms; do not allow the suspension rebound struts to support the full suspension load.
4. Remove the relevant rear wheel trim and the rear wheel.
5. Remove the gas spring sphere as described under Gas spring sphere - To remove. Fit a protective blank to the top of the strut.
6. Disconnect the seepage return pipe from the lower end of the suspension strut. Blank off the port and pipe connections.
7. Remove the retaining nut from the upper suspension strut mount. Collect the rubber mounting bush, gas spring mount and cup washer.

Note

In order to prevent rotation of the strut during removal of the retaining nut the location pin should be inserted through the mount. For details refer to suspension strut - To fit.

8. Remove the self-locking nut from the lower end of the suspension strut situated at the rear of the suspension trailing arm. Collect the rubber mounting bush and cup washer.
9. Support the suspension strut, then carefully push the piston rod fully into the strut. Lower the suspension strut from beneath the car taking care not to damage the gas spring connection stem. Collect the rubber mounts, distance pieces and cup washers.

Note

When pushing the piston rod into the suspension strut care should be taken to ensure that any mineral oil remaining in the strut is not forced from the gas spring connection stem.

Suspension strut - To fit (see Fig. G30m)

In order to correctly locate the suspension strut into position location holes are situated in the top face of the suspension strut and mount components. These location holes can be aligned using a 76,20 mm. (3.0in.) length of 4,75 mm. (0.187in.) bar. The location peg can be fitted to either of two

diametrically opposed holes in the strut, dependant on which side of the car the suspension strut is to be fitted. When positioned correctly the seepage drain unions should point rearwards on both sides of the car. Fit the suspension strut by reversing the procedure for removal noting the following points.

1. Fully compress the suspension strut; retain the piston rod in this position with a suitable piece of wire or rubber band attached to the drain union.
2. Fit the upper strut mount, distance piece, cup washers and locating peg into position on the strut stem.
3. Pass the strut stem through the hole in the body strut tower using the peg to locate its angular position i.e. drain union to the rear of the car.
4. Fit the cup washer, rubber mount and gas spring mount onto the strut stem and location pin. Fit and torque tighten the stem nut to the figures quoted in Chapter P.
5. **Remove the location pin**
6. Connect the strut piston rod to the trailing arm using a new self-locking nut.
7. Remove the protective cap from the strut stem. Lubricate the two stem sealing rings with hydraulic system mineral oil prior to fitting to the strut stem.
8. Fit the gas spring sphere assembly onto the strut stem mount, taking care not to damage the sealing rings (see Gas spring sphere - To fit).
9. All nuts, setscrews and pipe connections should be torque tightened in accordance with the figures quoted in Chapter P.
10. On completion, bleed the hydraulic system as described in Section G4m.
11. Check the levelled height of the car as described in Section G12m.

Gas spring and suspension strut operating pressures - To check

To ensure the levelling system operating pressures are within the correct operating range it is essential to check the system pressures whenever a mal -function of the levelling system or ride deterioration is suspected.

1. Check the car front standing height as described in Chapter H Part II Section H4m and correct if necessary.
2. Depressurise the hydraulic system as described in Section G2m.
3. Remove the suspension strut bleed screws and connect a zero kg/sq.cm. to 210 kg/sq.cm. (zero lb/sq.in. to 3 000 lb/sq.in.) pressure gauge into each bleed screw adapter.
4. Weight the front compartment of the car with two occupants or weight of approximately 140 kg. (300 lb.) equally disposed between the front seats. The fuel tank should contain 45 litres (10 Imp.gal. 12 U.S. gal.) of fuel. All accessories, spare wheel and tools must be fitted in their respective locations.
5. Ensure the gearchange selector is in the 'P' park position then remove the gearchange thermal cut-out from the fuseboard.

