Section G1m

Introduction

Chapter G Part II covers the components for the two independently power operated braking systems, the height control system and the mechanically operated parking brake fitted to Rolls- Royce and Bentley Corniche and Rolls-Royce Camargue cars, serial numbers 50 001 onwards.

These cars use hydraulic system mineral oil in the hydraulic systems.

The braking systems consist of two independent circuits.'System 1' operates the front road wheels, front brake calipers and the upper cylinders of the rear road wheel brake calipers. 'System 2' operates the front road wheel rear brake calipers and the lower cylinders of the rear road wheel brake calipers. All wheels are fitted with disc brakes.

Pressure for the system is supplied by two hydraulic accumulators,mounted on the 'A' bank side of the engine. The accumulators are charged by engine operated hydraulic pumps. The hydraulic pump situated in front of the engine air inlet manifold supplies hydraulic mineral oil to the front (vertically mounted) accumulator (System 1). The hydraulic pump situated at the rear of the engine supplies hydraulic mineral oil to the rear (horizontally mounted) accumulator (System 2). Both accumulators also supply pressurised hydraulic mineral oil to the height control system.

Each accumulator sphere is divided into two chambers by a diaphragm, a charge of nitrogen gas being applied and retained in one chamber by the diaphragm.

As an accumulator commences to be charged with hydraulic system mineral oil from its hydraulic pump, only a small amount of hydraulic system mineral oil is required to be pumped into the other chamber to raise its pressure to that of the initial charge of nitrogen. Hydraulic system mineral oil will continue to be pumped into this chamber against steadily increasing pressure as the diaphragm is lifted, compressing the gas above it, until the pressure regulator in the accumulator valve housing operates and unloads the hydraulic pump by allowing the hydraulic system mineral oil to bypass back to the reservoirs.The pressure of hydraulic system mineral oil stored in the sphere is maintained by the gas pressing against the diaphragm, the pressure reducing as hydraulic system mineral oil is used, until the regulator allows the pump to re-charge the sphere.

Spheres similar to those used on the accumulator but with lower nitrogen gas pressure are incorporated into the rear suspension struts, the gas under pressure acting as a spring. Hydraulic system mineral oil fed from the two accumulators flows into or out of the suspension strut spheres as varying loads are applied to the car. The quantity is controlled by the two height control valves with hydraulic system mineral oil exhausted from the suspension spheres being returned to its respective reservoir.

A pressure priority valve is incorporated into each system to ensure that the braking systems have priority over the rear suspension. If the pressure in a system(s) falls unduly the priority valve(s) will close and isolate the suspension system, allowing the pressure available to be utilised for braking purposes.

Also incorporated into each system is a minimum pressure valve. The purpose of this valve is to retain a pre-determined pressure in the rear suspension strut spheres when the engine is switched off and the car unloaded. This retention of pressure reduces the time and amount of pressurised hydraulic system mineral oil required to fully charge the hydraulic systems upon the initial starting of the engine.

The mechanical parking brake arrangement is hand operated on right-hand drive cars. On left-hand drive cars the parking brake is applied by a foot operated pedal and released by a hand lever.

Both types of brake operate two additional brake pads onto each rear brake disc.

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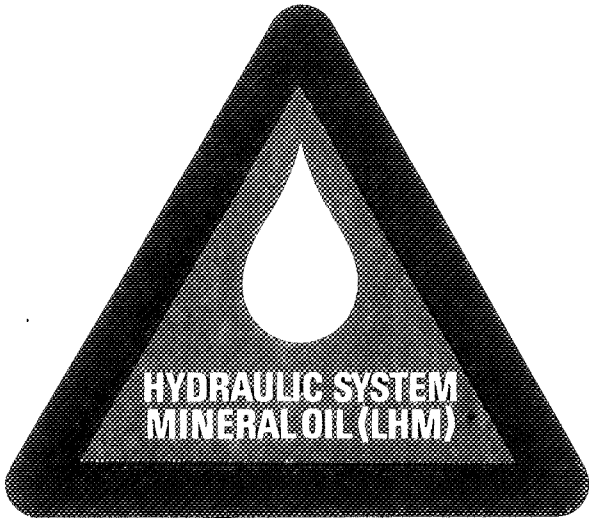
Chapter G

Part II
Hydraulic systems
Hydraulic system mineral oil (LHM)

Applicable to Corniche and Camargue cars from serial number 50 001

Section



Chapter G Part II

Issue record sheet 1

October 1979

The dates quoted below refer to the issue date of individual pages within this chapter.

Section	G1m	G2m	G3m	G4m	G5m	G6m	G7m	G8m	G9m	G10m	G11m	G12m
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Chapter G Part II

Issue record sheet 2

March 1980

The dates quoted below refer to the issue date of individual pages within this chapter.

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Mineral oil hydraulic system colour coding and component location

Right-hand drive cars

Figure G1m

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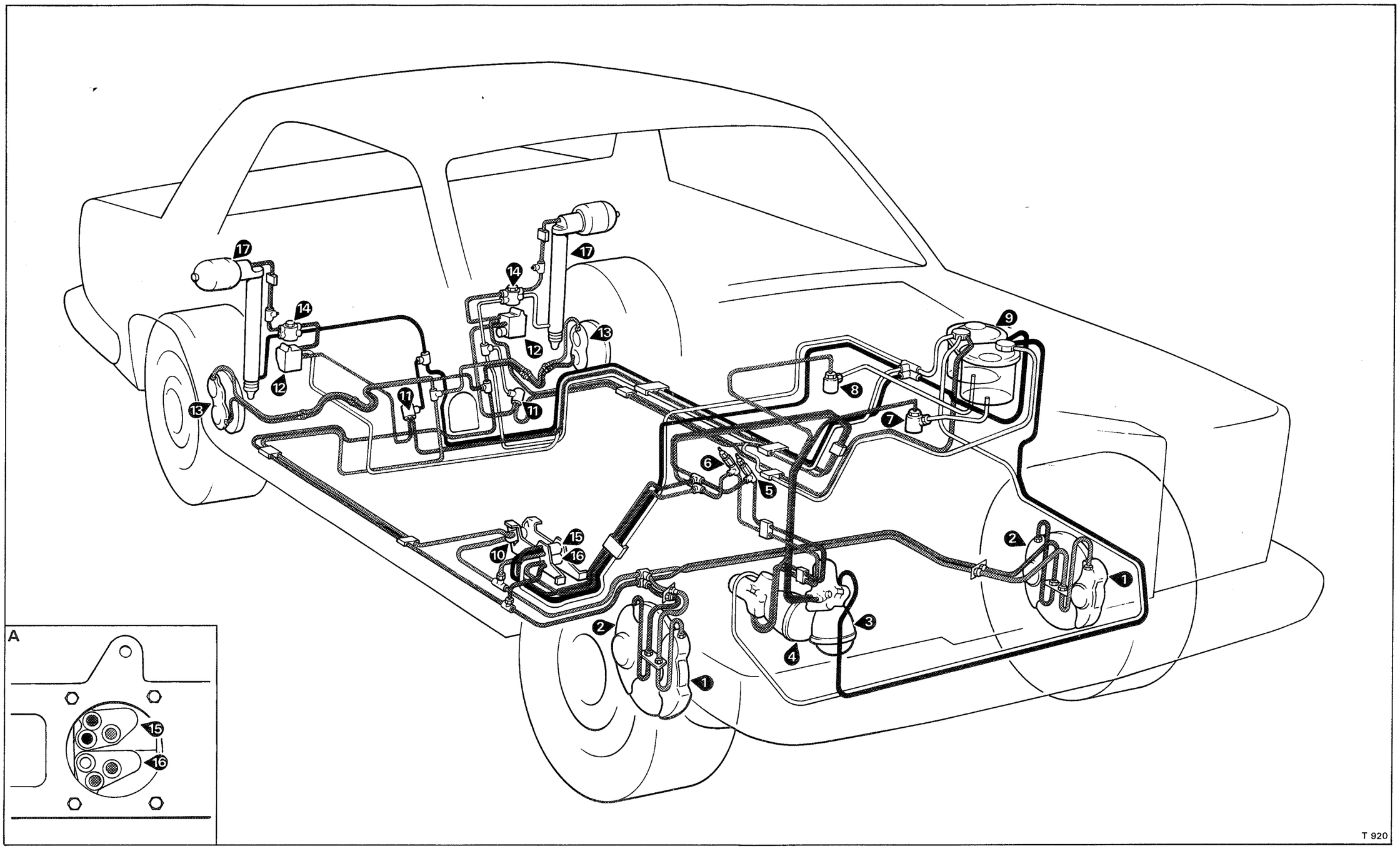

Fig. G1m Mineral oil hydraulic system colour coding and component location (Right-hand drive cars)

1 Twin cylinder disc brake caliper (No.1 system)
2 Twin cylinder disc brake caliper (No.2 system)
3 Hydraulic accumulator (No1 system)
4 Hydraulic accumulator (No.2 system)
5 Pressure switch (No.1 system)
6 Pressure switch (No.2 system)
7 Hydraulic pump (No.1 system)
8 Hydraulic pump (No.2 system)
9 Hydraulic mineral oil reservoirs
10 Deceleration conscious pressure limiting valve
11 Priority valve
12 Height control valve
13 Four cylinder disc brake caliper
14 Minimum pressure valve
15 Distribution valve (No.1 system)
16 Distribution valve (No.2 system)
17 Gas spring and suspension strut
A Distribution valve ports

Mineral oil hydraulic system colour coding and component location

Left-hand drive cars

Figure G2m

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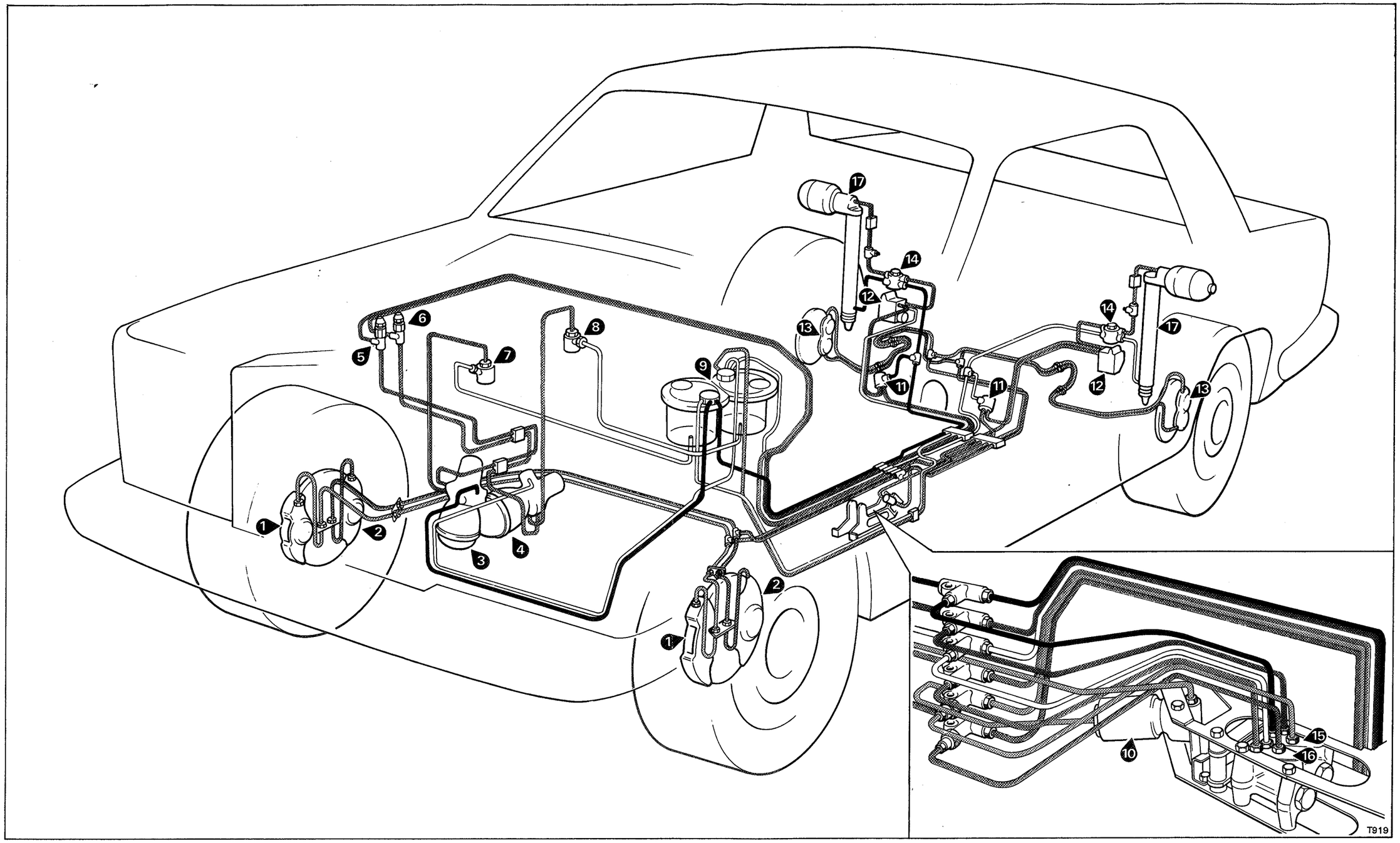
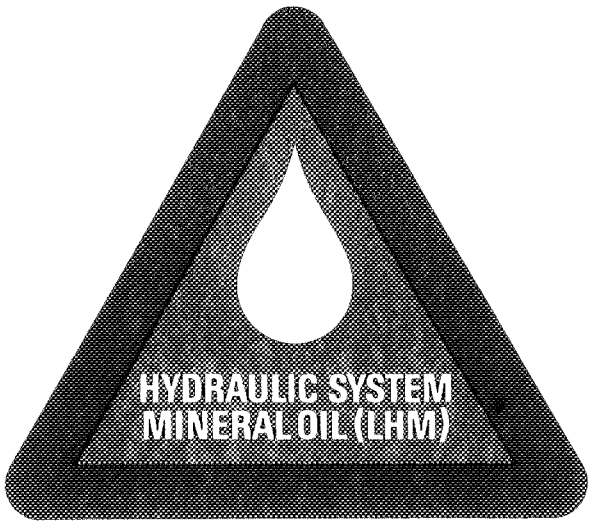


Fig. G2m Mineral oil hydraulic system colour coding and component location (Left-hand drive cars)

1 Twin cylinder disc brake caliper (No.1 system)
2 Twin cylinder disc brake caliper (No.2 system)
3 Hydraulic accumulator (No.1 system)
4 Hydraulic accumulator (No.2 system)
5 Pressure switch (No.1 system)
6 Pressure switch (No.2 system)
7 Hydraulic pump (No.1 system)
8 Hydraulic pump (No.2 system)
9 Hydraulic mineral oil reservoirs
10 Deceleration conscious pressure limiting valve
11 Priority valve
12 Height control valve
13 Four cylinder disc brake caliper
14 Minimum pressure valve
15 Distribution valve (No.1 system)
16 Distribution valve (No.2 system)
17 Gas spring and suspension strut

Diagram of hydraulic systems

Figure G3m



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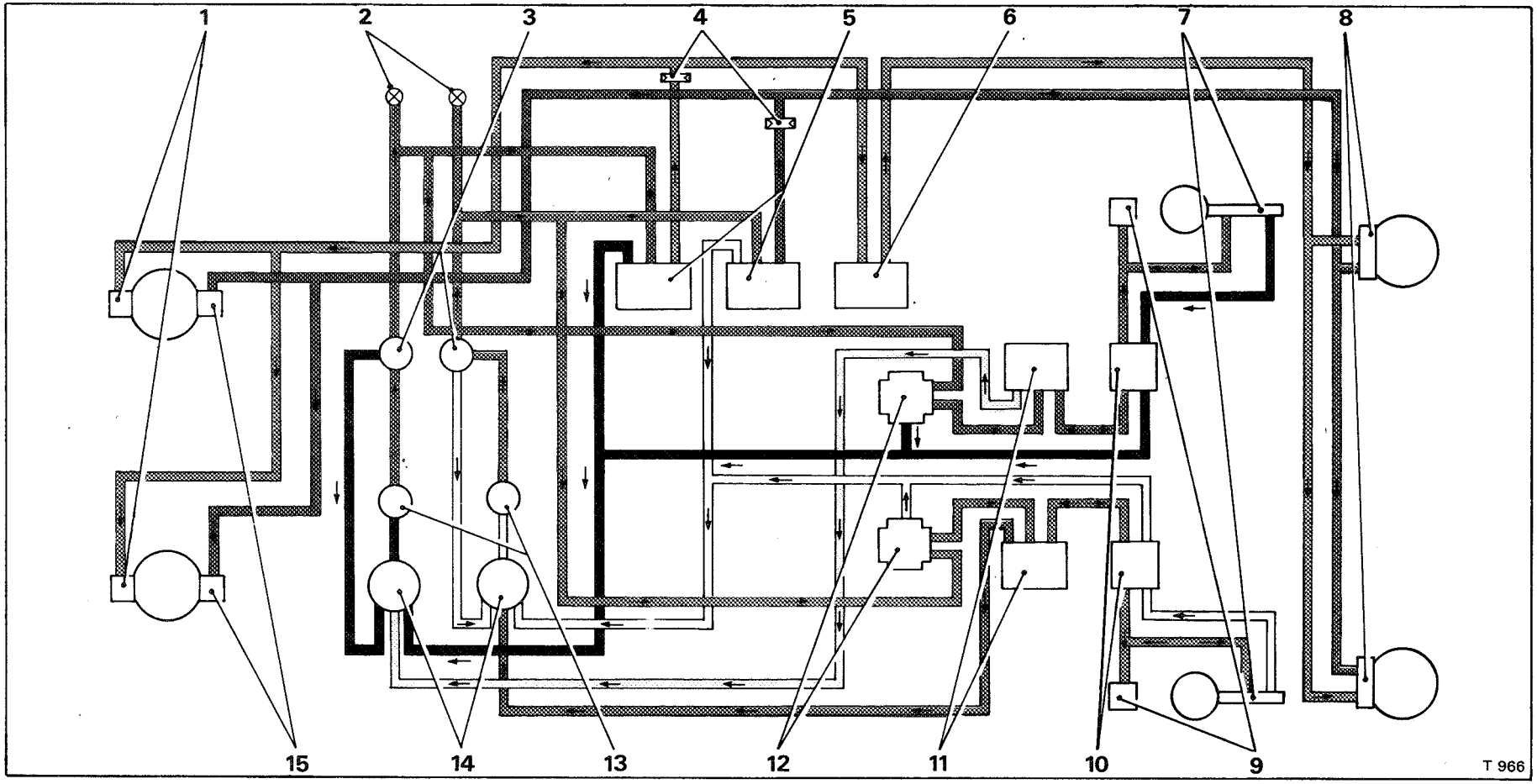

No. 1 Braking and right-hand side levelling system

- High pressure
- Low pressure
- Brake line pressure
- Levelling valve return

No.2 Braking and left-hand side levelling system

- High pressure
- Low pressure
- Brake line pressure
- Levelling valve return

Fig. G3m Diagram of hydraulic systems

1 Front wheel front brake calipers
2 Pressure switches
3 Hydraulic accumulators
4 Restrictors
5 Brake distribution valves
6 Deceleration conscious pressure limiting valve
7 Suspension struts
8 Rear wheel brake calipers
9 Suspension strut bleed points
10 Minimum pressure valves
11 Levelling valves
12 Priority valves
13 Hydraulic brake pumps
14 Mineral oil reservoirs
15 Front wheel rear brake calipers

Section G2m

Special precautions

Important

Hydraulic system mineral oil must be used in the hydraulic systems of cars with serial numbers from 50 001

Under no circumstances should a conventional synthetic brake fluid be substituted for the genuine hydraulic system mineral oil.

Before attempting any work on the hydraulic systems of the car, service personnel must note carefully the contents of this section and be fully conversant with the precautions required to ensure adequate safety and correct system operation.

The hydraulic systems operate at high pressure

Pipes and components must never be removed when the hydraulic systems are in a charged state.

Before any work, except specified test, is carried out on the hydraulic systems, depressurisation of the systems must be carried out.

All hydraulic system equipment should carry identification to show the type of system for which it may be used i.e. RR 363 Brake Fluid (colour reference yellow) for cars with serial numbers prior to 50 000 or Hydraulic system mineral oil (colour reference green) for cars with serial numbers from 50 001 onwards.

To assist in the identification marking of mineral oil components and equipment, self adhesive labels bearing the logo as shown in Figure G4m are available from the Parts Department at Crewe.

Hydraulic system mineral oil

Hydraulic system mineral oil is **Green** in colour. It is essential that only approved hydraulic system mineral oil is used (see Chapter D - Lubricants). Contamination of mineral oil hydraulic systems or components with any conventional vegatable or synthetic type of brake fluid will cause seals and hoses to deteriorate which could result in eventual brake faults.

To avoid contamination all mineral oil containers and components should be stored in a clearly defined area away from that used for conventional brake fluid.

Hydraulic system mineral oil can cause damage to tyres. In the event of mineral oil coming into contact with a tyre, damage can be prevented if the mineral oil is removed immediately using a soap solution. Finally wash the tyre with clean water.

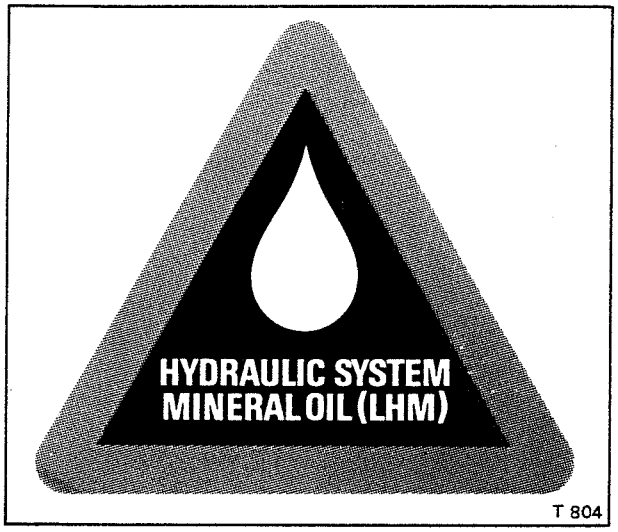

Fig. G4m Hydraulic system mineral oil logo

Component identification

All components which are susceptible to damage from brake fluids are colour coded **Green** and have **GMF** prefix part numbers e.g. GMF 1062.

Other components in the system which are not susceptible to brake fluid damage (i.e. metal pipes and connectors) are neither colour coded nor do they have a GMF prefix part number. It must be stressed however that these parts must not become contaminated with brake fluid as this could circulate to other components in the hydraulic systems.

For details of individual component identification reference should be made to the relevent component section in this chapter.

Cleanliness

For the correct functioning of the hydraulic system meticulous care should be taken to ensure complete cleanliness at all times.

Since both the braking system and height control system, have components with very fine manufacturing tolerances, the ingress of even very small particles of foreign matter could have very serious effects on the operation of the systems.

Care must be taken to ensure that at all times, only clean hydraulic system mineral oil is used in the system and that any overhauled units or components are not exposed to contamination during assembly or fitting.

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Contact with conventional brake fluids must be avoided at all times as these fluids have a detrimental effect on the rubber seals and hoses used in hydraulic mineral oil systems.

Depressurising the system
Method 1
Switch on the ignition and pump the brake pedal 50 to 60 times until the facia warning panels marked 1 BRAKE PRESSURE and 2 BRAKE PRESSURE are illuminated. Switch off the ignition.

To depressurise the rear suspension strut place a bleed tube to each strut bleed screw in turn. Open the bleed screw and allow the hydraulic system mineral oil to bleed into a clean container until the flow ceases.

Method 2
Open the bleed screw on both accumulators and allow sufficient time for the mineral oil pressure to discharge back to the reservoir. These bleed screws are in integral part of the accumulator, the mineral oil being allowed to flow from the accumulator sphere back to the reservoir when the bleed screw is opened (see Fig. G13m). Switch on the ignition and check that the facia warning panels marked 1 BRAKE PRESSURE and 2 BRAKE PRESSURE are illuminated.

Depressurise the rear suspension struts as described in Method 1.

Accumulator and Gas spring spheres
The accumulator and gas spring spheres are charged on one side of their diaphragms with nitrogen gas to a pressure of between 60 to 64 bars (870lb/sq.in. to 928lb/sq.in.) and 14 to 16 bars (203lb/sq.in. to 232lb/sq.in.) respectively prior to despatch from the factory.

Each sphere is marked with a band of white paint or a stick on yellow label when charged. The charge pressure in bars is stamped on the non-return valve cap at the end of the sphere.

A date of manufacture is also marked on each sphere. It is recommended that spheres are stored and issued from stock in date sequence.

Bleeding the hydraulic systems
It is recommended that the gear change thermal cut-out is removed from the fuseboard situated beneath the facia, to isolate the electric gear change whilst the systems are bled.

Only use hydraulic system mineral oil bleed equipment when bleeding the hydraulic systems. **Never connect equipment that has been used for conventional brake fluids to the system.**

The bleed screws for the accumulators are an integral part of the accumulator valve housing and bleed hose connection is not required.

Reference should be made to Section G4m.for details of the complete bleeding procedure.

When bleeding the hydraulic system, any hydraulic system mineral oil that has been spilt onto the tyres must be removed. The use of a soap solution and a final rinse with clean water is recommended for this purpose.

Under no circumstances should hydraulic system mineral oil be allowed to remain on the tyres for prolonged periods as this will cause tyre damage.

Removing components
Prior to disconnecting any pipes or removing hydraulic components from the car, the area around the pipes and components should be thoroughly cleaned. Particular attention should be given to the localised areas around the pipe unions and their corresponding ports.

Whenevever units, pipes or components are disconnected from the hydraulic systems all open ports and pipe ends must be blanked off immediately, to avoid contamination of the system.

It is stressed that the clean condition of any blanks used is equally as important as the clean condition of the components they seal.

Blanks which have been used on cars with conventional brake fluid systems should not be used, unless they have been thoroughly cleaned and all traces of brake fluid removed.

Note
Masking tape and/or cork bungs do not constitute blanks.

Quantities of blanks may be obtained, on request, from the Parts Department at Crewe.

In addition, special pressure blanks are available, capable of withstanding full hydraulic system pressure. These blanks should be used during testing and fault diagnosis procedures where it may be necessary to blank off a pipe or component and then charge the systems. When fitted these blanks must be torque tightened to the figures quoted for the pipe unions which they replace.

Cleaning components
Methylated spirit is the only recommended cleaner.

Components which have been removed should be thoroughly cleaned before replacement.

Rubber pipes, sealing rings and other components should be washed in methylated spirit and then dried with dry compressed air.

Note
When rubber seals are washed in methylated spirits, they must not be allowed to soak, as prolonged immersion could have a detrimental effect.

Metal pipes requiring the removal of underseal and road dirt from their outer surfaces, may be cleaned with trichlorethylene or paraffin. In such cases, a final cleaning procedure and flushing of the pipe internal bore using methylated spirit should be carried out. Blow dry with clean compressed air.

Cloths even the lint free types, should never be used to clean hydraulic components.

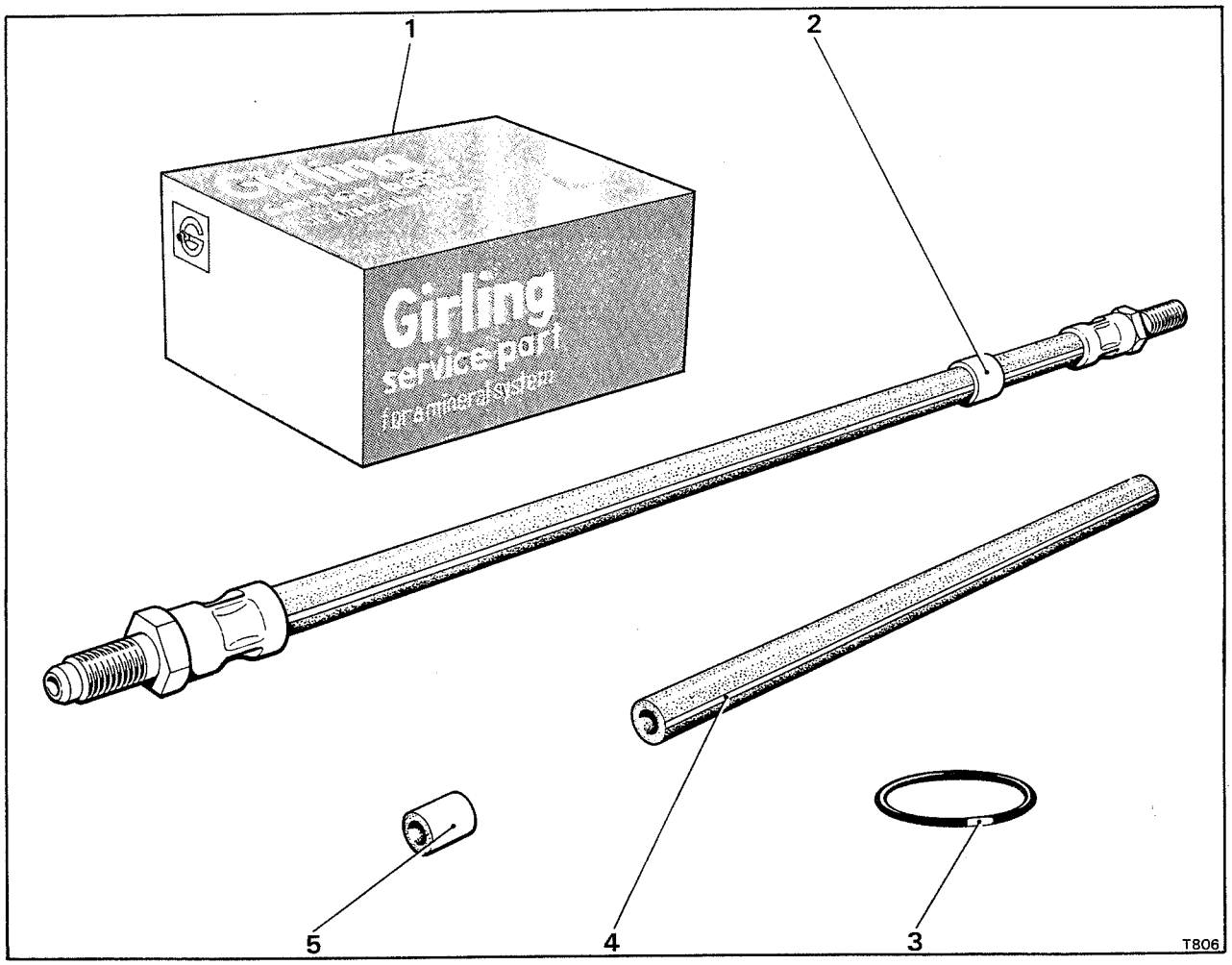

Fig. G5m Hydraulic system mineral oil component identification

1 Brake seal kit container
2 Flexible brake hose (green collar and strip)
3 Sealing ring (green paint mark)
4 Brake hose (green strip)
5 Pipe seal (green outer surface)

Service equipment

All service equipment should be clearly marked to indicate the type of hydraulic system for which it is suitable.

Under no circumstances should equipment used for conventional brake fluids be used on a mineral oil hydraulic system or component.

Only pressure gauges, test and bleed equipment bearing hydraulic system mineral oil identifications should be connected to a mineral oil system.

Hydraulic system - General maintenance

When the hydraulic reservoir and systems are drained completely always fill with fresh clean hydraulic system mineral oil of the specified type. Refer to Chapter D for the correct specification.

After filling the systems, bleed as described in Section G4m.

Servicing rubber components

In the interest of safety, the rubber components used in the hydraulic systems have been allotted specific 'life' mileages at the completion of which or at the nearest service prior to completion it is recommended that the components are renewed. Reference should be made to Service Schedule Manual publication number T.S.D.4117 for this information.

Only rubber components bearing mineral oil identification marks should be fitted to a mineral oil hydraulic system.

Under no circumstances must a rubber component for a conventional brake fluid system be substituted for the correct component.

Fitting replacement units

Replacement hydraulic units are tested and blanked

off before being despatched from the factory.

It is advisable, when fitting a replacement unit, that when the unit has been placed in position and the blanks removed, the mineral oil in the unit is allowed to drain before the pipes are connected.

When drained, the pipes should be connected and the appropriate bleeding operations carried out.

Note

The mineral oil should not be blown out, allowing it to drain is sufficient.

Storage and transportation

The care taken to prevent contamination of components during storage or transportation is extremely important.

All mineral oil components should be stored in a seperate and clearly defined area from that used for conventional brake fluid components.

Replacement parts, pipes and units must be clearly identified and securely sealed with the correct blanks. Blanks should not be removed until immediately prior to fitting; the replacement parts must also be protected from dust and damage.

Sealing rings and rubber pipes in storage should be protected from dust, light and heat in order to reduce deteriation of the rubber.

Where mineral oil components are transported or returned to the manufacturer they should be clearly marked as being for use on mineral oil hydraulic systems.

Section G3m

Hydraulic system pipework

Except in certain cases where flexible hoses are used to accommodate movement between two units the hydraulic system mineral oil is carried in bundy tubing.

The pipework, with the exception of the flexible hoses is almost entirely 4,76mm. (0.186 in.) diameter bundy tubing. The only exceptions are the reservoir end of the return pipe from the accumulator to the reservoir and the supply pipe from the brake pump to the accumulator, these are 6,35mm. (0.250 in.) diameter. The metal section of the feed pipes from the reservoir to the hydraulic pumps are 9,52mm. (0.375 in.) diameter. The accumulator return pipe connection is of 9,52mm.(0.375 in.) diameter but is reduced to take a 6,35mm. (0.250 in.) bore hose connection.

To enable pipe identification neoprene sleeves are fitted to each end of the metal pipes, except for the short bridge pipe fitted to each rear caliper. A chart quoting the pipe colours and functions is given on Page G3m - 2. This chart should be consulted to determine the function of each pipe i.e. high pressure, low pressure and system.

Generally, pipework connections are effected by flared pipe ends and unions, either male or female as necessary. Conical seats are machined in the components or junctions to seat the flares and provide effective joints.

On the accumulators and priorty valves a different type of connection is used requiring the fitting of a small rubber sleeve (see Fig. G6m). Sealing is achieved by deformation of the rubber when the sleeve nut is tightened.

To fit this type of connection the procedure given at the end of this section should be carried out.

In certain flexible pipe joints, face seals and copper washers are employed. A new copper washer must be fitted whenever the pipe is removed.

If hydraulic pipes are disturbed the following points should be noted.

The area around the pipe union and pipe end should be thoroughly cleaned before the union is unscrewed.

Pipe ends should always be blanked off immediately after removal. The blanks should not be removed until immediately prior to fitting.

Whenever pipes are removed, the flares should be inspected for serviceability. Pipes showing signs of damage, cracking or collapse must be renewed.

Before fitting,pipes and unions should be cleaned thoroughly using methylated spirits, then blown through with clean dry compressed air. Particular attention should be paid to the union and the exterior of the pipe immediately behind the flares.

When fitting pipes, do not overtighten unions as this could cause damage to pipe flares.

If, when a pipe is removed, the coloured sleeves are in poor condition they should be renewed. This is best achieved by expanding a new correctly coloured rubber sleeve sufficiently to clear the union, using a small three pronged expanding hand tool (i.e. Penguin pliers).

Identification sleeves are not fitted to the flexible hoses but the sleeves on the connecting pipes at either end may be used to identify the flexible pipe and its function.

The flexible and metal pipes can be readily identified by means of the colour coding and component location layout (see Figs. G1m and G2m). Also refer to the function chart shown on Page G3m-2.

Note

The two high pressure pipes from the hydraulic pumps to the hydraulic accumulators and the feeds from the reservoir to the hydraulic pumps are not marked and do not connect to any other marked pipes. Since these pipes are the only ones without means of identification confusion should not arise.

Extreme caution should be taken when fitting or renewing flexible pipes to ensure that the correct type of pipe is fitted, in the correct location and in accordance with the colour coding.

In the interest of safety, the flexible pipes fitted to the hydraulic systems have been allotted specific 'life' mileages at the completion of which or at the nearest service prior to completion it is recommended that the flexible pipes are renewed.

For recommended 'life' mileages reference should be made to the Service Schedule Manual publication number T.S.D. 4117.

When renewing flexible pipes and hoses, only those conforming with hydraulic system mineral oil requirements and bearing mineral oil identification marks should be fitted (see Fig. G5m). Under no circumstances must any other type of flexible pipe or hose be fitted.

When removing rigid or flexible pipes, the positions of all clipping points and pipe routing should be noted to ensure that, when fitted, no chafing or vibration of the pipes can occur. Always ensure that the flexible hoses and rigid pipes are routed to clear other components and that clearance is maintained during the full range of steering and

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suspension movement.

It should be noted that certain 4,76 mm. (0.186 in.) diameter pipes are not available as spares and in the event of a replacement being required it is recommended that they are produced using 'Armco' 25 microns zinc plated, fully chromate passivated bundy tubing. Care should be taken to avoid sharp bends when producing replacement pipes as this will cause the plating to fracture.

Note

The pipe connection tappings on the front road wheel brake calipers, accumulators, levelling valves and priority valves have a metric thread form. Care should be taken when producing replacement pipes to ensure that the correct type of pipe nut is fitted.

All pipes must be thoroughly cleaned using methylated spirit and dried using clean compressed air. The ends should then be blanked until immediately prior to fitting.

After fitting of replacement pipes they should be leak checked and then coated with underseal if they are in an exposed position.

Non-standard torque figures are specified for certain pipe unions and fittings. These figures are given in Chapter P which also quotes all standard and non-standard torque figures. These figures must be adhered to at all times to avoid overtightening and possible damage.

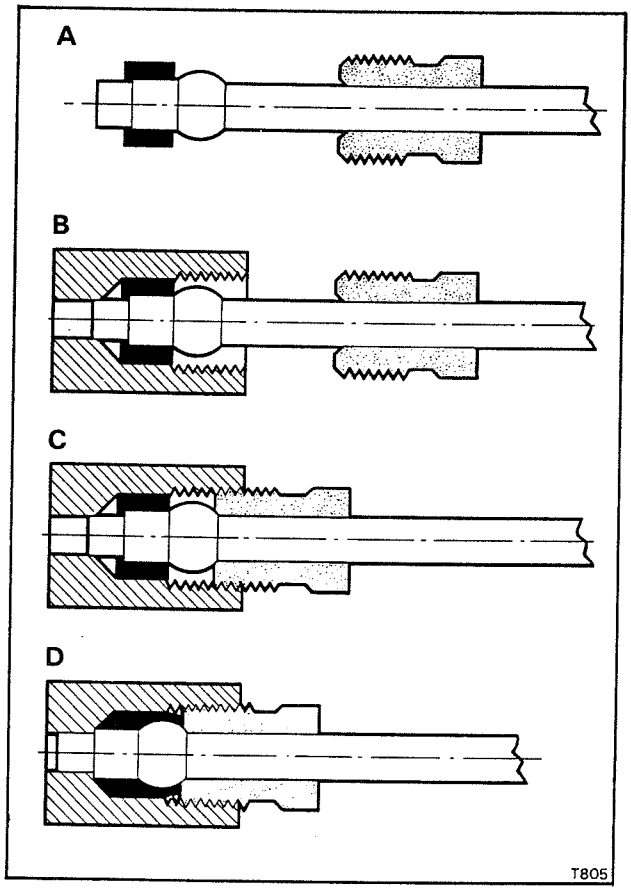

Fig. G6m Fitting a sleeved pipe connection

Rubber sleeve pipe connection - To fit (see Fig. G6m)

A. Slide the rubber sleeve onto the pipe until it abuts the collar.

B. Insert the small end of the pipe into the close fitting bore at the bottom of the threaded connection port.

C. Carefully centralise the pipe in the bore and screw in the sleeve nut until it abuts the pipe collar.

D. Torque tighten the nut to the figure quoted in Chapter P.

Note

The rubber sleeve must be renewed each time the pipe is disconnected.

It is important that the torque figure quoted in Chapter P is not exceeded as damage to the pipe end could result, causing pipe restriction and difficulty in withdrawing the pipe end from the connection bore.

Pipework colour coding

Colour	Function	Location
Red	High pressure No. 1 system	Brake and height control; pipes from the front hydraulic pump, to the front (vertically mounted) accumulator and from the front accumulator to the upper distribution valve. Also from the front accumulator to the right-hand rear levelling strut, passing through the right-hand priority valve, height control valve and minimum pressure valve.
Blue	High pressure (with footbrake applied) No. 1 system	Brake line; pipes from the upper distribution valve to the front brake calipers on the front wheels and the upper cylinders on the rear wheel brake calipers.
Yellow	Low pressure No. 1 system	Height control return; pipes from the right-hand height control valve to the front reservoir.
Black	Low pressure No. 1 system	Brake and height control; pipes from the upper distribution valve to the front reservoir and from the right-hand levelling strut through the minimum pressure valve and priority valve to the front reservoir. Also the return pipe from the front accumulator to the front reservoir.
Orange	High pressure No. 2 system	Brake and height control; pipes from the rear hydraulic pump to the rear (horizon-

		tally mounted) accumulator and from the rear accumulator to the lower distribution valve. Also from the rear accumulator to the left-hand rear levelling strut passing through the left-hand priority valve, height control valve and minimum pressure valve.
Mauve	High pressure (with footbrake applied) No. 2 system	Brake line; pipes from the lower distribution valve to the rear brake calipers on the front wheels and the lower cylinders on the rear wheel brake calipers, including the rear caliper bridge pipe.
Brown	Low pressure No. 2 system	Height control return; pipes from the left-hand height control valve to the rear reservoir.
White	Low pressure No. 2 system	Brake and height control return; pipes from the lower distribution valve to the rear reservoir and from the left-hand levelling strut through the minimum pressure valve and priority valve to the rear reservoir. Also the return pipe from the rear accumulator to the rear reservoir.

Section G4m

Bleeding the hydraulic systems

Introduction

In order to obtain optimum performance of the hydraulic systems, it is essential that they are free of air at all times. The two hydraulic systems are re-circulatory and therefore, if air is allowed to enter them at any point it will reduce the efficiency.

Bleed screws are provided on the side of the accumulators, on each pair of brake calipers,on each suspension strut and on the deceleration conscious pressure limiting valve. The accumulator bleed screws are an intergral part of the valve housing and do not require the connection of a bleed pipe during the bleeding operation. The bleed screws for the suspension struts are situated on each side of the car just rearward of the rear road springs and height control valves.

The accumulators are situated on the front right-hand ('A'bank) side of the engine. The accumulator for the number one system is vertically mounted and the number two system accumulator horizontally mounted.

The two hydraulic system mineral oil reservoirs are situated on the left-hand side of the engine compartment.

The front hydraulic reservoir supplies hydraulic system mineral oil for the number one system. From the reservoir mineral oil is supplied to the front brake pump, which in turn supplies hydraulic system mineral oil under pressure to the vertically mounted accumulator, the upper distribution valve, the front brake calipers on the front wheels, the upper cylinders of the rear brake calipers and the right-hand suspension strut.

The rear reservoir supplies hydraulic system mineral oil for the number two system. From the reservoir, mineral oil is supplied to the rear brake pump which in turn supplies hydraulic system mineral oil under pressure to the horizontally mounted accumulator, the lower distribution valve, the rear brake calipers on the front wheels, the lower cylinders of the rear brake calipers and the left-hand suspension strut.

When a rectification has been carried out between the brake pumps and the distribution or height control valves it will be necessary to bleed at all the bleed points in that particular circuit.

If however a rectification has been carried out between the distribution valves and the brake calipers, it should only be necessary to bleed at the bleed points between the distribution valve and the calipers in the faulty circuit.

Whenever in doubt it is advisable to bleed the complete system.

The power brake circuits should be bled at low pressure, ensuring that the systems are depressurised and the mineral oil levels in the reservoirs are kept above the minimum marks at all stages of the bleeding operation.

To obtain low pressure bleeding the system(s) must remain open at all times. Throughtout the bleeding operation, the brake pressure warning panel(s) marked 1 BRAKE PRESSURE and /or 2 BRAKE PRESSURE should be illuminated. Only when bleeding the suspension struts should the systems be fully pressurised and the warning panel lamps extinguished.

When bleeding the suspension struts, the interior of the car should be weighted to compress the suspension sufficiently for the height control valves to actuate, thus allowing pressurised mineral oil to flow to the suspension struts and bleed screws. The engine should be allowed to run for four minutes prior to bleeding, to ensure the systems are fully charged. Bleed both suspension struts until all the air bubbles have been expelled then allow fifteen seconds to elapse before fully tightening each bleed screw.

Bleeding the systems

The following information is a comprehensive bleeding operation which should be carried out to ensure removal of air from the complete hydraulic systems. However as previously stated, each system can be bled seperately at all points downstream of any replacements or pipe disconnections. A planned bleeding chart is given at the end of this section, but if any doubt exists, it is advisable to bleed the complete system concerned.

Whilst bleeding is being carried out, it is essential that the mineral oil level in the two reservoirs is kept to at least the topping-up mark on the level indicator plate, using clean hydraulic system mineral oil. Reference should be made to Chapter D for approved types.

All bleed screws should be torque tightened in accordance with the figures quoted in Chapter P.

When bleeding the hydraulic systems ensure that only equipment suitable for hydraulic system mineral oil is used. Never use equipment that has been used with a synthetic brake fluid i.e. RR 363 Brake fluid.

Attach a length of bleed tube to each bleed screw prior to the bleed screw being opened, immerse the free end of the tube in approximately

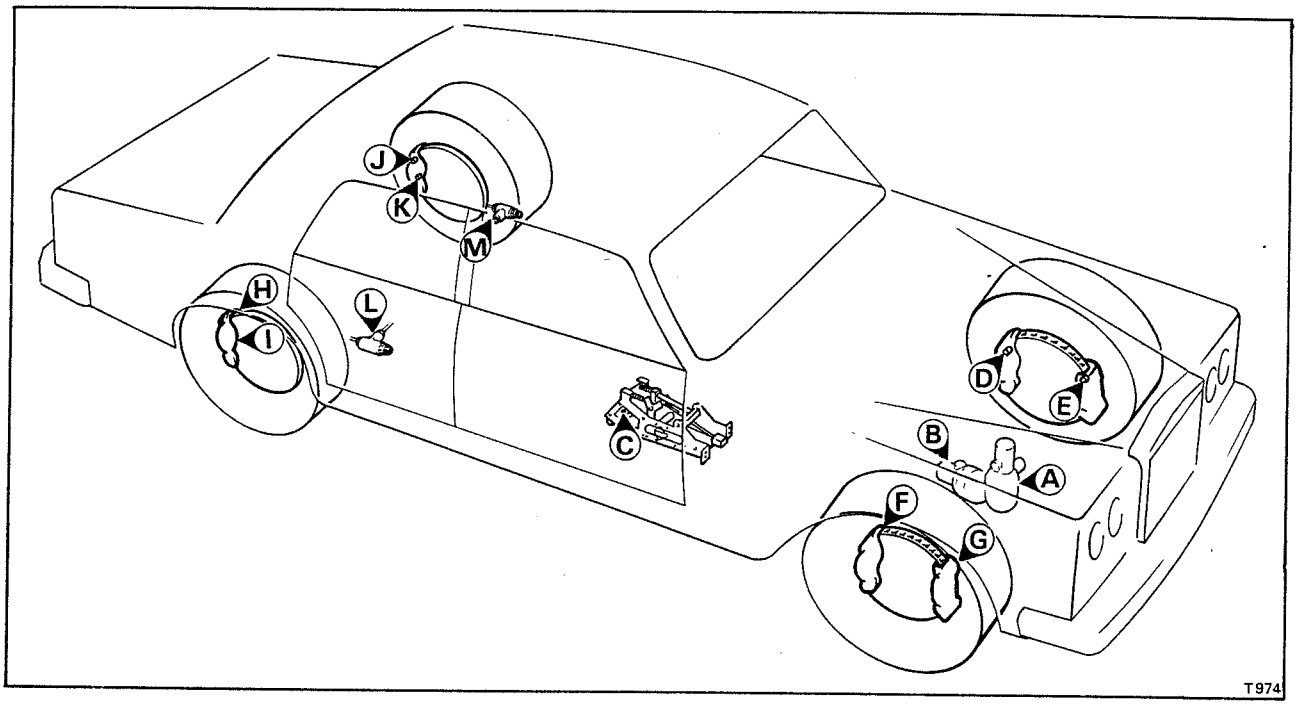

Fig. G7m Mineral oil hydraulic system bleed points

A Accumulator (No.1 system)
B Accumulator (No.2 system)
C Deceleration conscious pressure limiting valve
D Rear caliper left-hand front wheel
E Front caliper left-hand front wheel
F Rear caliper right-hand front wheel
G Front caliper right-hand front wheel
H Right-hand rear caliper (upper cylinder)
I Right-hand rear caliper (lower cylinder)
J Left-hand rear caliper (upper cylinder)
K Left-hand rear caliper (lower cylinder)
L Right-hand suspension strut (underside rear floor)
M Left-hand suspension strut (underside rear floor)

2,5 cm. (1 in.) of hydraulic system mineral oil contained in a clean bottle.

Bleed tube attachement is not necessary when bleeding the accumulators, as bleeding is effected internally through the accumulator valve housing, the mineral oil being allowed to flow back to its respective reservoir when the bleed screw is released approximately one revolution (see Fig. G13m).

With the gear selector in the 'P' park position and the parking brake applied the following sequence of operations should be carried out (refer to Fig.G7m).

Remove the gear change thermal cut-out from the fuseboard.

Depressurise the hydraulic systems as described in Section G2m. Complete depressurisation of the suspension struts is not necessary.