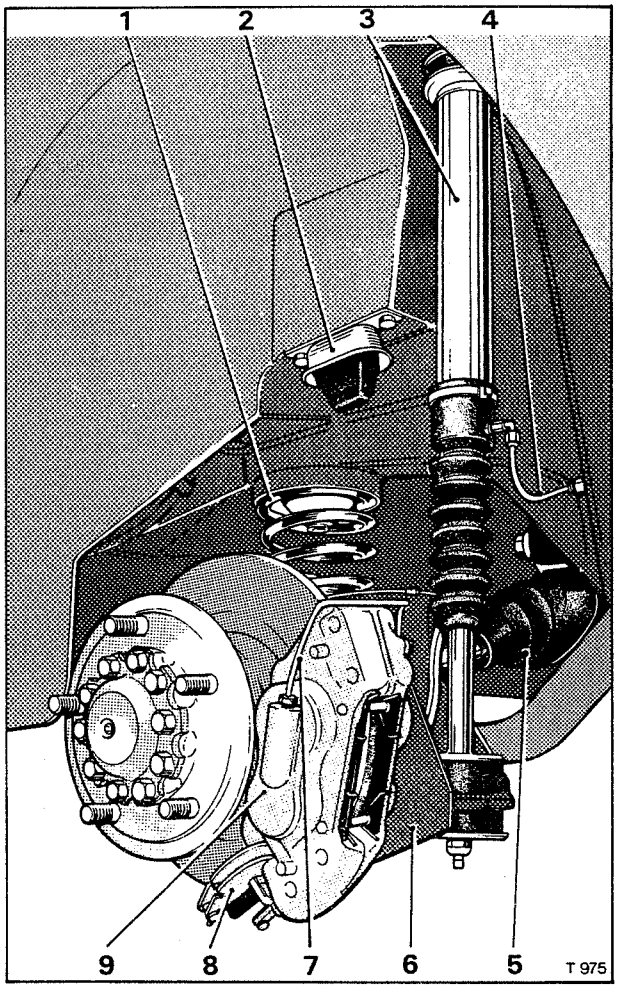

Fig. G29m Rear suspension strut

1 Rear suspension spring
2 Bump stop
3 Suspension strut
4 Seepage return pipe
5 Half-shaft
6 Trailing arm
7 Caliper bridge pipe
8 Parking brake caliper
9 Brake caliper

6. Start the engine and allow the systems to fully pressurise.
7. Place additional weights to a value of 230 kg. (500 lb.) into the luggage compartment of the car; allow the car to level (approximately 30 seconds).
8. Remove the weight from the luggage compartment of the car. Allow sufficient time for the car to level again. Check the pressure gauge readings and the rear standing height of the car. Check the standing height by measuring the height 'A' (see Fig. G25m) from the level surface on which the car stands, to the centre of the foremost bolt attaching the rear-frame mounting bracket to the body sill. Measure height 'B' from the level surface to the centre of the rearmost bolt attaching the parking brake linkage to the trailing arm. For the standing height to be