Open the accumulator bleed screws, Points A and B. Start and run the engine at 1 500 r.p.m. for one minute. Ensure that the facia warning panels 1 BRAKE PRESSURE and 2 BRAKE PRESSURE are illuminated.
Switch off the engine.
Close the accumulator bleed screws points A and B
Open bleed screws at points C,D and E.
Depress the foot brake pedal.
Start and run the engine at 1 000 r.p.m.
Allow points C,D and E to bleed until air free.
Open bleed screws F and G; allow bleeding to start.
Close bleed screws at points C,D and E.
Bleed at points F and G until air free.
Open bleed screws at points H and I; allow bleeding to start. Close bleed screws at points F and G.
Bleed at points H and I until air free.
Open bleed screws J and K; allow bleeding to start.
Close bleed screws at points H and I.
Bleed at points J and K until air free.
Close bleed screws at points J and K.
Release the foot brake pedal.

Add weight to rear of car to actuate levelling valves.
Allow systems to pressurise (facia warning panels extinguished).
Open bleed screws at points L and M; bleed until air free.
Close bleed screws at points L and M.
Check the hydraulic system mineral oil levels in the reservoirs and top-up as necessary.
Switch off engine.
Fit rubber dust cover to each bleed screw.

Note
System 1 BRAKE PRESSURE bleed points A, C, E, G, H, J and L. System 2 BRAKE PRESSURE bleed points B, D, F, I, K, and M.

When bleeding the suspension struts extra care should be taken when slackening the bleed screws as the system will be operating at full pressure.

Any hydraulic system mineral oil that has been spilt onto the tyres must be removed. The use of a soap solution and a final rinse with clear water is recommended for this purpose.

Under no circumstances should hydraulic system mineral oil be allowed to remain on the tyres for prolonged periods as this will cause tyre damage.

Sectional bleed requirements

Red pipe line (No. 1 system)
Any pipe disturbed between the front hydraulic reservoir, front hydraulic pump, accumulator (vertically mounted), upper distribution valve and right-hand suspension strut.

Bleed the complete system: accumulator, deceleration conscious pressure limiting valve, front calipers on the front wheels, upper cylinders on the rear wheel calipers and right-hand suspension strut.

Orange pipe line (No. 2 system)
Any pipe disturbed between the rear hydraulic reservoir, rear hydraulic pump, accumulator (horizontally mounted), lower distribution valve and left-hand suspension strut.

Bleed the complete system; accumulator, rear calipers on the front wheels, lower cylinders on the rear wheel calipers and left-hand suspension strut.

Blue pipe line (No. 1 system)
Any pipe disturbed between the upper brake distribution valve and front calipers on the front wheels and the upper cylinders on the rear wheel calipers.

Bleed the deceleration conscious pressure limiting valve, the front calipers on the front wheels and the upper cylinder on the rear wheel calipers.

Mauve pipe line (No. 2 system)
Any pipe disturbed between the lower brake distribution valve and rear calipers on the front wheel and lower cylinder on the rear wheel calipers.

Bleed the rear calipers on the front wheels and the lower cylinders on the rear wheel calipers.

After bleeding, the systems must be fully charged and the reservoirs topped-up in accordance with the instructions given on the reservoir instruction plate.

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Section G5m

Hydraulic mineral oil reservoirs

Introduction

The two hydraulic mineral oil reservoirs are situated on the left-hand valance of the engine compartment. Mineral oil for System 1 is contained in the front reservoir and for System 2 in the rear reservoir.

The reservoirs are made from a translucent material to enable the level and colour of the mineral oil to be seen. To indicate a low mineral oil level, each reservoir contains a float actuated reed switch. This switch will cause a facia warning lamp to illuminate should the mineral oil in the reservoir fall below a pre-set level.

Providing that the correct precautions are taken against the ingress of dirt into the systems and that perfectly clean hydraulic system mineral oil is always used when topping-up, the reservoirs will only require servicing at the intervals specified in the Service Schedule Manual publication number T.S.D. 4117.

Hydraulic mineral oil reservoir - To remove (refer to Fig. G8m)

The reservoirs can be removed individually from their support bracket.

1. Depressurise the hydraulic systems as described in Section G2m.
2. Disconnect the battery.
3. Disconnect the Lucar connector from the top of the reservoir.
4. To drain the reservoir, slacken the hose clip situated in the centre of the reservoir to hydraulic pump supply pipe. Compress the rubber hose section of the pipe to prevent mineral oil flow, then carefully withdraw the hose off the metal connecting pipe. Place the end of the hose into a clean container and allow the mineral oil to drain from the reservoir.
5. Blank off the hose and pipe ends.
6. Disconnect the pipe connections from the top of the reservoir and ease the pipes clear of the reservoir.
7. Remove the multi-lingual information plate from the top of the reservoirs.
8. Remove the small retaining screws from the top flange of the reservoir.
9. Lift the reservoir from the mounting bracket.

If necessary repeat the above operations to remove the remaining reservoir.

Reservoir - To dismantle, clean and assemble (refer to Fig.G9m)

1. Drain and remove the reservoir as described under Hydraulic mineral oil reservoir - To remove.
2. Carefully remove the reservoir lid and seal.
3. Remove the screws securing the reed switch and float assembly to the underside of the reservoir lid. Ensure that no foreign matter adheres to the magnet on the reed switch float.
4. Remove the reservoir filler neck filter.
5. Using a suitable broad ended screwdriver placed between the bottom of the reservoir and the outlet filter carefully ease the filter off its snap-on connection neck.

Note

When removing the inlet and outlet filters care should be taken to ensure that, the fine mesh of the filters is not torn or damaged.

Care must also be taken during dismantling and cleaning to ensure that the reed switch stem is not bent or damaged, as this will cause the switch to be inoperative.

6. Thoroughly clean all parts with methylated spirits, drying them with dry compressed air. Ensure that all holes and adapter threads are carefully cleaned and have blanks fitted.
7. Assemble the reservoir by reversing the dismantling procedure.

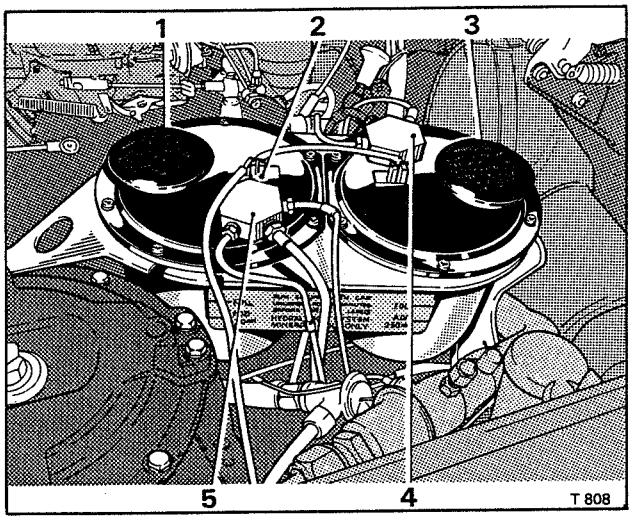

Fig. G8m Hydraulic system mineral oil reservoir

1 Filler cap (No.1 system)
2 Mineral oil level switch connection
3 Filler cap (No.2 system)
4 Pipe connection block (No.2 system)
5 Pipe connection block (No.1 system)

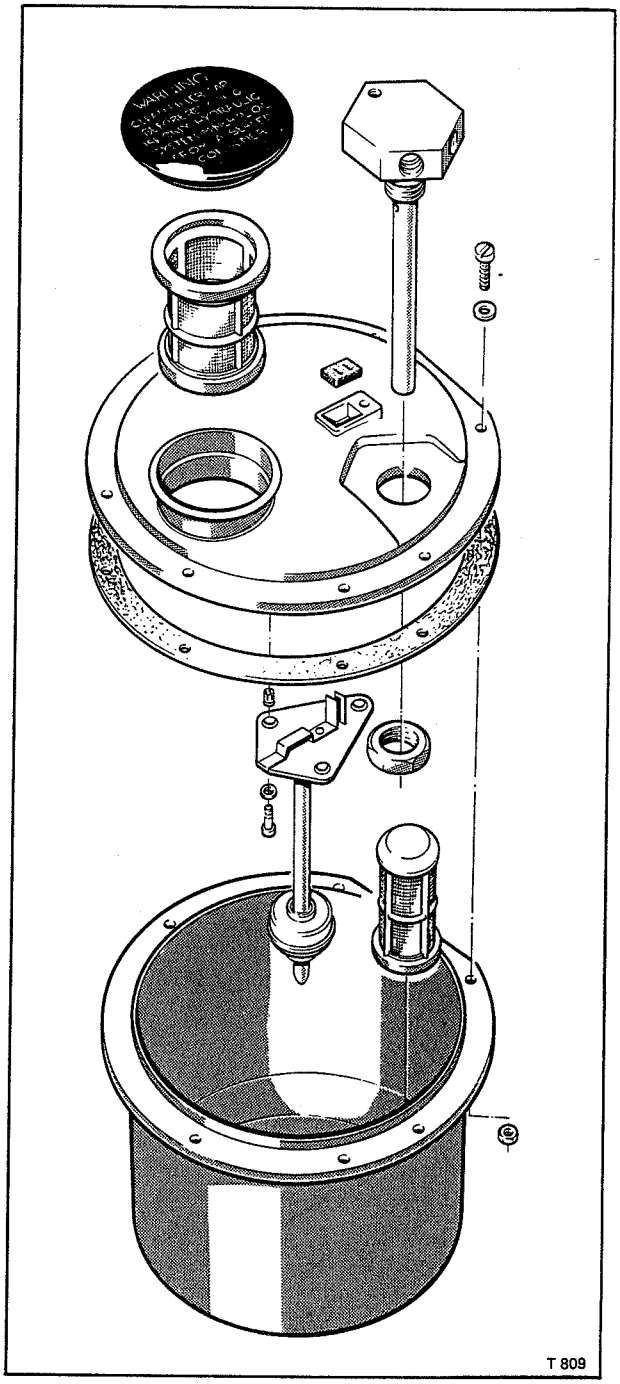

Fig. G9m Hydraulic system mineral oil reservoir

Reservoir - To fit and top-up

Fit the reservoir(s) by reversing the procedure given for removal noting the following points.

1. When the reservoir(s) have been fitted ensure that all pipes are connected and torque tightened (see Chapter P).

2. Fill the reservoirs with clean hydraulic system mineral oil (see Chapter D) until the levels in the reservoirs are slightly above the topping-up mark on the level indication plate.

3. Run the engine for approximately four minutes, then top-up the reservoir to the correct levels. Never allow the mineral oil levels to fall below the minimum level.

4. Check for leaks especially around all unions and pipes which have been disturbed.

5. The hydraulic system(s) must then be bled completely as described in Section G4m.

Reed switch - To remove

In the event of a low mineral oil level reed switch being faulty renewal can be carried out as follows.

Drainage of the reservoir is not necessary.

1. Remove the multi-lingual information plate from the top of the reservoirs.

2. Disconnect the battery.

3. Disconnect the Lucar connection from the top of the relevant reservoir.

4. Disconnect the pipe connections from the manifold block on top of the reservoir.

5. Remove the screws retaining the reservoir lid; carefully lift the lid and allow the mineral oil to drain from its underside before removing the lid completely.

6. Remove the screws retaining the reed switch to the underside of the reservoir lid and remove the reed switch Ensure that no foreign matter adheres to the float magnet.

Reed switch - To fit

To fit a reed switch, reverse the procedure for removal noting the following points.

1. All parts should be thoroughly cleaned with methylated spirits prior to assembly.

2. All screws and pipe connections should be torque tightened in accordance with the figures quoted in Chapter P.

Section G6m

Hydraulic pumps

Introduction

The hydraulic pumps used on cars with a mineral oil hydraulic system, can be distinguished from those used on conventional brake fluid systems, by the green plastic disc fitted beneath the top adapter of the pump and the smaller pressure outlet adapter.

Internally the pump has a larger diameter plunger than pumps using RR 363 brake fluid and seals to meet mineral oil requirements.

The brake pump push rod has a collapsible section of increased diameter; the top edge of the push rod being chamfered for identification (see Fig. G10m).

Never fit a brake pump or push rod from a conventional (RR 363) brake fluid system as a replacement.

When overhauling a mineral oil brake pump always ensure that sealing rings bearing mineral oil identification marks are fitted (see Section G2m).

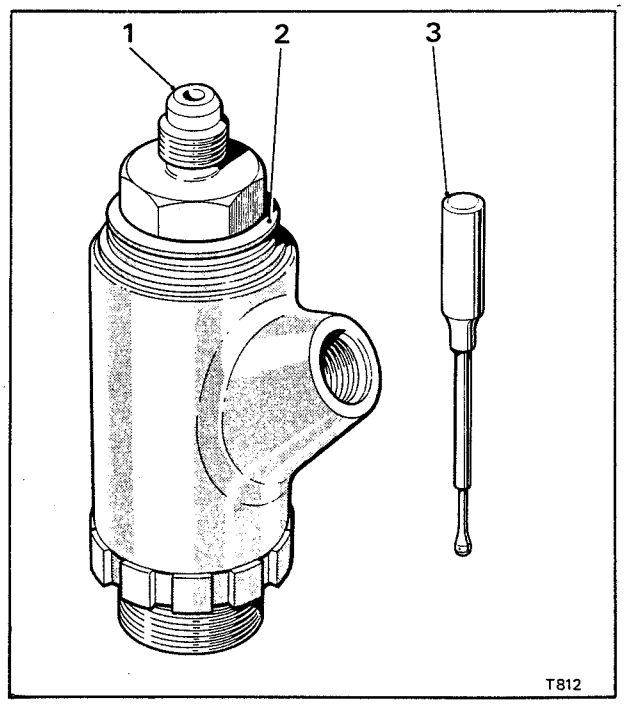

Fig. G10m Mineral oil hydraulic pump identification features
1 Smaller pipe connection
2 Green disc
3 Chamfered end face

Hydraulic pump housing sealing rings - To renew

If hydraulic system mineral oil leakage occurs from a brake pump housing it is possible to renew the two sealing rings with the pump(s) in position using the following procedure.

1. Depressurise the hydraulic systems as described in Section G2m.
2. On cars fitted with a Solex carburetter remove the air cleaner.
3. Ensure that the pump(s) and the surrounding area is thoroughly clean.
4. Compress the rubber hose section of the hydraulic pump low pressure inlet pipe to prevent mineral oil flow. Remove the hose from the pump inlet stub pipe. Suitably blank the hose end or allow the hydraulic system mineral oil to drain into a clean container.

Note

To enable work to be carried out on the rear hydraulic pump the ignition distributor should be removed as described in Chapter M.

To gain access to the front hydraulic pump; on cars fitted with a Solex carburetter, the fuel pipes should be removed from above the hydraulic pump.

On cars fitted with an exhaust emission control system, the three way connector and check valve must be removed.

5. Disconnect the high pressure outlet and low pressure inlet pipes from the hydraulic pump.
6. Remove the circlip from the top of the pump and draw the outer housing upwards and off the pump.
7. Discard the two sealing rings; fit new sealing rings lubricated with clean hydraulic system mineral oil of the approved type.
8. Fit the pump outer housing, aligning the port with the inlet pipe. Press the housing firmly into position then fit the circlip.
9. Prime the pump with approved hydraulic system mineral oil. Connect the low pressure feed and high pressure outlet pipes to the pump, also connect the low pressure hose from the reservoir.
10. Top-up the reservoir(s) with approved hydraulic system mineral oil (see Chapter D) and bleed the hydraulic systems as described in Section G4m.

Hydraulic pumps - To remove

1. Carry out Operations 1 to 6 inclusive of Hydraulic pump housing sealing rings - To renew.
2. Using special box spanner (RH 8428) unscrew and remove the pump from its pedestal on the tappet chest cover; blank off the pedestal against the ingress of dirt.

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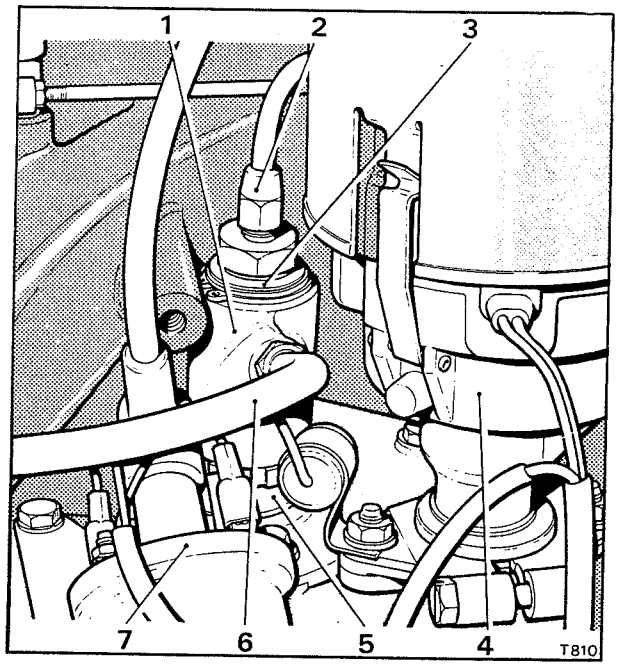

Fig. G11m Rear hydraulic pump (No.2 system)

1 Pump outer housing
2 High pressure outlet pipe
3 Green identification disc
4 Ignition distributor
5 Pump mounting pedestal
6 Low pressure inlet pipe
7 Ignition coil

Note
The pump cannot be removed using the top adapter as a spannering point.

Hydraulic pump - To dismantle
When two pumps are being dismantled the components from each pump must not be interchanged.
1. Remove the adapter from the top of the pump and withdraw the non-return valve assembly from the bore.
Gentle use of a small screwdriver may be necessary to assist removal of the chamfered washer. If the washer has spread it should be discarded and a new one fitted on assembly.
2. Remove the inlet valve ring, spacer ring and conical valve spring.
3. From the lower end of the pump remove the circlip and withdraw the plunger and spring coller; collect the spring.
4. Carefully withdraw the plunger barrel from the pump body.

Note
The barrel and plunger are a matched ground component and pieces are not interchangeable with pieces from other assembles.
5. Remove and discard the three 'O' rings from the pump body.
6. To dismantle the non-return valve assembly, remove the circlip, push out the valve from the outer body and collect the spring, end stop and valve.

Hydraulic pump components - To clean and inspect
Important
Ensure that all components are absolutely clean.
Tapped holes require special attention to ensure that they are free from foreign matter and slivers of thread which might break off during assembly and become entrapped in the hydraulic system. One method of achieving this is to screw slave adapters or setscrews down the threads before thoroughly cleaning the components in methylated spirits and drying with dry compressed air, not cloth.
It is important that the seating of the valves is correct and that the finely machined barrel and plunger are not scored or damaged.
Under normal circumstances after a thorough cleaning and the introduction of a new set of sealing rings, the only parts that might need renewal are the small coil springs.

Hydraulic pump - To assemble (refer to Fig. G12m)
Lubricate the components and sealing rings with approved hydraulic system mineral oil (see Chapter D) prior to fitting into their respective positions. Ensure all sealing rings being used are for use with hydraulic system mineral oil.
1. Lubricate all parts including sealing rings with approved hydraulic system mineral oil (see Chapter D) prior to fitting in their respective positions.
2. Fit the small 'O' ring into position in the centre bore of the pump body.
3. Insert the plunger barrel into the pump body, pressing it through the sealing ring until it abuts the shoulder.
4. Insert and locate the spacer; fit the valve spring (crowned face towards inlet valve) and the inlet valve into position adjacent to the barrel head. Ensure that the seating face of the valve is free from damage marks otherwise the efficiency of the pump will be reduced.
5. Assemble the non-return valve, reversing the procedure given for dismantling. Ensure that the valve is fully seated and the circlip correctly located in its groove. The end stop should be drawn upward to abut the circlip.
6. Fit the non-return valve assembly, larger diameter leading, into the pump body bore to abut the inlet valve ring.
7. Fit the chamfered sealing ring, small bore diameter leading into the pump body bore to abut the shoulder to the non-return valve.
8. Fit the adapter to the top of the pump body; torque tighten to the figure quoted in Chapter P. Blank off the union.
9. Fit the coil spring into the lower end of the pump body.
10. Fit the spring collar to the barrel plunger and carefully insert the plunger into the bore of the barrel.
11. Depress the plunger against the spring sufficiently to enable the circlip to be fitted in its location.

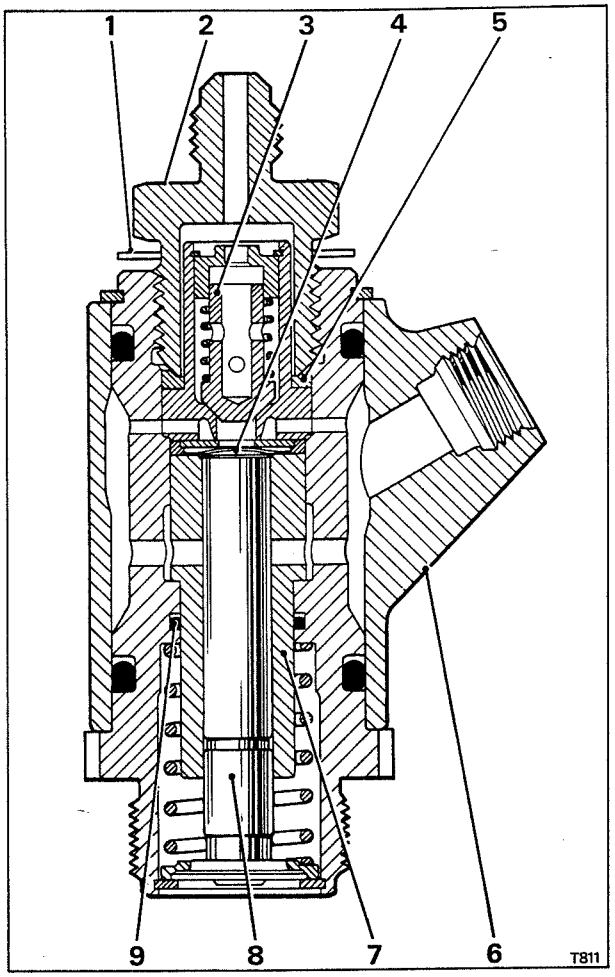

Fig. G12m Hydraulic pump

1 Identification disc
2 Adapter - high pressure inlet
3 Non-return valve
4 Inlet valve
5 Chamfered ring
6 Outer housing
7 Pump barrel
8 Plunger
9 Sealing ring

1. The hydraulic pump and pipe connections should be torque tightened in accordance with the figures **12.** Fit the two 'O' rings to the outside of the pump body. The pump is now ready for fitting to the engine.

Hydraulic pump - To fit and set

Prior to fitting the pump to the engine tappet cover flange, ensure that the shim washer fitted between the pump mounting flange and tappet cover is of the correct thickness and that the push rod is the correct type (see Fig. G10m). For the correct setting procedure of the pump reference should be made to Chapter E.

To fit the hydraulic pump, reverse the procedure for removal noting the following points.

quoted in Chapter P. The pump should only be tightened using special box spanner (RH 8428); the top adapter should never be used as a spannering point.

2. Bleed the hydraulic systems as described in Section G4m. Check all disturbed pipe connections for leaks.

Hydraulic pumps - To test (on the car)

1. Depressurise the system as described in Section G2m.

2. Disconnect the accumulator to reservoir return pipe at the manifold on top of the respective reservoir. Attach a bleed tube onto the end of the pipe, place and secure the other end of the tube in a clean measuring vessel.

3. Open the bleed screw on the accumulator which is supplied by the brake pump being checked.

4. Ensure that the appropriate reservoir is full and start the engine.

5. Hydraulic system mineral oil should flow from the bleed tube in a series of spurts, coinciding with each revolution of the camshaft. The rate of flow should be approximately 300 ml. per minute at an engine speed of 1 000 r.p.m.

6. If hydraulic system mineral oil does not flow or the pumped quantity is below requirements, the pump should be removed and overhauled.

Section G7m

Hydraulic accumulators.

Introduction

The hydraulic accumulators are mounted at the front of the crankcase on 'A' bank side of the engine.

The front accumulator which is vertically mounted supplies the No.1 Hydraulic system, the horizontally mounted rear accumulator supplies the No.2 Hydraulic system.

Both accumulators have an internal bleed screw incorporated in the valve housing. Bleeding or depressurising of an accumulator is achieved by slackening the bleed screw (see Fig. G13m) approximately one revolution. This allows the hydraulic system mineral oil to return internally through the valve housing to its respective reservoir.

In the event of accumulator failure only the accumulator valve assembly, the sphere or a complete accumulator are available for replacements. All spheres will be charged to a pressure of between 60 bars and 64 bars (870 lb/sq. in. and 928 lb/sq. in.) prior to despatch from the manufacturer, the charge pressure in bars being stamped on the screw head at the top of the sphere. Whenever a sphere is found to be below working pressure a replacement sphere must be fitted; **no attempt should be made to recharge the sphere.**

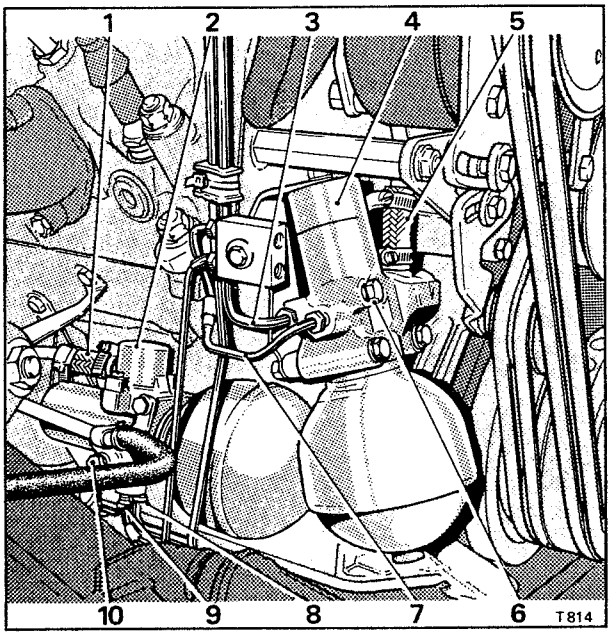

Fig. G13m Hydraulic accumulators

1 Low pressure return to reservoir
2 Accumulator (No.2 system)
3 High pressure inlet from pump
4 Accumulator (No.1 system)
5 Low pressure return to reservoir
6 Bleed screw
7 High pressure outlet to upper distribution valve and right-hand suspension strut
8 High pressure inlet from pump
9 High pressure outlet to lower distribution valve and left-hand suspension strut
10 Bleed screw

Hydraulic accumulator - To remove

It should be noted that the high pressure pipe connections on the accumulators are of the rubber sleeve type (see Section G3m). All pipes and ports should have blanks fitted when disconnected.

1. Depressurise the hydraulic system as described in Section G2m.
2. Disconnect the high pressure outlet pipe (orange or red) from the accumulator and connector block; remove the pipe.
3. Disconnect the high pressure inlet pipe from the accumulator.

Note

When removing a front accumulator it will be necessary to detach the outlet pipe connector block from its mounting bracket to allow the inlet pipe to be withdrawn from the accumulator port.

4. Fit a hose clamp to the intermediate hose of the accumulator return pipe to prevent the flow of hydraulic system mineral oil from the reservoir.
5. Unscrew the worm drive clip on the small accumulator return pipe connection and withdraw the pipe and hose from the accumulator.
6. Remove the setscrew from the mounting bracket at the end of the accumulator.
7. Support the accumulator, then remove the two remaining securing bolts; collect the distance pieces. Lower the accumulator from the engine.

Hydraulic accumulator - To fit

Fit the accumulator to the engine by reversing the procedure given for removal noting the following points.

1. When fitting the high pressure pipe connections new rubber sleeves must be fitted to the pipe ends. For fitting instructions reference should be made to Section G3m.
2. All setscrews and pipe connections must be torque tightened in accordance with the figures quoted in Chapter P.
3. After fitting, top-up the reservoir(s) with

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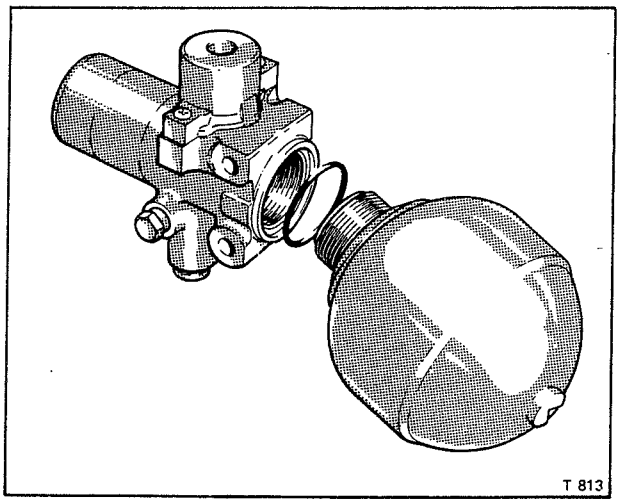

Fig. G14m Hydraulic accumulator with sphere removed

recommended hydraulic system mineral oil (see Chapter D). With the engine running leak check all joints and unions which have been disturbed.
4. Test the accumulator as described in Hydraulic accumulator - To test.
5. Bleed the hydraulic system(s) as described in Section G4m.

Hydraulic accumulator sphere - To renew (see Fig. G14m)
1. Remove the accumulator as described under Hydraulic accumulator - To remove.
2. Carefully hold the valve body of the accumulator in a vice, then using a suitable strap spanner located around the circumference of the sphere, unscrew and remove the sphere from the valve housing. Discard the sealing ring.
3. Locate a new sealing ring lubricated with clean hydraulic system mineral oil into the valve body.
4. Fit the new sphere to the valve body and torque tighten to the figure quoted in Chapter P.
5. Fit the accumulator as described under Hydraulic accumulator - To fit.

Hydraulic accumulator - To test
1. Depressurise the hydraulic system as described in Section G2m.
2. Replace the pressure switch of the relevent system with a length of high pressure pipe fitted with a bleed screw connection and a 210 kg/sq. cm. (3 000 lb/sq. in.) pressure gauge (RH 9546).
3. Start the engine. The gauge needle should immediately rise to 63 kg/sq. cm. (900 lb/sq. in.) indicating the nitrogen gas pressure in the accumulator sphere. The pressure should then slowly rise to a pressure of between 167 kg/sq. cm. and 177 kg/sq. cm. (2 393 lb/sq. in. and 2 538 lb/sq. in.). At this pressure the accumulator cut-out valve should actuate and the pump cease to charge the accumulator.
4. After the cut-out pressure has been reached note the pressure to which the gauge settles. This settling takes up to one minute and the pressure should not be more than 10,5 kg/sq. cm. (150 lb/sq. in.) below the cut-off pressure. The pressure should then remain steady unless the brake pedal is applied or the height control system actuated.
5. Fit a bleed tube onto the bleed screw of the gauge connecting pipe. Open the bleed screw and allow the pressure gauge reading to fall. When the pressure has fallen to between 142 kg/sq. cm. and 152 kg/sq. cm. (2 031 lb/sq. in. and 2 176 lb/sq. in.) the accumulator control valve should allow the hydraulic pump to recharge the accumulator.
6. If, on first starting the engine, the pressure gauge needle fluctuates violently, rapidly climbs to 175,5 kg/sq. cm. (2 500 lb/sq. in.) and then immediatly falls to zero on application of the brake pedal, a complete loss of nitrogen gas pressure from the accumulator sphere is indicated.
7. In the event of the nitrogen gas pressure of the accumulator being less than 42 kg/sq. cm. (600 lb/sq. in.) (refer to Operations 3 and 6) the accumulator sphere must be renewed.
8. If the cut-in and cut-out pressures of the accumulator are outside the limits quoted in Operations 3 and 5 the accumulator valve assembly must be renewed.
9. If the pressure continues to fall after the accumulator has reached the cut-out pressure of between 167 kg/sq. cm. and 177 kg/sq. cm. (2 393 lb/sq. in. and 2 538 lb/sq. in.) and then settled an internal leak is indicated.
10. If observation of the gauge shows that the pump is still pumping (needle fluctuating with the pump pulses) without giving a rise in pressure then there is a leak equal to the pump flow at that pressure. Pump 'cut-out' indicated by the change of audible note of the pump can be heard if the end of the engine dipstick is placed on top of the pump and used as a hearing aid.

To verify an accumulator internal leak, depressurise the system and remove the outlet pipe from the pressure switch threeway connection. Blank off the port using a blank capable of withstanding full hydraulic system pressure. Repeat the test. If the symptoms persist, the accumulator valve assembly has an internal leak and the valve assembly should be renewed. If however the gauge now behaves correctly and the pump can be heard to cut-out the leakage is occuring downstream and a component isolating procedure should be undertaken.

The component isolating procedure necessary to locate the fault consists of depressurising the systems then removing or blanking off the pressure feed to the various components in turn and repeating the test procedure.

The pressure feeds to the components can be readily identified from the colour coding chart (see Section G3m).

Note
Always ensure that the mineral oil in the reservoirs

is above the minimum level at all times during the test procedure.
When a unit has been blanked off, before removing the blank, the systems must be depressurised either by continuous system operation with the engine switched off or by bleeding the appropriate accumulator until it is depressurised.

After tests have been carried out involving blanking off components all blanks should be removed and components reconnected. The systems should then be bled in accordance with the information given in Section G4m.

Section G8m

Deceleration conscious pressure limiting valve

Introduction

The deceleration conscious pressure limiting valve is non-adjustable and should not require servicing.

If a valve is found to be faulty usually indicated by premature rear brake locking, the complete valve should be renewed.

Replacement seal kits are not available for this valve.

Under no circumstances should a complete valve assembly or seals for use with conventional brake fluid (i.e. RR 363) systems be fitted, as a replacement.

To enable the valve to be identified as a hydraulic system mineral oil component the body of the valve is coloured green and a green identification tab is fitted to the valve bleed screw.

Deceleration conscious pressure limiting valve - To remove

1. Place the car on a ramp and remove the undershield protecting the brake actuation linkage.
2. Depressurise the hydraulic systems as described in Section G2m.
3. Disconnect the two pipes from the pressure limiting valve; blank off the pipe ends and valve ports.
4. Remove the split pins and nuts from the two valve mounting bolts; withdraw the bolts and remove the valve and distance pieces.

On left-hand drive cars the angular end plate must be removed to enable the valve and distance pieces to be removed from the mounting bolts.

Deceleration conscious pressure limiting valve - To fit

To fit the pressure limiting valve reverse the procedure given for removal noting the following.

1. All nuts must be torque tightened in accordance with the figures quoted in Chapter P prior to the split pins being fitted.
2. On completion the hydraulic system must be bled as described in Section G4m.

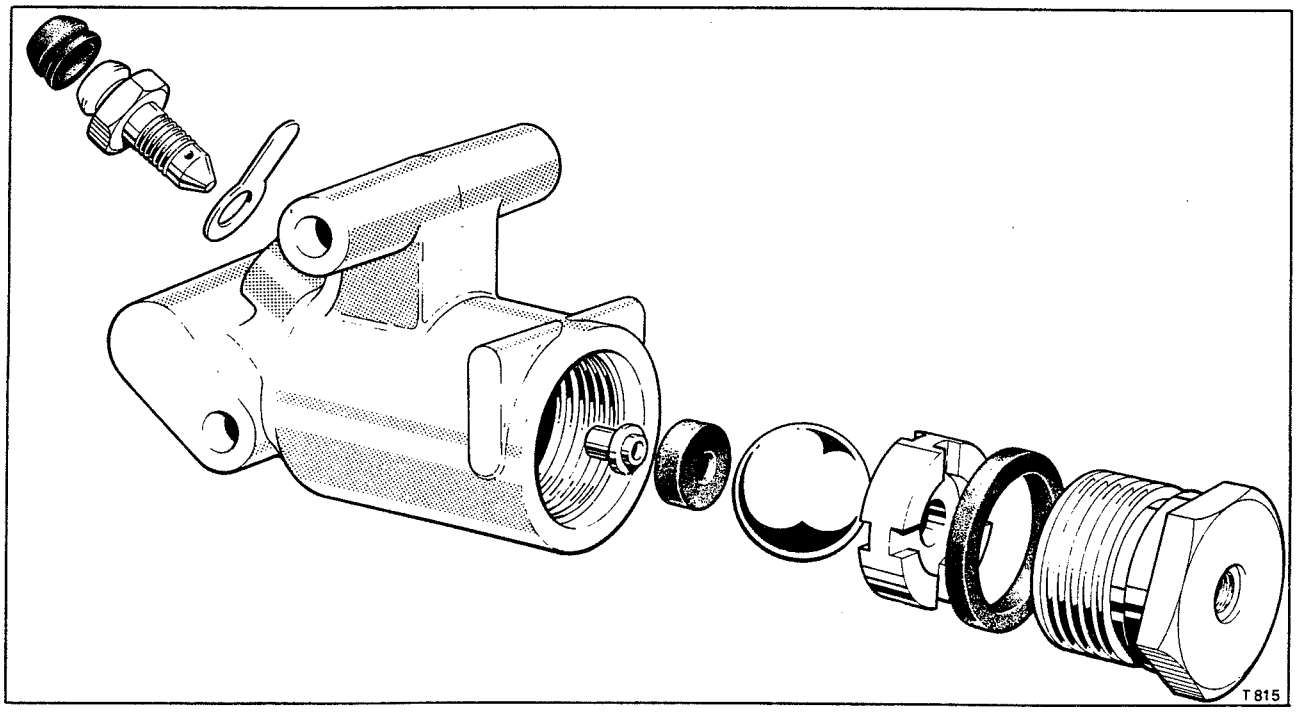

Fig. G15m Deceleration conscious pressure limiting valve

Section G10m

Brake actuation linkage assembly

Introduction

The brake actuation linkage assembly is mounted just rearward of the toe-board. On right-hand drive cars the assembly is positioned just inboard of the body sill. On left-hand drive cars the assembly is fitted adjacent to the inner side of the body longeron.

The assembly houses the distribution valves, deceleration conscious pressure limiting valve and the stop lamp switch; the assembly being the same for both right and left-hand drive cars.

Always ensure that replacement distribution valves and pressure conscious deceleration valve fitted to this assembly are for use with hydraulic system mineral oil and bear the relevant identification markings (see Sections G8m and G9m).

Under no circumstances must valves for use with conventional brake fluid systems (i.e. RR 363) be used for replacements.

Brake actuation linkage assembly - To - remove

1. Place the car on a ramp; depressurise the hydraulic systems as described in Section G2m
2. Disconnect the battery.
3. Remove the undershield from around the linkage assembly.
4. Disconnect the Lucar connections, then remove the brake stop lamp switch and mounting bracket.

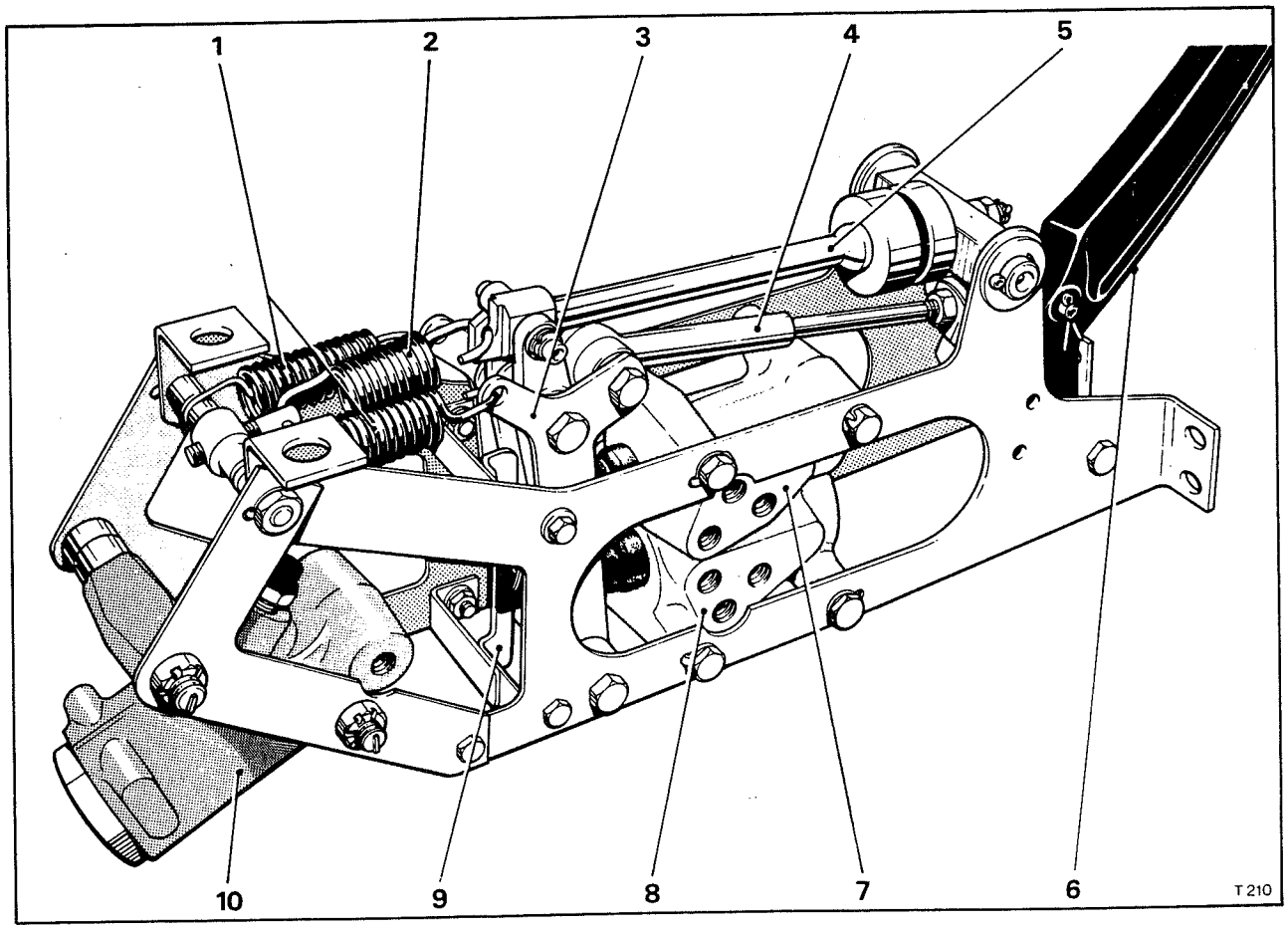

Fig. G17m Brake actuation linkage assembly

1 Return springs
2 Pedal 'feel' spring
3 Balance lever assembly
4 Brake actuation rod
5 Pedal 'feel' rod
6 Brake pedal lever
7 Upper distribution valve (No.1 system)
8 Lower distribution valve (No.2 system)
9 'Off' stop bracket
10 Deceleration conscious pressure limiting valve

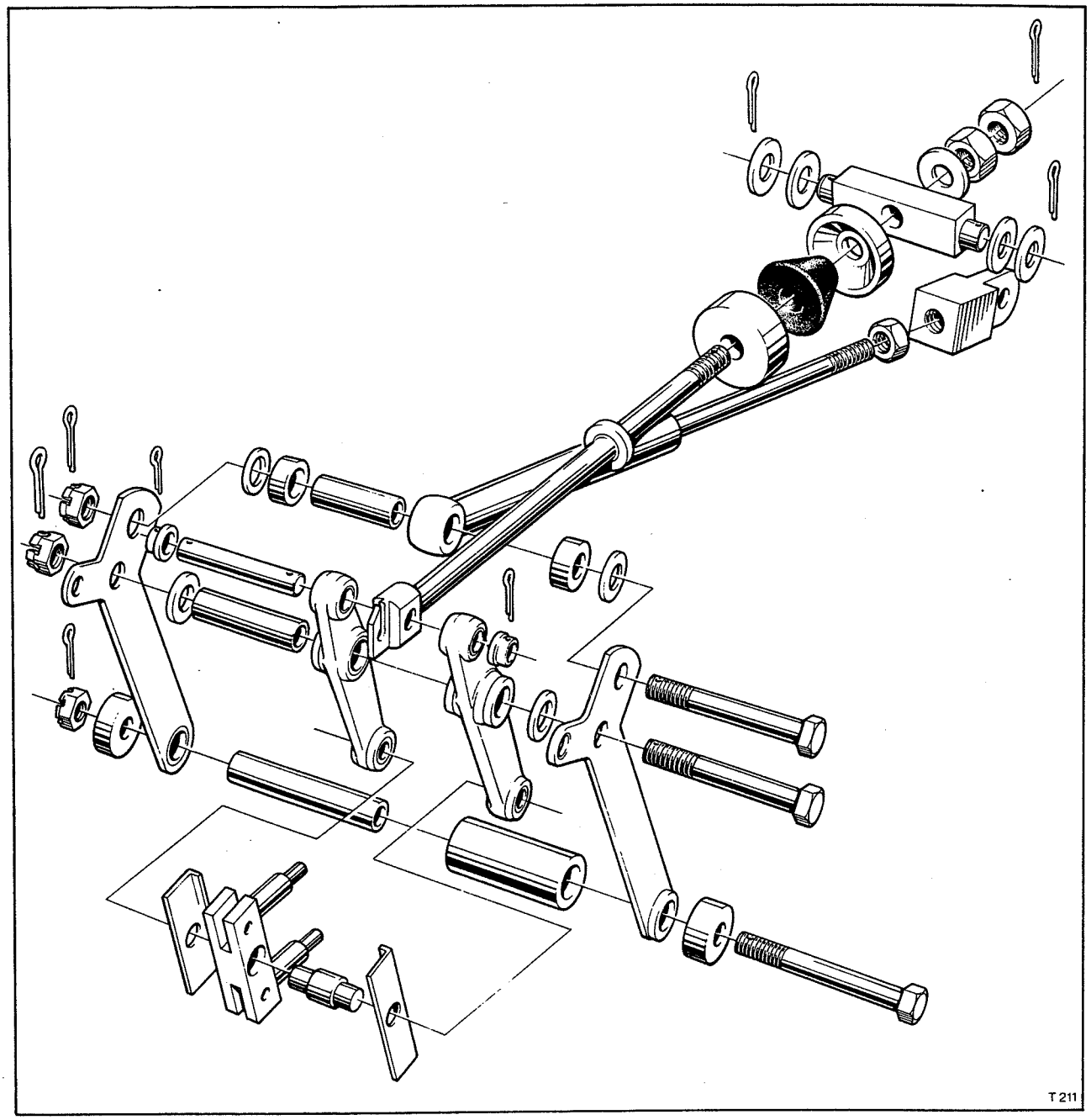

Fig. G18m Brake actuation linkage balance lever assembly

5. Remove the brake pedal pinch bolt from the upper end of the brake pedal lever and ease the pedal stem out of the lever. Collect the rubber seal.
6. Disconnect the pipes from the distribution valves and deceleration conscious pressure limiting valve. Blank off all exposed pipe ends and valve ports.
7. On right-hand drive cars disconnect the petrol pipe clip from the linkage side mounting bracket.
8. Remove the setscrews (right-hand drive cars) or bolts and nuts (left-hand drive cars) securing the linkage assembly side plates at the forward end. Support the linkage assembly and remove the two rear securing setscrews. Lower the assembly from the car.

On left-hand drive cars, the brake pedal lever must be withdrawn from the rubber sealing boot when lowering the actuation linkage from the car.

Important

Under no circumstances should the brake actuation assembly be allowed to hang from the brake pedal, supported by the actuation rod, as this may result in the rod being bent.

Brake actuation linkage - To dismantle

Prior to dismantling the linkage note should be taken of the relative positions of the distance pieces and bolt directions (see Figs. G17m and G18m).

1. Remove the brake actuation linkage from the car as described previously.
2. Remove the split pin and clevis pin from the operating rod pivot on the brake pedal lever.
3. Remove the three springs from the rear of the linkage.
4. Remove the split pin and nuts from the end of the pedal 'feel' rod.
5. Remove the 'off' stop bracket from behind the balance levers.
6. Remove the pivot bolt from the lower end of the balance levers. Ease the levers rearward and carefully withdraw the balance lever push rods from the distribution valves. Remove the distance pieces and pivot tube from the lower end of the balance levers.
7. Lift the levers clear of the side plates and withdraw the 'feel' rod from its retaining bar. Collect the conical rubber and abutment cups.
8. Remove the split pin from one side of the 'feel' rod pivot pin, withdraw the pin and collect the collar.
9. Remove the two bolts retaining the pivot arms to the balance levers. Noting their positions collect the washers, distance pieces and pivot tubes.
10. Remove the balance levers from each side of the distribution valve push rod equalising block, collect the pin retaining plates.

Note
The levers and pivot pins are clearance fits and are easily removed.

Brake linkage assembly bushes and pivot pins - To renew

1. Remove and dismantle the brake linkage as described previously.
2. Carefully press the bushes requiring renewal out of their locations and fit new bushes. The bush bores are machined to final size, therefore no reaming or boring is necessary.
3. Any pivot pins that are worn or damaged must be renewed.

Brake actuation linkage - To assemble

Assemble the linkage by reversing the dismantling procedure noting the following points.
1. Clean all components prior to assembly. Lightly lubricate the linkage pivots, the protruding parts of the distribution valve stems and the push rod location bores with Molytone 'C' grease.
2. All bolts and nuts must be torque tightened to the figures quoted in Chapter P before split pins are fitted and tab washers secured.
3. The linkage should operate freely when located between the assembly side mounting plates. All levers must be absolutely free to move with negligible friction on their pivots. Distance tubes must be similarly free in the Oilite bushes.

Note
All bolts should be fitted in the directions shown in Figure G17m in order that certain individual items may be removed without removing the complete assembly from the car.

Brake actuation linkage - To adjust

Adjustment of the actuation linkage should be carried out in the following sequence.
(a) Distribution valve push rod clearance.
(b) Rubber 'feel' cone setting.
(c) Main 'feel' spring setting.
(d) Brake pedal height setting.