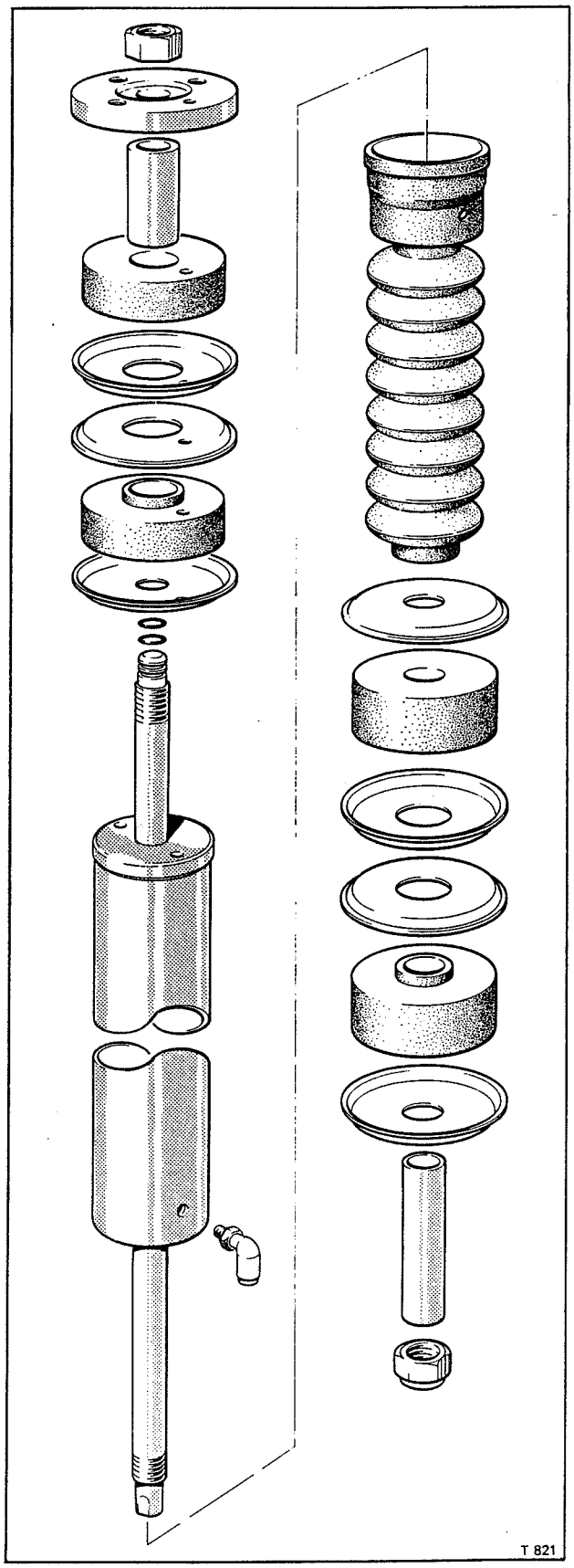

Fig. G30m Rear suspension strut mounts

correct the dimension 'A' should be within a tolerance of between plus 5,08 mm. and minus 3,17 mm. (plus 0.20 in. and minus 0.125 in.) of the dimension at 'B'.

On Corniche cars destined for U.S.A. and Canada an additional spacer ring is fitted to each rear suspension spring to meet the statutory condition of car height. In this case 15,24 mm. (0.60 in.) should be added to the dimension taken at 'B' prior to the comparision of the two dimensions 'A' and 'B' being made.

8. With the standing height correct, the pressure registered on each pressure gauge should be between 21 kg/sq.cm. and 24,5 kg/sq.cm. (300 lb/sq.in. and 350 lb/sq.in.).

If the pressure is above 24,5 kg/sq.cm. (350 lb/sq.in.) the suspension spring has sagged and extra spring packings should be fitted to the springs until the strut pressure registered on the gauge is within the 21 kg/sq.cm. to 24,5 kg/sq.cm. (300 lb/sq.in. to 350 lb/sq.in.) limit.

If the strut pressure is above 24,5 kg/sq.cm. (350 lb/sq.in.) and the standing height is high, either the height control valve is failing to exhaust mineral oil from the strut or the minimum pressure valve setting is too high. Since the latter is an unlikely cause of the fault, the height control valve should be checked as described in Section G12m under Height control valve - To set.

9. Repeat Operation 4 to 8 inclusive. If the fault still persists, renew the height control valve.

10. If the suspension strut pressure is low and the standing height of the car is low either,

a. The height control valve is not admitting oil to the suspension strut, requiring the valve to be renewed.

b. The height control valve is incorrectly adjusted and should be adjusted as described in Section G12m under Height control valve - To adjust.

c. There is a leak from the height control valve minimum pressure valve, suspension strut, gas adapter or associated piping.

Gas spring sphere gas charge pressure - To check

1. Depressurise the hydraulic systems as described in Section G4m.

2. Remove the suspension strut bleed screw from the three-way adapter and fit a zero kg/sq.cm. to 210 kg/sq.cm. (zero lb/sq.in. to 3 000 lb/sq.in.) pressure gauge into the adapter.

3. Load the car sufficiently to ensure the height control valves are in the open position.

4. Ensure the gearchange selector is in the 'P' park position, then remove the gearchange thermal cut-out.

5. Start the engine; note the instantaneous pressure registered on the pressure gauge as the height control valve operates. This initial pressure is the gas spring sphere charge pressure, the sphere having a gas pressure of between 14,21 kg/sq.cm. and 16,24 kg/sq.cm. (203 lb/sq.in. and 232 lb/sq.in.) when fully charged.

In the event of the gas spring sphere gas pressure falling below 10,5 kg/sq.cm. (150 lb/sq.in.) the sphere must be renewed.