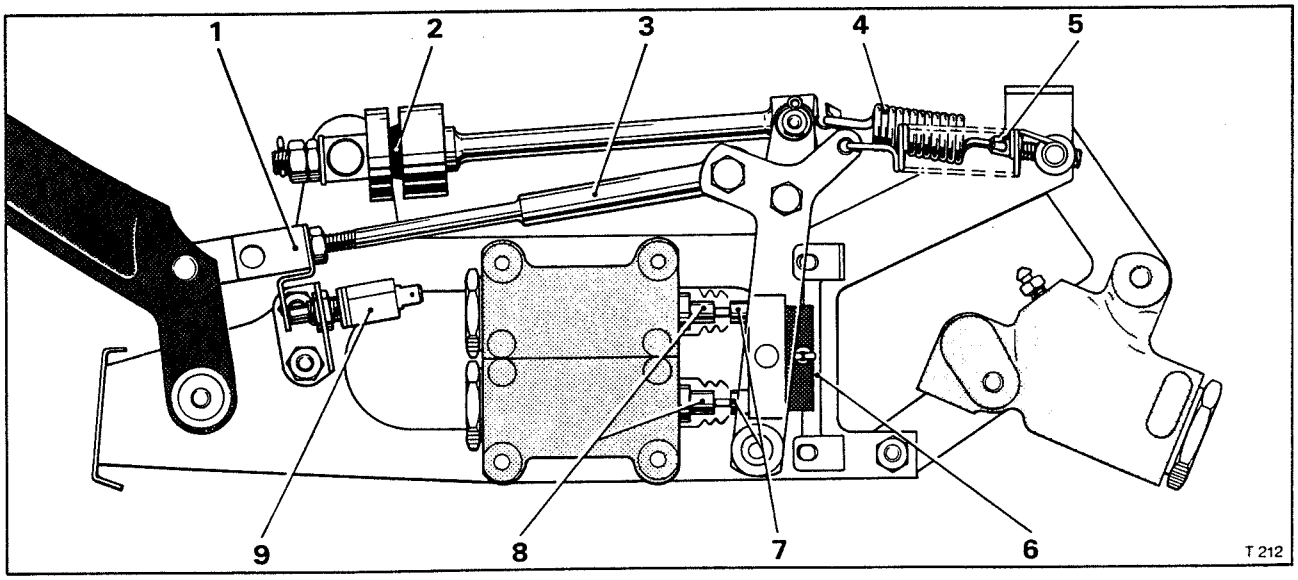

Fig. G19m Brake actuation linkage adjustment points

1 Brake pedal lever adjustment block
2 Rubber 'feel' cone
3 Brake actuation operating rod
4 Main 'feel' spring
5 Feel spring adjustment screw
6 Off stop bracket
7 Balance lever push rods
8 Distribution valve stems
9 Brake stop lamp switch

Note
Adjustments 'a', 'b' and 'c' can be carried out with the actuation linkage assembly removed from the car.

Distribution valve push rods - To set (see Fig. G19m)
1. Slacken and unscrew the brake 'feel' rod adjusting nuts until clearance is obtained between the feel rod mounting block and the rubber cone seat.
2. Remove the 'feel' and return springs.
3. Slacken the four bolts securing the 'off' stop bracket to the actuatuion linkage side plate.
4. Slide the 'off' stop bracket forward on the elongated holes until a clearance of up to 0,254 mm. (0.010in.) is obtained between the balance lever push rods and the distribution valve stems; with no preload being applied to the valve stems. Ensure that the setting is equal on each valve, then tighten the bracket securing bolts.

Note
It will be necessary to draw back the two rubber dust covers on the distribution valves in order to check the push rod to distribution valve stem clearance.

Rubber 'feel' cone - To set (see Fig. G19m)
1. Fit the two return springs to the linkage assembly. At this point the two abutment cups and the rubber 'feel' cone should be loose and free to slide on the shaft.
2. Tighten the adjusting nut until the clearance between the abutment cups and the rubber cone has been removed, without a preload being applied to the rubber cone.
3. Securely tighten the lock-nut onto the adjusting nut, then depress and release the brake pedal several times to ensure that the cone is seated correctly. Recheck the cone setting. Ensure that a security split pin is fitted to the end of the shaft.

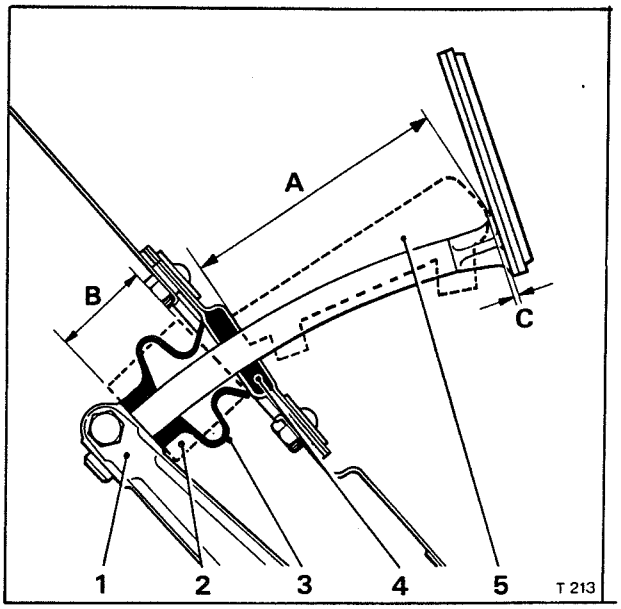

Fig. G20m Brake pedal height settings
1 Brake lever
2 Brake lever setting gauge
3 Rubber seal
4 Toe-board seal and housing
5 Pedal height checking template
A 99,06 mm. to 98,30 mm. (3.90 in. to 3.870 m.)
B 38,10 mm. to 37,97 mm. (1.50 in. to 1.495 in.)
C 0,38 mm. to 5,08 mm. (0.015 in. to 0.20 in.)

Main 'feel' spring - To set (see Fig. G19m)
1. Ensure that the actuation assembly remains in the 'off' position.
2. Fit one end of the 'feel' spring into the adjusting screw fitted in the centre of the spring anchor rod.
3. Rotate the spring and screw half a turn at a time in the direction required until the spring can be fitted into the 'feel' rod hook, with no clearance between the spring and hook, ensure that there is no spring preload.

Note
It is necessary to stretch the spring over the hook to obtain the correct position where clearance is determined.

4. Remove the spring from the hook and rotate the spring and screw 1½ turns clockwise, when viewed from the brake pedal end of the assembly (i.e. effectively tensioning the spring). Fit the spring onto the hook.

Note
It is essential to follow both of the previous setting instructions accurately as deviations will completely alter the subjective feel and acceptability of brake control.

Clearance between the rubber 'feel' cone and its abutments will cause a spongy, long travel pedal feel at low decelerations; any preload on this rubber will cause jerky initial braking under these conditions.

Inadequate preload on the rear tension spring will produce unwanted free travel at the pedal followed by jerky initial braking; too much preload on this spring will give jerky initial braking followed by a period of 'spongy' pedal travel.

Brake pedal height setting (see Figs. G20m and G21m)
This setting can only be carried out with the actuation linkage assembly fitted to the car.
1. Locate the setting gauge into the brake pedal stem hole in the end of the pedal lever (see Fig. G20m). Raise the pedal lever until the gauge touches the underside of the toe-board seal housing.
2. Adjust the block on the lever operating rod until the hole in the block aligns with the hole in the pedal lever.

Note
Shortening the rod length reduces the gap between the pedal lever and seal plate, half a revolution of

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the block being equal to approximately 3,17mm. (0.125 in.) of pedal lever movement.

3. Remove the setting gauge from the brake lever. Connect the rod to the lever by inserting the clevis pin. Fit the split pin.

4. Fit the rubber seal between the brake pedal lever and toe-board seal plate.

On left-hand drive cars slide the convoluted rubber seal over and down the brake pedal lever; fit the two retaining screws and washers. Ensure that the seal does not prevent the lever and linkage returning to the fully 'off' position.

5. Insert the brake pedal through the toe-board felt and rubber seals into the hole in the brake pedal lever.

6. Fit and tighten the pinch bolt to secure the brake pedal lever.

7. Check that the rubber seal does not prevent the actuation linkage returning to the 'off' position and that the brake pedal does not foul the seal housing at any point along its travel.

8. Fit the brake stop lamp switch and adjust the setting as described under Brake stop lamp switch - To adjust.

Brake pedal height - To check

1. Place the checking template as shown in Figure G20m between the underside of the brake pedal and the upper surface of the pedal seal housing with the two lugs of the gauge located under the pedal stem. Rest the flat base of the template on the seal housing. Ensure that both carpet and underlay are removed from the housing surface.

2. If the clearance between the top of the template and the underside of the pedal is less than 0,38 mm. (0.015 in.) or more than 5,08 mm. (0.20 in.) adjust the length of the pedal lever rod as described in Brake pedal height setting.

Brake pedal lever - To remove

1. Place the car on a ramp and remove the undershield from around the brake actuation linkage.

2. Disconnect the battery.

3. Disconnect the Lucar connections and remove the stop lamp switch.

4. Remove the brake pedal stem pinch bolt from the top of the pedal lever and withdraw the stem out of the lever. Collect the rubber seal from the pedal stem.

5. Remove the split pin and clevis pin from the operating rod pivot on the pedal lever.

6. Remove the bolt and nut from the pedal lever pivot. Remove the lever and collect the pivot tube. On left-hand cars it is necessary to withdraw the lever from the convoluted rubber seal during final removal.

Brake pedal lever - To fit

To fit the brake pedal lever reverse the procedure given for removal noting the following points.

1. All nuts must be torque tightened to the figures quoted in Chapter P..

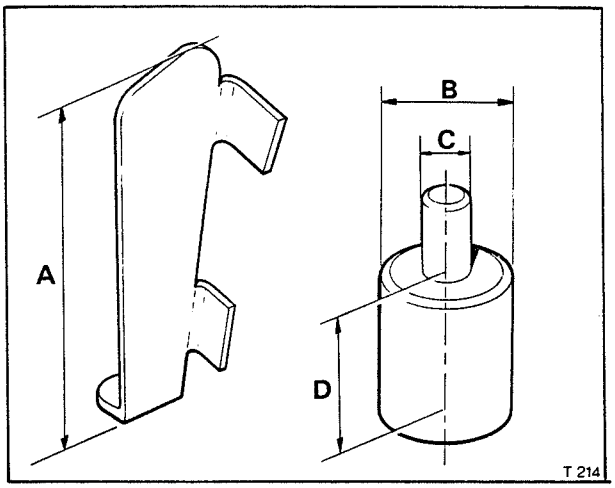

Fig. G21m Brake pedal setting gauge and checking template

A 99,06 mm. to 98,30 mm. (3.90 in. to 3.870 in.)
B 34,92 mm. to 34,29 mm. (1.375 in. to 1.350 in.)
C 12,50 mm. to 12,44 mm. (0.492 in. to 0.490 in.)
D 38,10 mm. to 37,97 mm. (1.50 in. to 1.495 in.)

2. The pedal lever and the stop lamp switch must be checked for correct operation and adjusted if necessary as described under the appropriate headings in this section.

Brake stop lamp switch - To adjust

With all other adjustments to the brake actuation linkage and brake pedal completed, set the brake stop lamp switch as follows.

1. Slacken the nuts retaining the stop lamp switch to the switch mounting bracket.

2. Switch on the ignition.

3. Adjust the switch position until the stop lamps are illuminated during the initial movement of the footbrake pedal; between 3,2 mm. and 9,5 mm. (0.125 in. and 0.375 in.) of brake travel.

4. Tighten the retaining nuts and again check the stop lamps for operation.

5. Switch off the ignition.

Section G11m

Priority valves

Introduction

The priority valves are mounted on the underside of the body, between the rear seat heel board and the rear suspension crossmember.

A priority valve is incorporated into the supply line to each height control valve. The function of this valve is to prevent the flow of hydraulic system mineral oil to the height control valves until a pressure of between 71 kg/sq.cm.and 92 kg/sq.cm. (1 015 lb/sq.in. and 1 305 lb/sq.in.) is attained in the accumulators. This flow prevention ensures there is sufficient pressure in the hydraulic systems to operate the height control mechanism without jeopardising the braking efficiency of the car.

If the pressure in the hydraulic system(s) falls unduly while the engine is running, the priority valve(s) will close and isolate the suspension height control mechanism. The reduced hydraulic pressure is then totally utilised for braking purposes.

The priority valves are non-serviceable units therefore, in the event of valve malfunction the complete valve assembly must be renewed.

Priority Valve - To remove (see Fig. G22m)

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

2. Disconnect the seepage return hose from the three way connector.

3. Disconnect the two high pressure pipes from the valve and discard the rubber end seal from each pipe.

4. Unscrew the valve retaining setscrew and remove the valve.

5. Remove the sepage pipe from the valve.

Priority valve - To fit

1. Push the sepage pipe onto the stub pipe at the top of the valve. Fit a new retaining clip and secure it in position using crimping pliers.

2. Fit new rubber end seals to the two high pressure pipes and connect the pipes to the valve ports.

Note

Reference should be made to Section G3m before fitting this type of pipe connection.

3. Fit and torque tighten the valve retaining set-screw to the figures quoted in Chapter P.

Priority valve - To test

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

2. Remove the pressure switch from the hydraulic system, relevant to the priority valve being tested. Connect a zero kg/sq.cm. to 210 kg/sq.cm. (zero

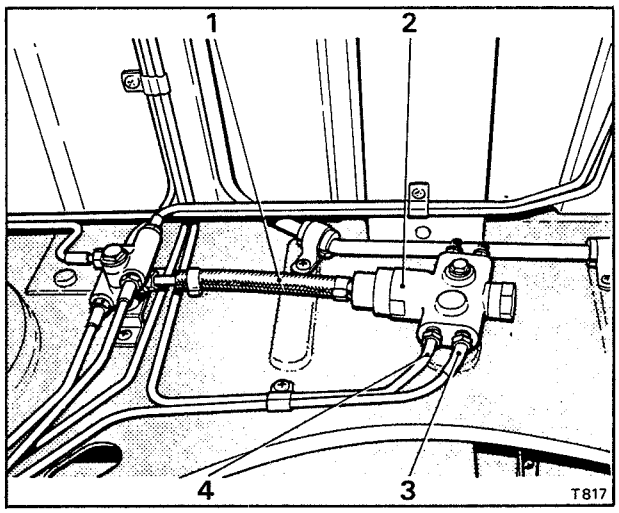

Fig. G22m Priority valve (Right-hand shown)

1 Valve seepage return pipe
2 Priority valve (No.1 system)
3 Inlet pipe from accumulator
4 Outlet pipe to height control valve

lb/sq.in. to 3 000 lb/sq.in.) pressure gauge into the pressure switch adapter.

3. Add weight to the luggage compartment of the car equal to 140 kg (300 lb).

4. Start and run the engine at approximately 1000 rpm.

5. Note the pressure registered on the pressure gauge at the point where the car commences to level. This pressure should not exceed 91,35 kg/sq. cm. (1 305 lb/sq.in.).

6. Switch off the ignition.

7. Attach bleed pipes to the rear suspension strut bleed screws. Carefully open the bleed screws. Allow the hydraulic system mineral oil to flow into a clean container until the levelling system is fully exhausted,indicating that the priority valve has closed.

8. The pressure retained in the braking system and registered on the pressure gauge with the priority valve closed must not be less than 71,05 kg/sq.cm. (1 015 lb/sq.in.).

9. If the valve operating pressures are not within the above limits the priority valve must be renewed.

10. After the tests have been completed top-up the reservoirs to the correct levels with clean recommended hydraulic system mineral oil (see Chapter D).

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Section G12m

Height control valves

Introduction

The height control valves are mounted on the underside of the car body adjacent to each rear suspension spring. Actuation of the valves is controlled by pivoting links attached to each trailing arm. Both valves are identical.

The height control valves regulate the flow of hydraulic system mineral oil either to or from the rear suspension struts, dependant on the variation in load applied to the rear suspension. Any sustained change in the suspension height of the car operates the valves. Under extra load conditions (i.e. car standing height is low) pressurised hydraulic system mineral oil is allowed to pass from the accumulator, through the height control valves to the rear suspension struts. When the car load is reduced (i.e. car standing height is high), the height control valves allow hydraulic system mineral oil to return from the rear suspension struts to the respective system reservoirs.

The height control valves are non-serviceable units, therefore, in the event of valve malfunction the complete valve assembly must be renewed.

In order to obtain the correct standing height of the car reference should be made to Section H4m. Any error in standing height cannot be corrected by adjustment of the height control valve actuation links.

When work is being carried out on the levelling system of the car it should be noted that the height control valves are designed to give a delay of between 15 and 30 seconds before they respond to movement of the operating lever.

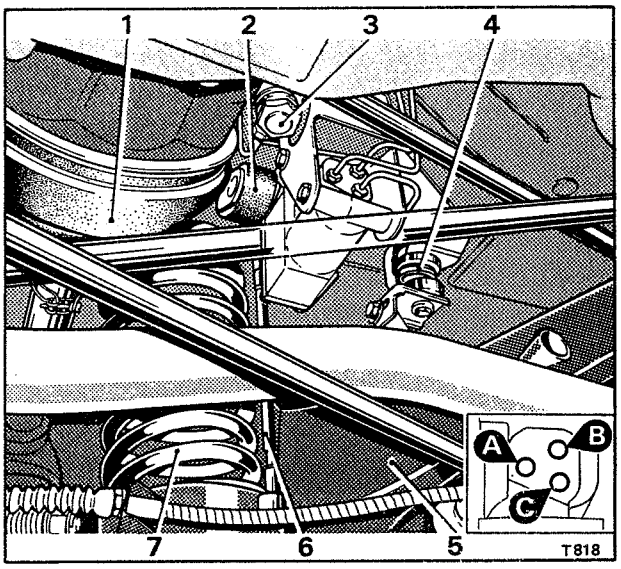

Fig. G23m Height control valve (left-hand shown)

1 Axle half-shaft
2 Height control valve
3 Minimum pressure valve
4 Exhaust mount
5 Trailing arm
6 Height control valve actuation link
7 Rear suspension coil spring
A Return to reservoir
B Inlet from priority valve
C Outlet to minimum pressure valve

Height control valve - To remove (see Fig. G23m)

1. Place the car on a ramp and depressurise the hydraulic system as described in Section G2m.
2. Disconnect the valve actuation link from the trailing arm.
3. Remove the three pipe connections from the valve assembly; fit blanks to the pipe ends and valve ports.
4. Remove the valve mounting bolts and lower the valve from its mounting bracket.
5. Remove the valve actuation link from the operating arm.

Height control valve - To fit

Fit the height control valve by reversing the procedure for removal noting the following points.

1. Before connecting the valve actuation link to the trailing arm, the standing height of the car must be checked as described in Section H4m and the actuation link adjusted as described under Height control valve - To set.

Note

Corrections to the car standing height cannot be made by adjustment of the actuation link.

2. All setscrews and pipe connections should be torque tightened in accordance with the figures quoted in Chapter P.
3. After fitting a height control valve the hydraulic system must be bled as described in Section G4m.

Height control valve - To set

1. Using jacks and sill blocks located under the sills of the car adjust the front and rear car standing height to the dimensions given in Chapter H Part II.

Note

In order to retain the car on the jacks and sill blocks, ballast weights should be applied to the luggage compartment and interior of the car.

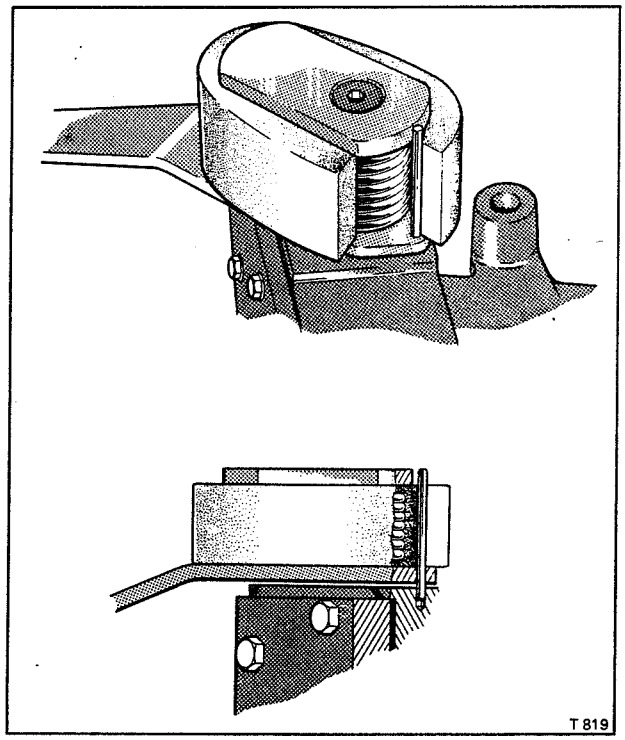

Fig. G24m Height control valve actuation arm location pin

2. Fit the operating arm location pin into position on the height control valve (see Fig. G24m).
3. With the car standing height correct, adjust the operating arm actuation link until the ends can be located onto the ball pins on the operating arm and suspension trailing arm. Lubricate the joints with Rocol MTS 1000 grease or equivalent. Adjust the joints to give complete freedom of movement without free play.
4. Remove the location pin from the height control valve operating arm

Failure to remove the location pin will result in severe damage to the height control valve when suspension movement occurs.

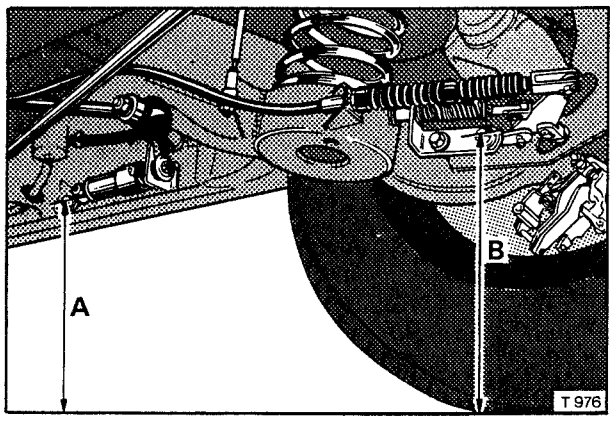

Fig. G25m Levelled height setting measurement positions

5. Remove the ballast weights, jacks and sill blocks.
6. If any hydraulic pipes have been disconnected bleed the hydraulic system as described in Section G4m.

Levelled height - To check

Before any attempt is made to check the levelled height it is important that the car standing height is correct. For details of the setting procedure reference should be made to Chapter H Part II.

1. With the car at the correct standing height, adjust the height control valve actuation arm links as described under Height control valve - To set.
2. Weight the front compartment of the car with two occupants or weights to a total of approximately 140 kg. (300 lb.) equally disposed between the two 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 positions.
3. Add additional weights to the luggage compartment of the car equal to 230 kg. (500 lb.). Unlike the standing height checking operations, the weight must remain in the luggage compartment throughout the levelled height checking operations.
4. Ensure the gear change selector is in the 'P' park position then remove the thermal cut-out from the fuseboard. Start the engine and allow the car to attain its levelled height position.
5. Measure the levelled height. The levelled height measurements are taken at the same points on the car as those for the rear standing height (see Fig. G25m). Calculate the levelled height by measuring the height 'A' from the level surface on which the car stands to the centre of the foremost bolt attaching the rear sub-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 levelled height to be correct the dimension 'A' should be within a tolerance of between plus 6,35 mm. and minus 11,43 mm. (plus 0.250in. and minus 0.450in.) of the dimension at point 'B'. If the height of the car is outside of these tolerances the height control valve should be renewed.

On Corniche cars destined for U.S.A. and Canada, the additional spacers fitted to the rear suspension springs must be taken into account when calculating the levelled height. On these cars 15,24 mm. (0.60.) must be added to the dimension taken at 'B' prior to the comparison of 'A' and 'B' being made.

The above limits allow for a tolerance on the height control valve neutral position, therefore the length of the actuatuion arm link of the valve should.not be adjusted.

Section G13m

Minimum pressure valve

Introduction

The minimum pressure valves are incorporated into the hydraulic systems between the height control valves and the suspension struts. Each valve is mounted behind its respective height control valve.

The purpose of the valves is to retain a predetermined hydraulic pressure in the suspension struts.

During normal system operation, the minimum pressure valve is held in the open position by hydraulic system pressure and the flow of hydraulic system mineral oil between the height control valve and suspension strut is uninterrupted.

If however the hydraulic pressure supply to the suspension strut falls below 21 kg/sq.cm. (300 lb/sq.in.) the minimum pressure valve will close and isolate the suspension struts from the system.

The minimum pressure valves are non-serviceable items, therefore, in the event of a valve malfunction the complete valve assembly must be renewed.

Minimum pressure valve - To renew (see Fig. G26m.)

1. Place the car on a ramp and depressurise the hydraulic system as described in Section G2m.

2. Disconnect the pipe connections from the valve; fit blanks to all pipe ends and valve ports.

3. Remove the valve mounting bolts. Remove the valve from the car.

4. Fit a new minimum pressure valve by reversing the procedure for removal.

5. Torque tighten all bolts and pipe connections to the figures quoted in Chapter P.

6. Bleed the hydraulic system as described in Section G4m.

Minimum pressure valves - To test

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

2. Remove the suspension strut bleed screws. Connect a zero kg/sq.cm. to 210 kg/sq.cm. (zero lb/sq.in. to 3 000 lb/sq.in.) pressure gauge into both bleed screw adapters.

Note

Although zero kg/sq.cm. to 210 kg/sq.cm. (zero lb/sq.in. to 3 000 lb/sq.in.) gauges are quoted, it is essential that they give a correct reading 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 preferred.

3. Ensure the front and rear standing height of the car are correct as described in Chapter H Part II Section H4m.

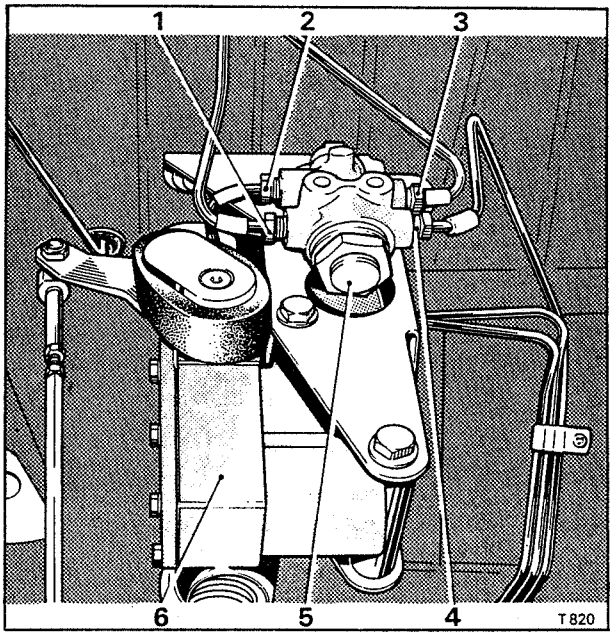

Fig. G26m Minimum pressure valve

1 Seepage return pipe from suspension strut
2 Supply pipe from height control valve
3 Supply pipe to suspension strut
4 Seepage return pipe to reservoir
5 Minimum pressure valve
6 Height control valve

4. Weight the front compartment with two occupants or weights of approximately 140 kg. (300lb.) equally disposed between the two front seats. The fuel tank should contain 45 litres (10 Imp. gal. 12 U.S. gal.) of fuel. All accessories, spare wheel and tools should be in their respective positions.

5. Ensure the gearchange selector is in 'P' park position and the gearchange thermal cut-out is removed from the fuseboard. Start the engine.

6. Add an additional 230 kg. (500 lb.) of load to the luggage compartment of the car. Allow the car to level (approximately 30 seconds).

7. Gradually remove the additional weight from the luggage compartment and allow the levelling system to exhaust.

8. Disconnect the height control valve actuation links from the trailing arms. Pull the actuation arms slowly downward approximately 25,4 mm. (1.0 in.) to ensure the systems are completely exhausted.

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Note
It is important to exhaust the height control valves slowly when checking the minimum pressure valve setting, otherwise an inconsistant pressure reading will result.

9. With the height control systems exhausted, the minimum pressure valves should retain a pressure of of between 21 kg/sq.cm. and 24,5 kg/sq.cm. (300 - lb/sq.in. and 350 lb/sq.in.) in the suspension struts. The actual retained pressure will be registered on the pressure gauges inserted at the bleed connections. Should the retained pressure be outside the above limits the faulty valve(s) should be renewed.

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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.

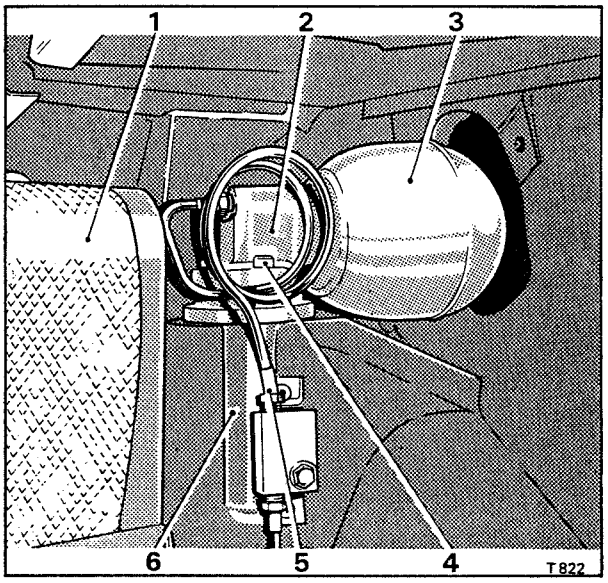

Fig. G27m Gas spring sphere

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

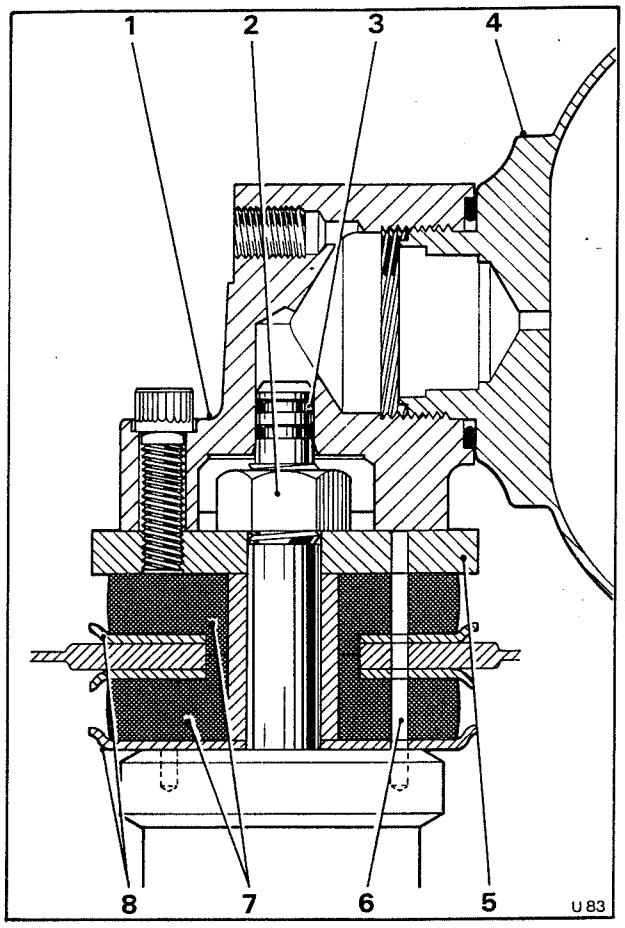

Fig. G28m Gas spring to suspension strut mounting

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.

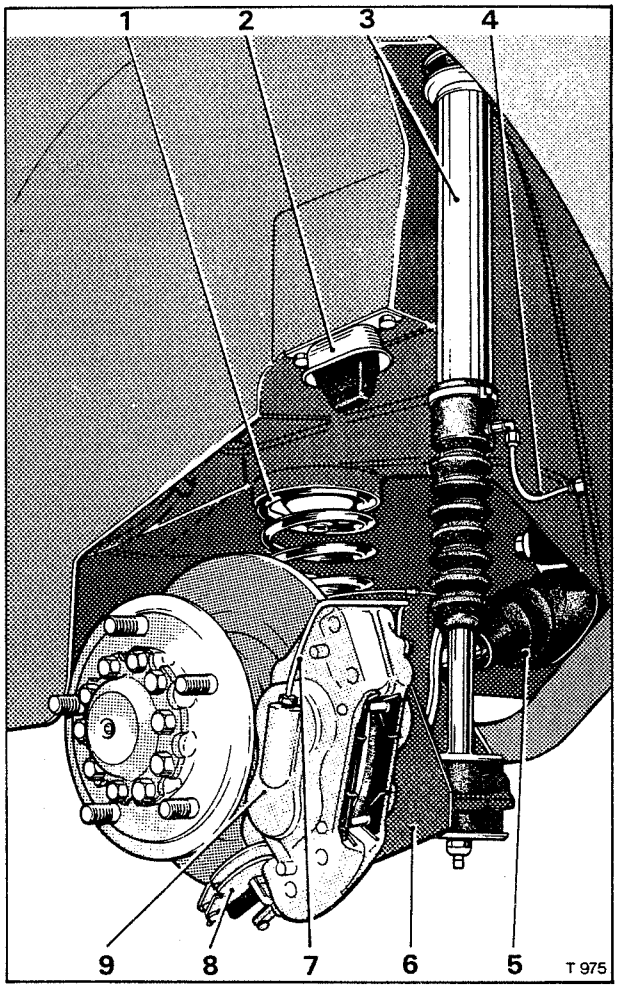

Fig. G29m Rear suspension strut

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

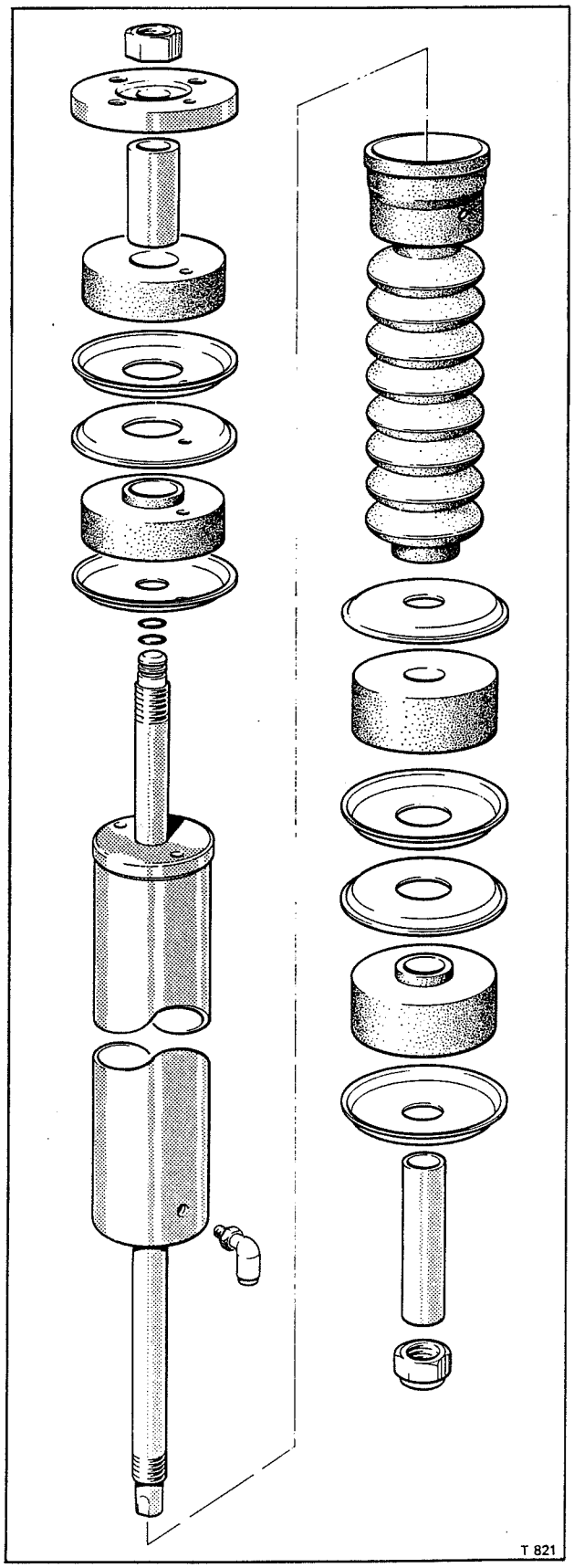

Fig. G30m Rear suspension strut mounts

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.

Section G15m

Pressure switches

Introduction

Both accumulator pressure switches are situated in the engine compartment on the right-hand valance.

The pressure switches are actuated by the hydraulic system mineral oil in the hydraulic systems and will illuminate the warning panel(s) situated on the facia if the pressure in the hydraulic system(s) falls below a safe working pressure. It is important therefore that the switches are operating correctly at all times.

In the event of a pressure switch failure the pressure switch must be renewed.

Whenever a pressure switch is fitted it is important that only a switch suitable for use with hydraulic system mineral oil is used.

Pressure switches suitable for use with hydraulic system mineral oil can be identified by a green plastic disc fitted around the centre of the switch.

Never fit a pressure switch intended for use with conventional brake fluids (i.e. RR 363) as a replacement.

Pressure switch - To test

1. The hydraulic pressure switches are designed to 'fail safe' i.e. if a pressure switch fails it will operate the facia panel warning lamps.
2. The warning lamp bulb can be checked for correct operation by moving the gear range selector lever to the 'D' Drive position and turning the ignition key against the spring pressure to the 'start' position. This operation should result in all of the panels in the warning cluster situated on the facia being illuminated.

Important

Ensure that both the parking brake and footbrake are applied when carrying out this operation.

3. The best method of testing a hydraulic pressure switch is by substitution. If this is not possible the following procedure should be carried out.
4. Depressurise the hydraulic systems as described in Section G2m.
5. Remove the outlet connection from the pressure switch three way adapter and connect a zero kg/sq. cm. to 210 kg/sq.cm. (zero lb/sq.in. to 3 000 lb/sq. in.) pressure gauge fitted with a connection pipe and bleed screw into the adapter.
6. Connect a battery and test lamp in series to the pressure switch as shown in Figure G32m. The test lamp should illuminate, confirming that the switch contacts are made, denoting no brake fluid pressure.

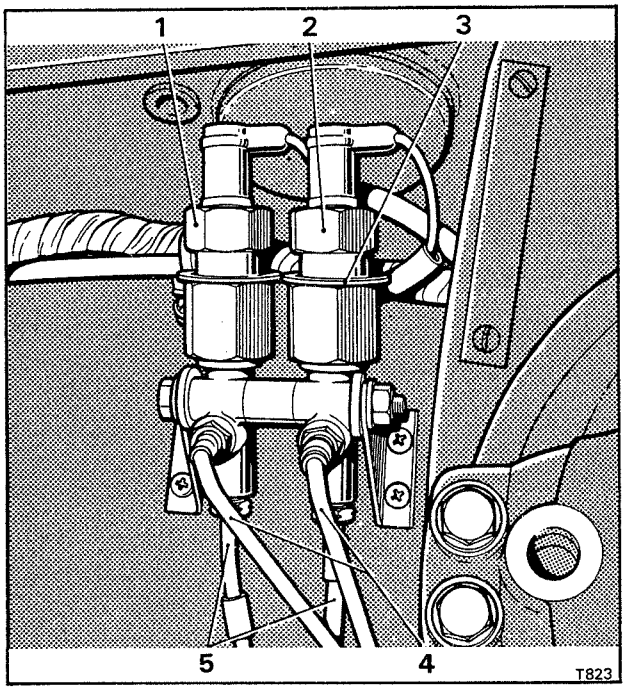

Fig. G31m Pressure switches

1 Pressure switch (No.1 system)
2 Pressure switch (No.2 system)
3 Green identification disc
4 Supply pipes to distribution valves and suspension struts.
5 Supply pipes from accumulators

7. Start and run the engine at approximately 800 r.p.m. and observe the pressure gauge. The test lamp should extinguish at a pressure not exceeding 45,70 kg/sq.cm. (650 lb/sq.in.). Switch off the ignition and using a bleed tube attached to the gauge feed pipe bleed screw, slowly bleed off the mineral oil into a clean container, thus allowing the hydraulic pressure to fall. Observe the pressure at which the test lamp illuminates, this pressure should not be less than 17,58 kg/sq.cm. (250 lb/sq.in.).
8. When tests and rectifications have been completed the systems must be bled as described in Section G4m.

Pressure switch - To renew (see Fig. G31m)

1. Depressurise the hydraulic systems as described in Section G2m.
2. Disconnect the electrical connection from the top of the pressure switch. Unscrew the pressure switch

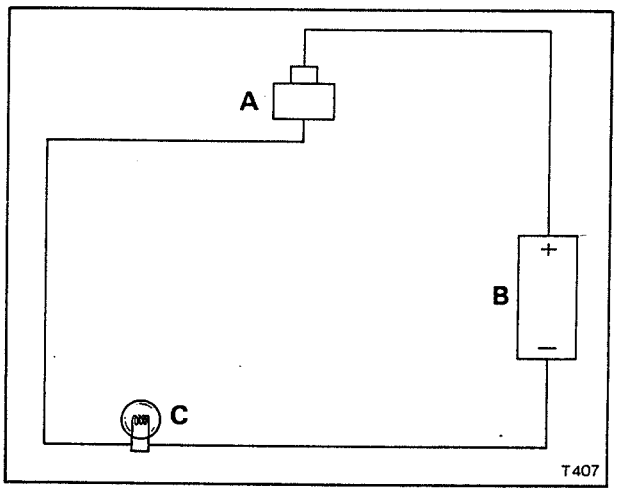

Fig. G32m Pressure switch test circuit
- **A** Pressure switch
- **B** Battery
- **C** Test lamp

from the threeway adapter; discard the two aluminium sealing washers.

3. Screw a new pressure switch into the three-way adapter, fitting a new sealing washer to each side of the distance washer on the switch connection. Torque tighten the switch to the figures quoted in Chapter P.

4. Fit the electrical connection to the pressure switch contact pin.

5. When fitting is completed bleed the hydraulic system as described in Section G4m.

Section G16m

Front and rear disc brakes

Introduction

Two twin cylinder calipers are fitted to each front wheel and a four cylinder caliper to each rear wheel.

The calipers are divided between the two independently operated hydraulic systems. System 1 operates the front calipers on the front wheels and the upper cylinders on the rear wheel calipers. System 2 operates the rear calipers on the front wheels and the lower cylinders on the rear wheel calipers.

Bleed screws are fitted to the inner faces of each caliper to facilitate bleeding of the two systems.

Brake calipers fitted to cars with mineral oil hydraulic systems are similar in appearance to those fitted to cars using conventional brake fluid (i.e. RR 363). In order to distinguish calipers suitable for use with hydraulic system mineral oil a section of the outer surface is painted green. The calipers are also fitted with a green identification tag around each bleed screw.

Under no circumstances should a caliper for use with conventional brake fluid be used as a replacement.

In order to obtain maximum efficiency and safety from the braking systems it is important that only replacement disc pads of approved design and material specification are fitted.

Brake pads of different specification or different manufacture vary in their friction, wear and operating characteristics and if mixed could have an adverse effect on braking performance.

It is important when changing brake pads that the friction material of the new pads is of the same type and grade as that fitted to the other brake calipers; otherwise it will be necessary to renew all the brake pads.

Inspection of all brake pads must be carried out at the specified service intervals; for details reference should be made to the Service Schedule Manual publication number T.S.D. 4117.

The brake pads must be renewed when the brake pad linings are worn to within 3,18 mm. (0.125 in.) of the back plate.

After fitting new brake pads an initial running-in period of between 1 100 kilometres and 1 300 kilo -metres (700 miles and 800 miles) should be observed.

During this initial running-in period, the brakes should not be applied harshly or for prolonged periods from high speeds except in an emergency. The force with which the brakes are applied may be progressively increased towards the end of the running-in period.

Note

If the brakes are to be relined with pads which have different recommended linings from those previously fitted, the disc faces should be cleaned prior to fitting the new pads. All traces of the old pad material should be removed by hand rotating the disc whilst applying fine emery cloth to the disc faces. Do not emery the disc radially. Always ensure that the same type and grade of pad lining is fitted to all six brake calipers.

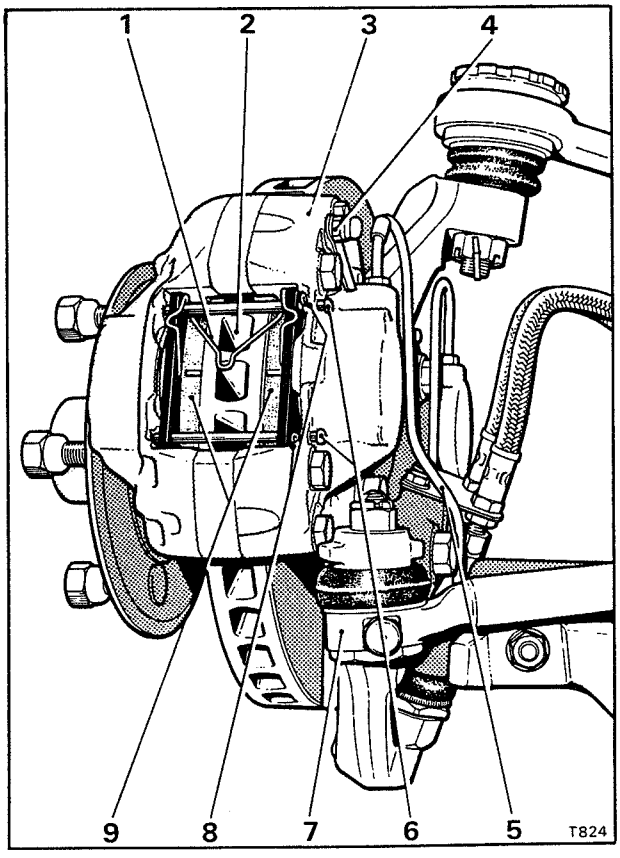

Fig. G33m Front wheel front brake caliper

1 'M' spring
2 Brake disc
3 Brake caliper
4 Bleed screw
5 Brake pressure supply pipe
6 Brake pad retaining pins
7 Track rod
8 Pin retaining clips
9 Brake pads

Front wheel brake pads - To renew

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

Note

This operation is not essential for brake pad renewal but is recommended as a safety precaution in the event of the brake pedal being accidentally depressed whilst the brake pads are removed.

2. Slacken but do not remove the front road wheel retaining nuts.

3. Securely chock the rear road wheels; jack up the front of the car. Support the car with stands and sill blocks.

4. Remove the front road wheels.

5. Remove the spring clips from the two brake pad retaining pins. Withdraw the pins from the caliper. Unclip the 'M' spring from the rear of each brake pad.

6. Withdraw the brake pads from the caliper.

7. Prior to fitting the new brake pads, inspect the caliper piston dust seals for signs of damage or heat hardening and renew as necessary.

8. Carefully press the caliper pistons back into their bores, taking care not to damage or trap the piston seals. Ensure the piston seal retaining clips are correctly located.

9. Fit the new brake pads into position in the caliper.

10. Fit the trailing, brake pad retaining pin through the caliper and brake pads. Secure the pin with the retaining clip.

11. Locate the ends of the 'M' spring into the centre holes of the brake pad back plate. Ease the spring into position and secure with the leading, pad retaining pin. Fit the pin retaining clip. When fitted the 'ears' of the 'M' spring must rest on the edge of the brake pad backing plate, with the bends at the top of the 'M' figuration butting against the caliper body (see Fig. G33m).

Note

The 'M' spring is only fitted onto the brake pad retaining pin at the leading end of the caliper, i.e. upper pin on the front wheel, front brake caliper and lower pin on the front wheel, rear brake caliper.

When fitting the 'M' spring do not compress the spring more than the normal gap between the two brake pads, otherwise permanent distortion of the spring may occur.

Due to inherent distortion during pad wear, new 'M' springs should be fitted whenever the brake pads are renewed.

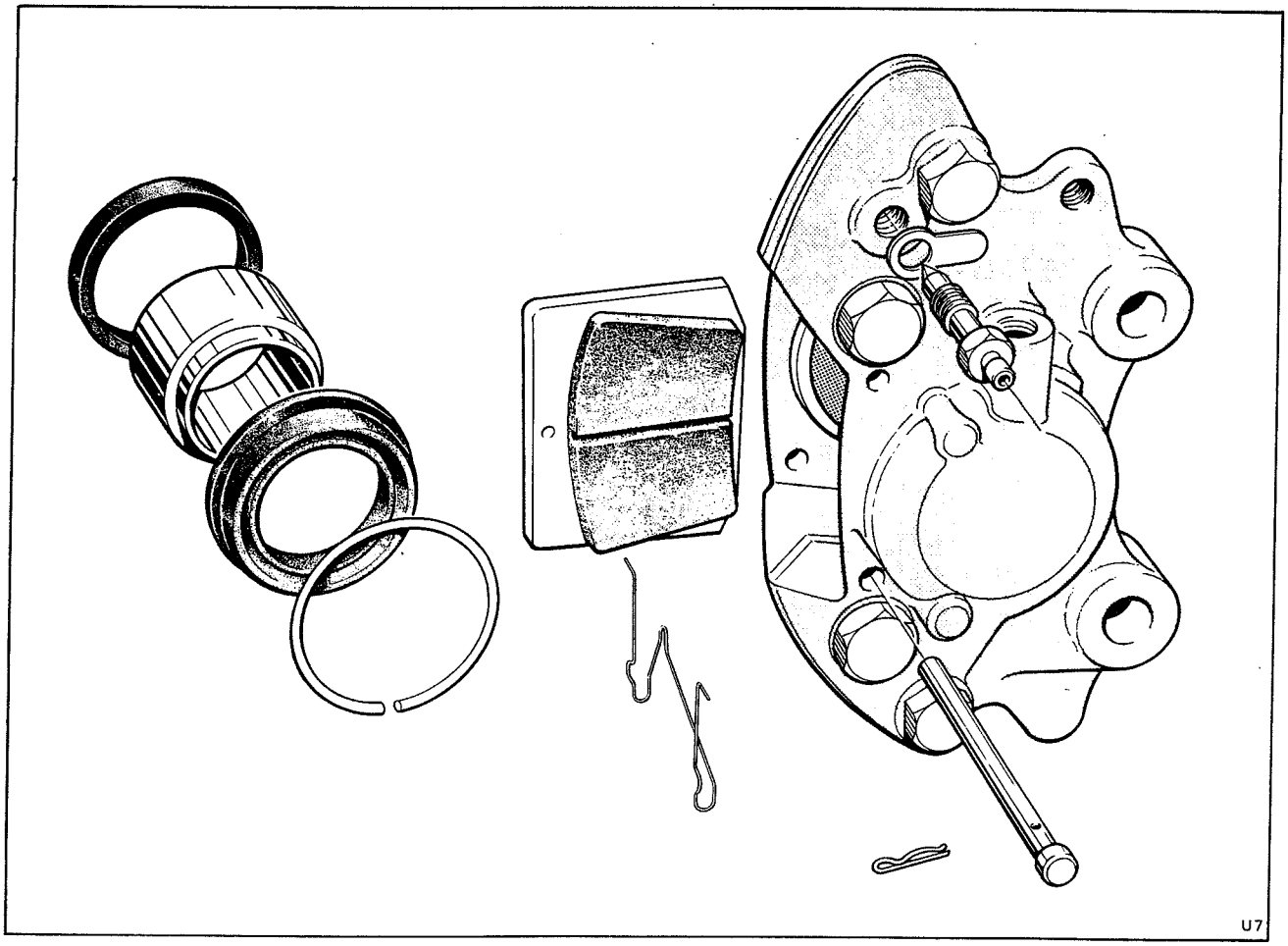

Fig. G34m Front wheel brake caliper (left-hand rear shown)

Rear wheel brake pads - To renew

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

Note

This operation is not essential for brake pad renewal but is recommended as a safety precaution in the event of the brake pedal being accidentally depressed whilst the brake pads are removed.

2. Securely chock the front road wheels, then jack up the rear of the car. Support the car with stands and sill blocks.
3. Remove the rear road wheels.
4. Remove the spring clips from the two brake pad retaining pins (see Fig. G35m) and withdraw the pins. Collect the anti-rattle spring clip from the rear of each brake pad.
5. Withdraw the brake pads from the caliper.
6. Prior to fitting the new pads, inspect the caliper piston dust seals for signs of damage or heat hardening and renew as necessary.
7. Carefully press the caliper pistons back into their bores, taking care not to damage or trap the seals. Ensure that the seal retaining clips are correctly located.
8. Fit the new pads by reversing the removal procedure. Ensure that the anti-rattle spring clips and pad retaining pin clips are correctly located (see Fig. G35m).

Front brake caliper - To remove

1. Depressurise the hydraulic systems as described in Section G2m.
2. Securely chock the rear road wheels.
3. Remove the wheel disc from the front wheel then slacken but do not remove the wheel retaining nuts.
4. Raise the front of the car on a hydraulic jack. Securely support the car on stands and sill blocks.
5. Remove the road wheels.
6. Disconnect the caliper feed pipe and blank off the pipe end and caliper port against the ingress of dirt.
7. Remove the fitted bolts which secure the caliper to the axle yoke. Withdraw the caliper off the brake disc.
8. It is recommended that a distance piece is fitted between the caliper pads after removal to prevent the piston easing out of their bores.

Rear brake caliper - To remove

1. Depressurise the hydraulic systems as described in Section G2m.
2. Securely chock the front wheels of the car.
3. Remove the wheel disc from the rear road wheel, then slacken but do not remove the wheel retaining nuts.
4. Raise the rear of the car with a hydraulic jack. Securely support the car on stands and sill blocks. Do not allow the full load of the suspension to hang on the suspension struts.
5. Remove the road wheel.
6. Disconnect the parking brake operating rod from the caliper lever.

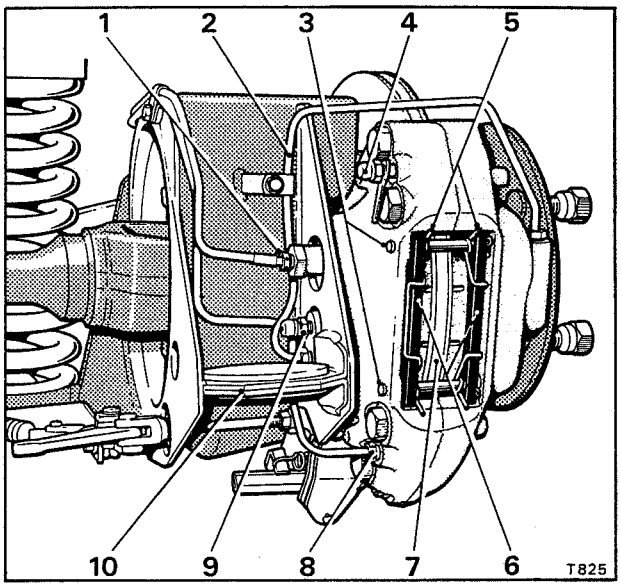

Fig. G35m Rear wheel brake caliper

1 Upper cylinder supply pipe
2 Lower cylinder bridge pipe
3 Brake pad retaining pins
4 Upper cylinder bleed screw (No.1 system)
5 Anti-rattle spring clips
6 Brake pads
7 Brake disc
8 Lower cylinder supply pipe
9 Lower cylinder bleed screw (No2 system)
10 Trailing arm suspension strut mount

7. Disconnect the two feed pipes from the caliper; fit blanks to the pipe ends and caliper ports.
8. Remove the caliper bridge pipe; fit blanks to the pipe ends and caliper ports.
9. Remove the pipe connection adapter and lower bleed screws from the inner face of the caliper.
10. Remove the fitted bolts securing the caliper to the rear hub yoke.
11. Carefully withdraw the caliper off the brake disc.

Note

If difficulty is experienced in withdrawing the caliper from the brake disc, slacken the four bolts securing the hub yoke to the trailing arm approximately four revolutions. Carefully draw the hub assembly away from the trailing arm until sufficient clearance is obtained to allow the removal of the caliper from the brake disc.

Brake caliper piston seals - To renew

The brake caliper seals should be renewed at the intervals specified in the Service Schedule Manual publication number T.S.D. 4117.

Only seals suitable for use with hydraulic system mineral oil must be fitted. Under no circumstances should seals for use with conventional brake fluid (i.e. RR 363) be used.

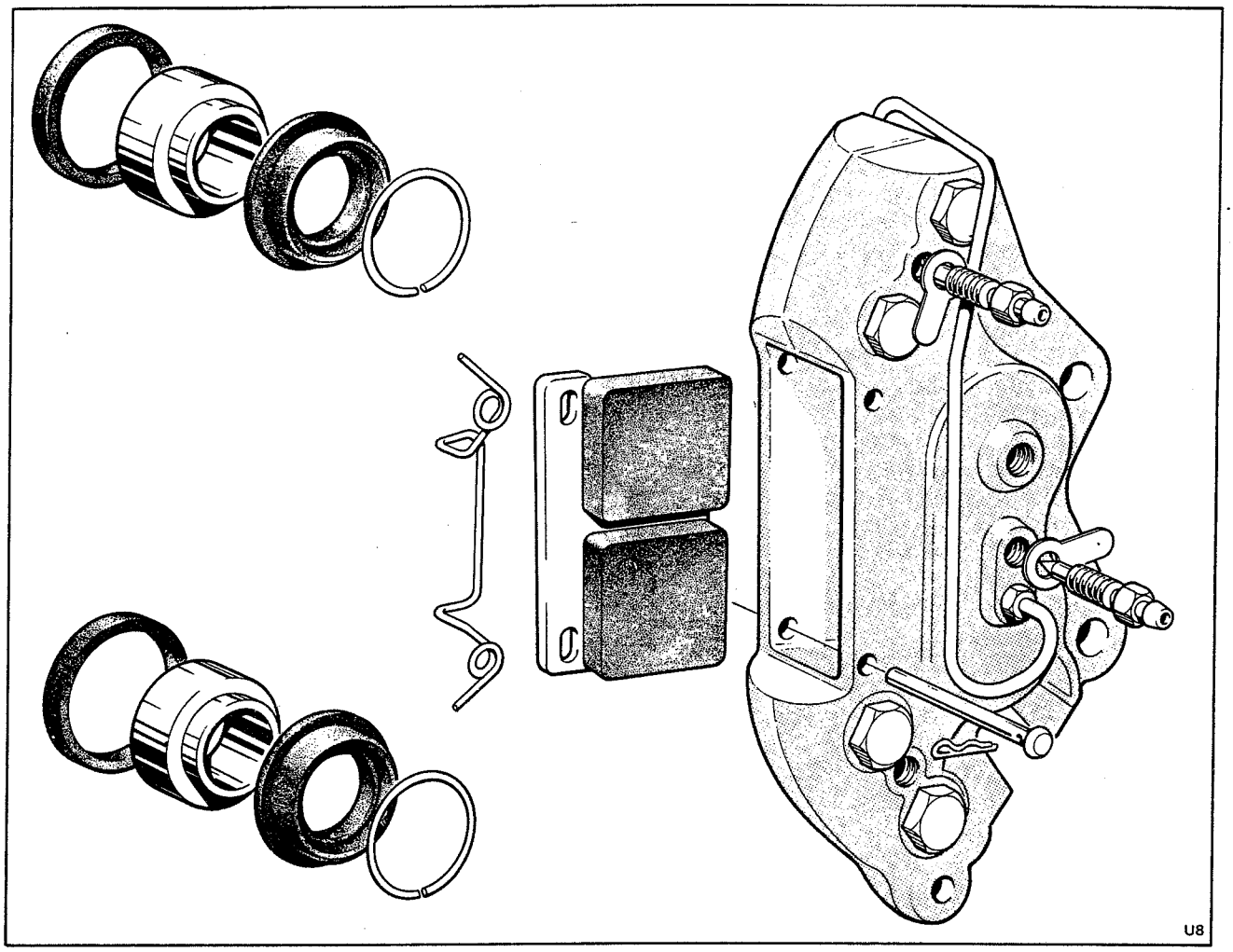

Fig. G36m Rear wheel brake caliper

1. Depressurise the hydraulic systems as described in Section G2m.
2. Remove the brake caliper from the car and remove the brake pads as described previously.
3. Remove the spring clip retaining the caliper piston dust seal; remove the dust seal.
4. Ease the piston from its bore taking care not to damage the piston.
5. Remove the piston seal from the caliper bore.
6. Clean the caliper bore and piston with methylated spirits, and dry thoroughly using dry compressed air.
7. Immerse the new piston seal in approved hydraulic system mineral oil (refer to Chapter D), then carefully insert it into the groove in the caliper bore, ensuring it is correctly seated.
8. Lubricate the piston outside diameter with a small quantity of approved hydraulic system mineral oil, then carefully fit the piston.
9. Fit a new dust seal around the piston top and over the caliper bore flange. Fit the spring ring taking care not to 'pinch' the seal with the ends of the ring.

Brake calipers - To fit

Fit the brake calipers by reversing the respective removal procedure noting the following points.

1. All setscrews and pipe connections must be torque tightened in accordance with the figures quoted in Chapter P.
2. Ensure that a minimum clearance of 8,00 mm. (0.312 in.) is maintained between the caliper bridge pipe and the brake disc when fitting rear brake calipers.
3. When fitting is completed bleed the hydraulic systems as described in Section G4m.

Note

The supply pipe connection ports on the front wheel brake calipers are a metric threaded fitting and only pipes fitted with the correct metric pipe nuts should be used.

Brake disc - To remove

1. Depressurise the hydraulic systems as described in Section G2m.
2. Remove the front or rear hub as necessary, following the procedure described in Chapter H

Front hubs or Chapter J Rear hubs.
3. To remove a front brake disc remove the setscrews securing the disc to the hub.
4. To remove a rear brake disc dismantle the rear hub as described in Chapter J then unscrew the disc retaining setscrews.

Brake disc - To fit
Fit the brake disc by reversing the procedure for removal noting the following points.
1. All setscrews must be torque tightened in accordance with the figures quoted in Chapter P.
2. The hubs must be assembled and fitted as described in their respective Chapter H or J.
3. On completion the hydraulic systems must be bled as described in Section G4m.

Note
New brake discs are treated with a protective film. When a new disc has been fitted the brakes should be gently applied until the protective film has been removed from the working surface of the disc by the first few brake applications.

If only one front brake disc has been replaced the car will gently pull to the side opposite the new disc until the protective film has been removed.

Section G17m

Parking brake linkage

Introduction

The parking brake is operated by a hand pulled mechanism on right-hand drive cars and by a foot pedal application with a hand pull release on left-hand drive cars. Both types of mechanism operate a caliper lever arrangement fitted beneath the two rear hydraulic brake calipers. These levers apply a wedge shaped friction pad to each side of the brake disc.

The parking brake should be inspected for wear and manually adjusted at the intervals specified in the Service Schedule Manual publications T.S.D. 4117.

Pads must be renewed when the friction material has worn to within 3,18 mm. (0.125 in.) of the pad back plates.

Hand operated ratchet assembly - To remove

Right-hand drive cars

1. Place the car on a ramp and securely chock the road wheels. Release the parking brake to the 'off' position.
2. At the intermediate linkage on the underside of the body, unhook the parking brake return spring from the operating lever. Remove the clevis pin attaching the front parking brake cable to the end of the lever (see Fig. G37m).
3. Remove the trim retaining screw from the centre panel of the parking brake handle aperture.
4. Remove the Lucar connectors from the micro-switch mounted on the lower end of the ratchet assembly cover tube.
5. Remove the setscrews securing the upper support bracket to the facia structure.
6. Remove the setscrew securing the lower support bracket.
7. Ease the complete ratchet assembly downwards, from beneath the facia.
8. Draw the ratchet assembly away from the toe-board and disconnect the cable from the retaining piece bolted to the bottom of the operating rod; remove the assembly.

Hand operated ratchet assembly - To dismantle

1. Remove the ratchet assembly from the car as described previously.
2. Remove the cable retainer from the lower end of the operating rod. Refit the screw into the operating rod to retain the coil spring and end fittings.
3. Remove the cheese headed screw and washer from behind the cover tube locking nut.

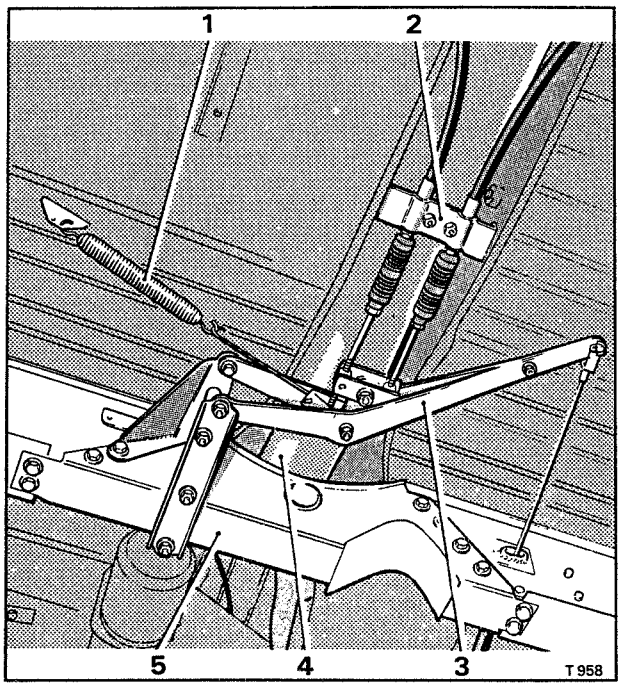

Fig. G37m Parking brake intermediate linkage (Right-hand drive cars)

1 Return spring
2 Abutment bracket rear brake cables
3 Operating lever
4 Propeller shaft
5 Centre body member

4. Unscrew the locking nut from behind the upper support bracket.
5. Withdraw the operating rod and roller assembly from the cover tube.

The roller assembly can be extracted from the cover tube by pulling the assembly to the top of the tube, then tilting the tube and carefully manipulating first one roller then the other roller out of the slots.

6. Remove the retaining screw from the lower end of the operating rod. Slide the coil spring, stop plate, roller assembly and distance piece off the operating rod.
7. Remove the operating rod from the upper housing and seperate the housing and ratchet components.
8. Inspect all components for signs of wear and damage, paying particular attention to the bushes, ratchet assembly and springs. New parts should be fitted as necessary.

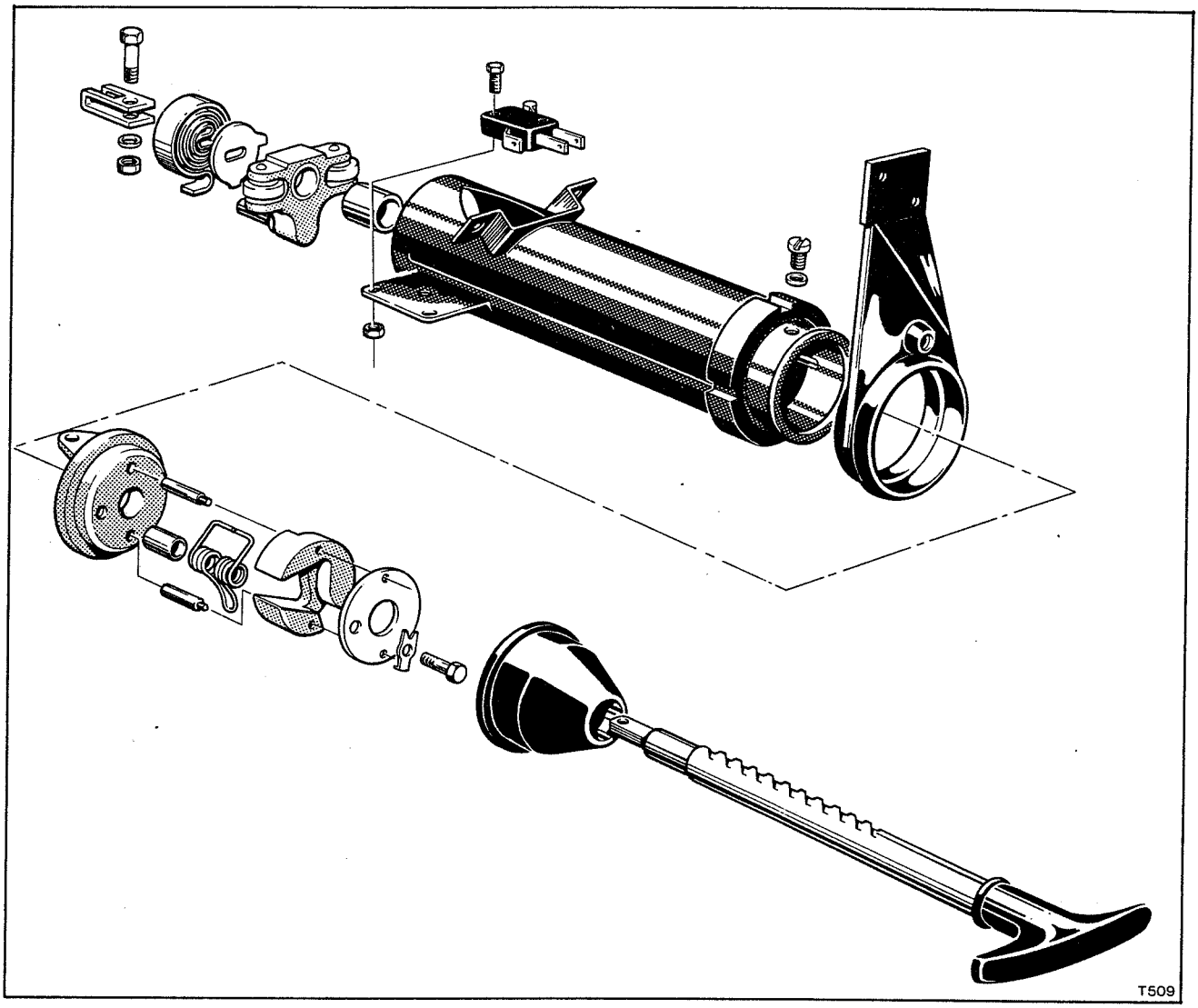

Fig. G38m Parking brake ratchet assembly (Right-hand drive cars)

Hand operated ratchet assembly - To assemble
Assemble the ratchet assembly by reversing the procedure given for dismantling noting the following points.
1. The hand operating rod is spring loaded and must turn in a clockwise direction from the horizontal position to release the ratchet mechanism. For correct operation ensure that the coil spring and stop plate fitted below the roller assembly are located as shown in Figure G38m.
2. Lightly lubricate the ratchet panels and roller mechanism using Retinax A grease or equivalent.
3. Care must be taken when entering the rollers and operating rod into the cover tube slots. Hold the tube at an angle to the control rod. Enter one roller into the tube, then carefully manipulate the other roller into position.
4. The cable retainer should be fitted after the control rod and roller assembly has been fitted into the cover tube.
5. Adjust the micro-switch so that on the initial movement of the parking brake the facia warning panel marked PARKING BRAKE illuminates.

Hand operated ratchet assembly - To fit
Fit the ratchet assembly by reversing the procedure given for removal noting the following points.
1. All setscrews should be torque tightened in accordance with the figures quoted in Chapter P.
2. Care should be taken to ensure the brake cable end is located correctly in the connector link.
3. Ensure that the brake cable is correctly positioned in the guide pulleys.
4. Check the operation of the mechanism to ensure free movement of the rachet assembly and brake cable.

Foot operated parking brake mechanism - To remove
Left-hand drive cars
1. Place the car on a ramp and securely chock the

road wheels. Release the parking brake to the 'off' position.

2. At the intermediate linkage on the underside of the body, unhook the parking brake return spring from the operating lever. Remove the clevis pin attaching the front brake cable to the lever (see Fig. G39m).

3. Remove the knee roll trim from the parking brake area as described in Chapter S in order to gain access to the four setscrews which retain the foot pedal mechanism.

4. Disconnect the Lucar connections from the micro-switch.

5. Disconnect the brake cable from the retaining piece on the actuation lever.

6. Remove the four pedal mechanism retaining setscrews and lower the mechanism from beneath the facia.

Foot operated parking brake mechanism - To dismantle

1. Remove the foot operated parking brake mechanism as described previously.

2. Remove the sprag plate and release lever return springs.

3. Dismantle the parking brake foot mechanism by removing the pivot bolts from the foot pedal lever, sprag plate, release actuator and hand release lever. Remove these items from the mounting bracket frame; collect the distance tube from each pivot.

4. Seperate the release actuator from the intermediate lever by removing the clamping setscrew, collect the distance piece.

5. Inspect all items for wear and damage; renew parts as necessary.

Foot operated parking brake mechanism - To assemble (see Fig. G40m)

Assemble the parking brake mechanism by reversing the procedure given for dismantling noting the following points.

1. Sparingly smear the inside of the sprag plate hole with Retinex 'A' grease or equivalent.

Note

The sprag rod must be clean, dry and free of lubricant.

2. The sprag plate pivot bolt should be fitted with the bolt head on the left-hand side of the frame. All other bolts should be fitted from the right-hand side of the frame.

3. Adjust the mechanism as described under Foot operated parking brake - To adjust.

4. All setscrews should be torque tightened to the figures quoted in Chapter P.

Foot operated parking brake - To adjust (see Fig. G41m)

Operations 1 to 3 inclusive can be carried out with the parking brake mechanism removed from the car.

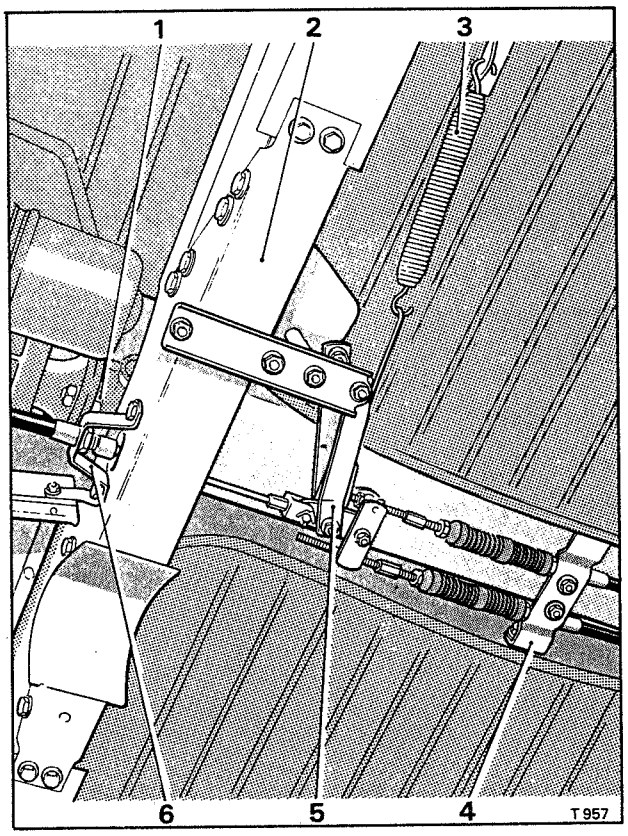

Fig. G39m Parking brake intermediate linkage (Left-hand drive cars)

1 Propeller shaft
2 Centre body member
3 Return spring
4 Abutment bracket - rear brake cables
5 Operating lever
6 Mounting bracket - front brake cable

1. Slacken the setscrew securing the intermediate lever to the actuator.

2. Slowly depress the pedal from the 'off' position. The sprag plate will rise from its 'off' position for approximately one third of the sprag rod's length, then lower for the remainder of pedal travel. With the sprag plate in its highest position adjust the actuator to obtain a clearance of 0,127 mm. to 0,254 mm. (0.005 in. to 0.010 in.) between the actuator pawl and the sprag plate. Tighten the setscrew securing the intermediate lever to the actuator.

3. With the sprag rod approximately 3,17 mm. (0.125 in.) away from its rubber off stop, set the warning lamp micro-switch so that it operates i.e. the point where the switch gives an audible click. Check that the switch roller assembly is not trapped between the switch body and roller ramp when the sprag rod is against the 'off' stop.

4. Release the parking brake caliper adjusters at the rear wheels to enable the parking brake pedal to be fully depressed to the floor. Check the release

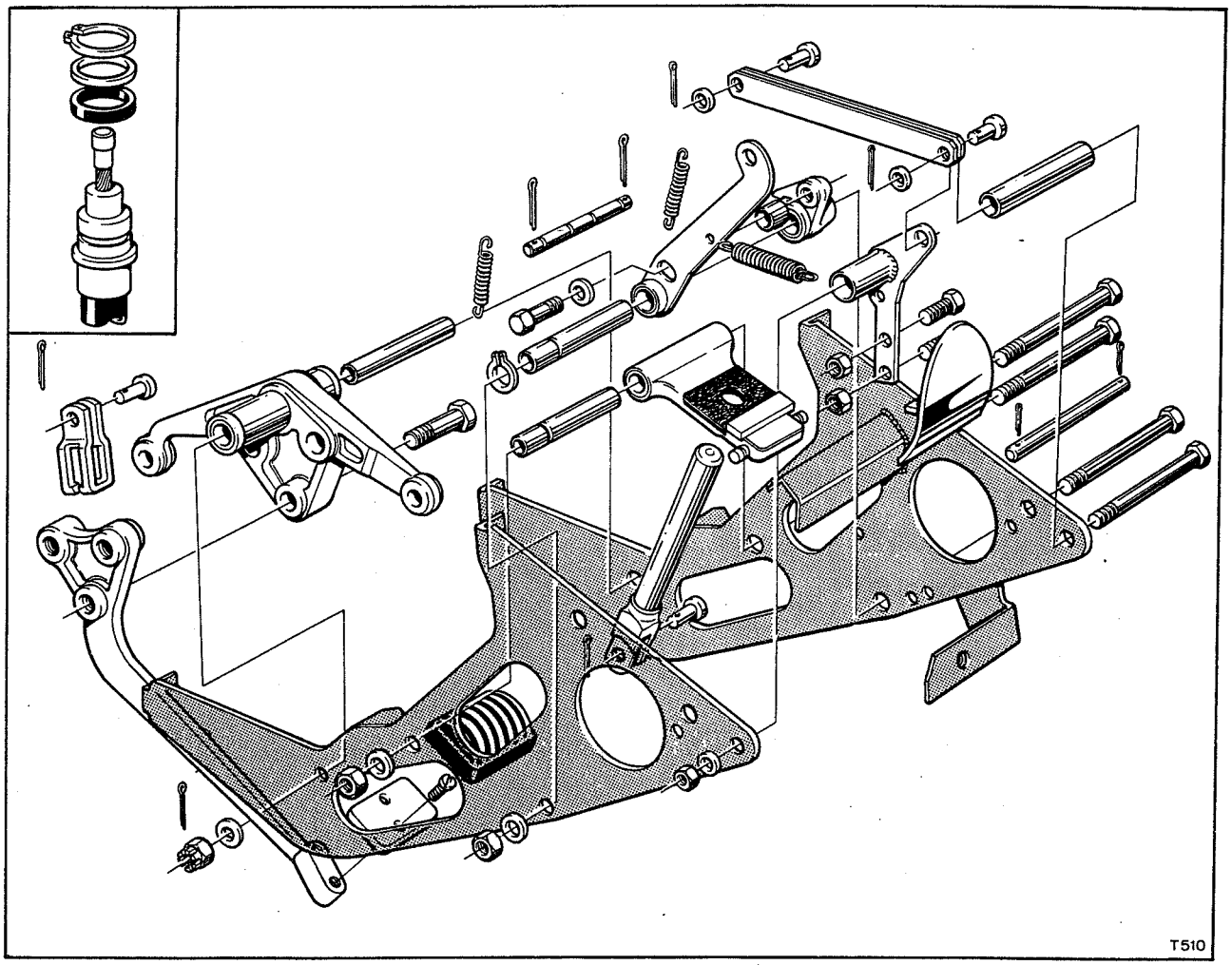

Fig. G40m Foot operated parking brake and cable connection

handle travel; there should be a minimum of 12,70mm. (0.50 in.) extra travel (measured at the end of the release handle) after the point of mechanism release. If the handle travel is incorrect the clearance between the actuator pawl and the sprag plate should be checked as described previously in Operation 2.

5. Adjust the parking brake cables and pads as described in their relevant sections.

6. Apply the parking brake. The foot pedal should remain in the 'on' position without slipping until the mechanism is released. If slipping occurs inspect the sprag rod and sprag plate for signs of wear and replace as necessary.

7. Check that the facia warning lamp marked PARKING BRAKE is extinguished when the brake is released to the 'off' position.

Foot operated parking brake - To fit

Fit the foot operated parking brake by reversing the procedure for removal noting the following points.

1. All setscrews should be torque tightened in accordance with the figures quoted in Chapter P.

2. Care should be taken to ensure the brake cable end is located correctly in the connector link.

3. Check the operation of the parking brake as described in Foot operated parking brake - To adjust.

Parking brake front cable - To remove
Right-hand drive cars

1. Remove the hand operated ratchet assembly as described under Hand operated ratchet assembly - To remove.

2. Remove the circlip retaining the rubber seal to the brake cable on the interior side of the toeboard. Remove the seal from the cable.

3. Remove the two setscrews retaining the felt seal housing to the engine side of the toeboard. Withdraw the cable from the housing and felt seal.

4. Remove the two brake cable guide pulleys; collect the distance tube from the centre of each pulley.

5. Remove the nuts and bolts retaining the brake cable outer cover to their mountings on the under side of the body. Also remove the clips retaining the cable in position.

6. Carefully withdraw the brake cable from behind

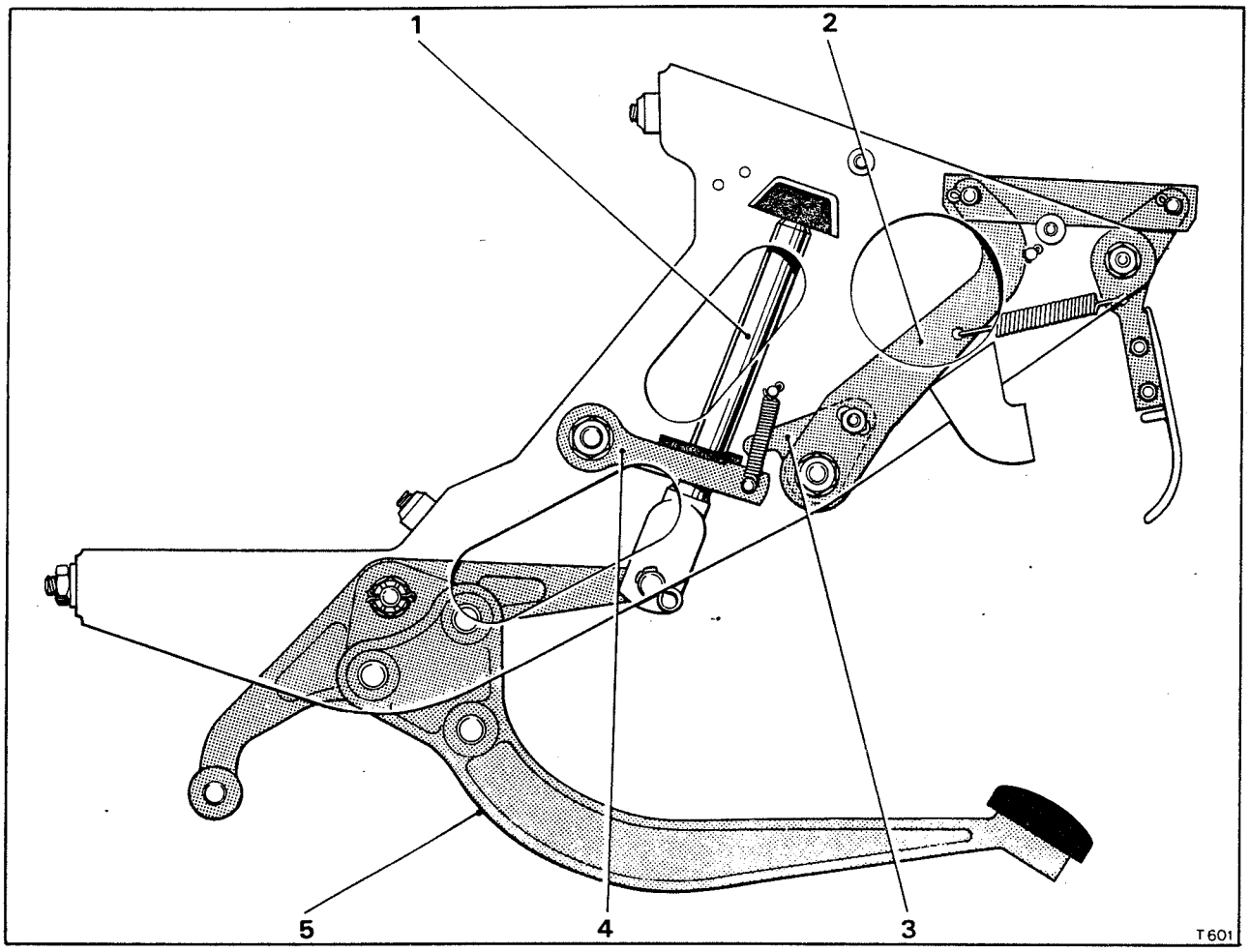

Fig. G41m Foot operated parking brake adjustment components

1 Sprag rod
2 Intermediate lever
3 Actuator
4 Sprag plate
5 Foot pedal

the exhaust pipe heatshield and remove it from the car.

Parking brake front cable - To fit
Right-hand drive cars

Fit the parking brake front cable by reversing the procedure given for removal noting the following points.

1. All setscrews and nuts should be torque tightened in accordance with the figures quoted in Chapter P.
2. Lubricate the guide pulley pivots with Molytone 265 grease and the pulley grooves with Midland Silicone MS44 grease.

Note

Use of any other grease on the pulley grooves could have a harmful effect on the inner cable low friction coating.

3. Ensure that the guide pulley cable retainers are correctly located in the pulley mounting brackets.
4. Check for freedom of movement during the application and release of the parking brake. The parking brake should operate freely without roughness or binding throughout its operation.
5. Adjust the parking brake cables and calipers as described under Parking brake cables and calipers - To adjust.

Parking brake front cable - To remove
Left-hand drive cars

1. Carry out Operations 1 and 2 of Foot operated parking brake mechanism - To remove.
2. Disconnect the front end of the brake cable from the retaining piece on the actuation lever of the foot pedal mechanism.
3. Remove the circlip retaining the outer cable to the car floor below the foot pedal mechanism.
4. Disconnect the rear end of the outer cable from the support bracket on the centre crossmember of the body.
5. Disconnect the clip securing the cable to the

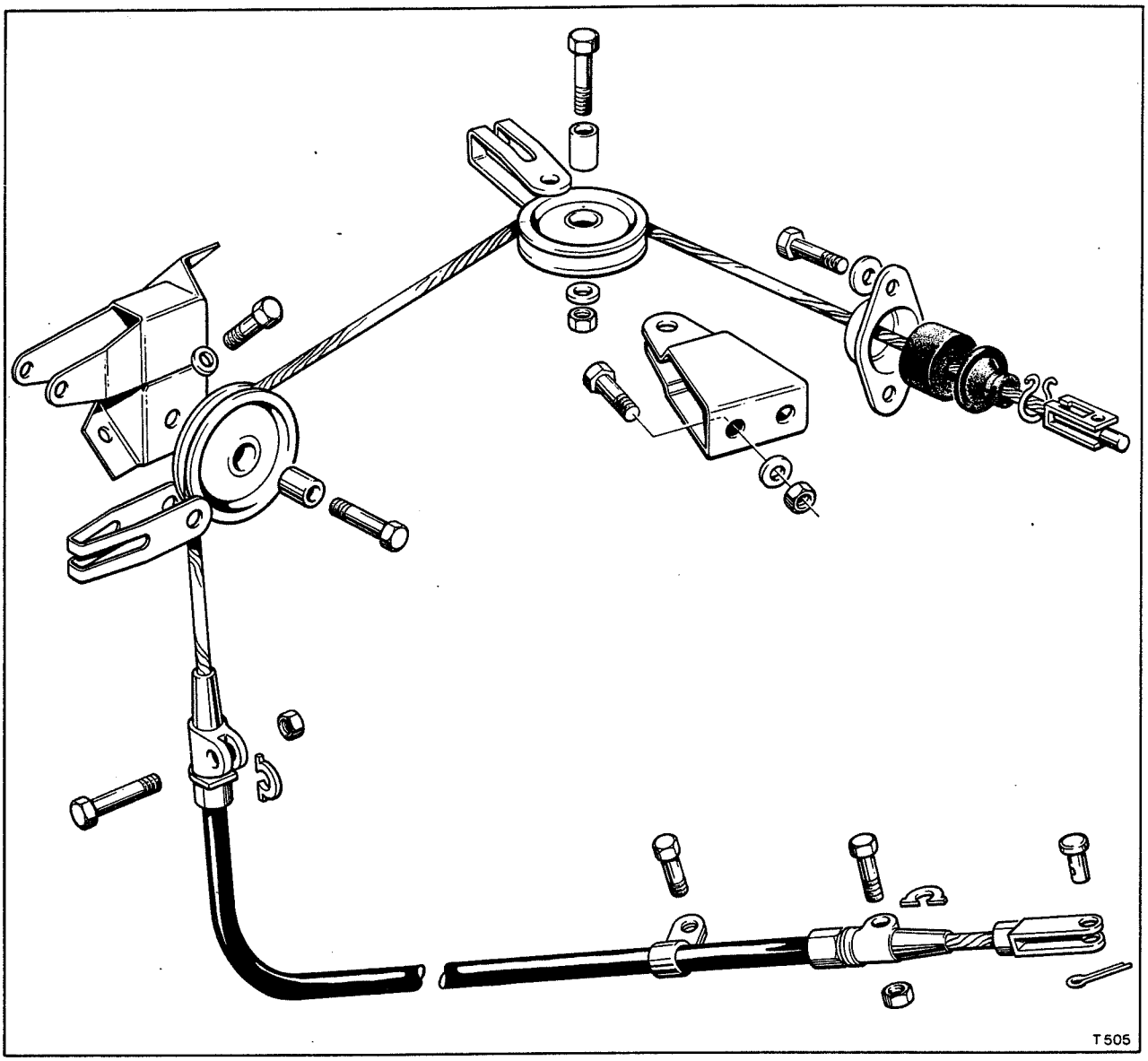

Fig. G42m Parking brake front cable and pulleys (Right-hand drive cars)

bracket on the transmission sump. Remove the brake cable from the car.

Parking brake front cable - To fit

Left-hand drive cars

Fit the parking brake front cable by reversing the procedure given for removal noting the following points.

1. All setscrews and nuts should be torque tightened in accordance with the figures quoted in Chapter P.
2. Lubricate the clevis pin with Molytone 265 grease prior to fitting.
3. Check for freedom of operation during the application and release of the parking brake. The parking brake should operate freely without roughness or binding throughout its operation.
4. Adjust the cables and calipers as described under Parking brake cables and calipers - To adjust.

Parking brake rear cables - To remove

Although the parking brake intermediate linkages, situated on the centre body crossmember are different for right-hand and left-hand drive cars, the rear brake cable arrangements are identical.

1. Disconnect the rear cables at the equaliser fitted to the intermediate linkage on the centre body crossmember.
2. Disconnect the rear end of each cable from the parking brake caliper mechanism.
3. Remove the two centre bolts from the abutment bracket at the front end of the cables; collect the top clamping plate.
4. Disconnect the cable support clips.
5. Carefully withdraw the cables from beneath the heat shields and remove them from the car.

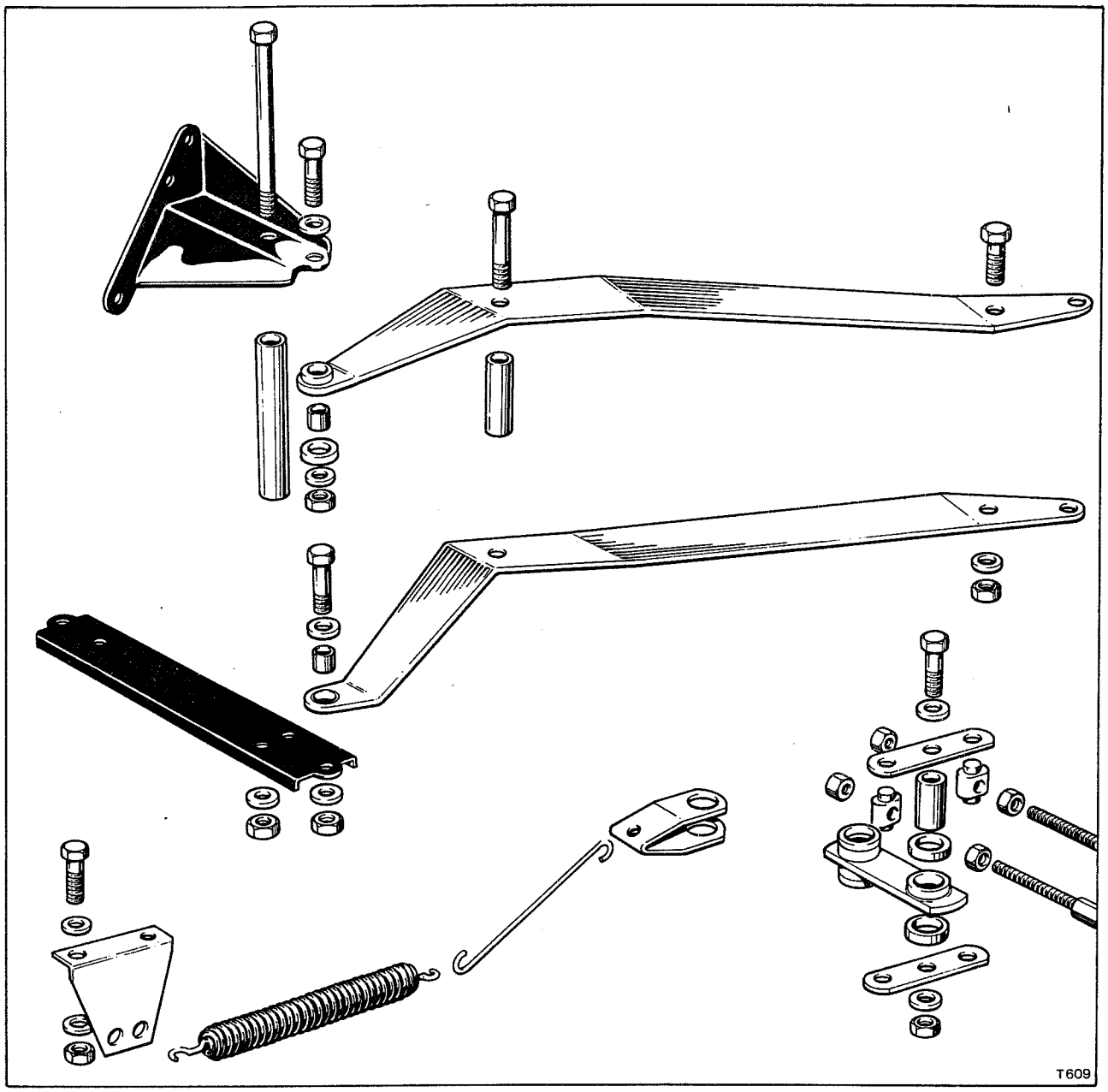

Fig. G43m Parking brake intermediate linkage (Right-hand drive cars)

Parking brake rear cables -To fit

Fit the parking brake rear cables by reversing the procedure given for removal noting the following points.

1. All setscrews and nuts should be torque tightened in accordance with the figures quoted in Chapter P.
2. Lubricate the clevis pins and cable adjustment threads with Molytone 265 grease prior to fitting.
3. Check for freedom of operation during the application and release of the parking brake. The parking brake should operate freely without roughness or binding throughout its operation.
4. Ensure that the cables are correctly located in the cable support clips and can move freely through them. Also, that the cables are routed above the lower tube of the rear suspension space frame.
5. Adjust the cables as described under Parking brake cables and calipers - To adjust.

Parking brake cables and calipers - To adjust

Before any adjustments are made to the parking brake rear cables the caliper on each rear wheel should be set as follows.

1. Remove the clevis pin connecting the brake cable to the actuation lever.
2. Disconnect the actuation rod from the actuation lever.

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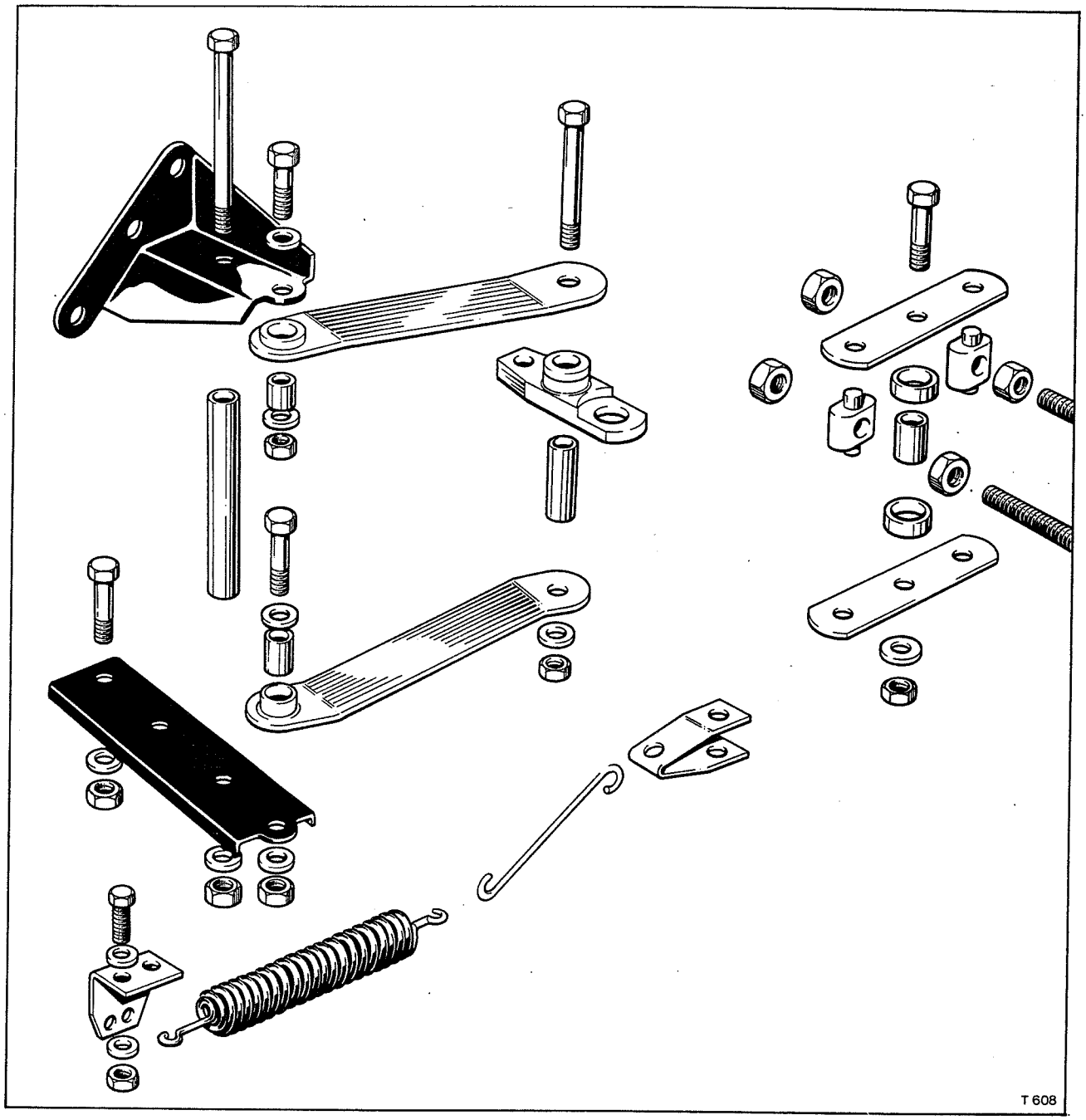

Fig. G44m Parking brake intermediate linkage (Left-hand drive cars)

3. Check and adjust if necessary, the length of the actuation rod, to obtain a measurement of 63 mm. (2.5 in.) between the exposed face of the jaw locknut and the face of the opposite jaw.

4. Position the rod onto the actuation lever; fit the clevis pin, waved washer and split pin. Lubricate the clevis pin with Molytone 265 grease or equivalent.

5. Ensure the parking brake caliper is on its 'offstop'. Check that the clearance (point A) between the washer on the spring guide rod and the spring abutment bracket is approximately 6 mm. (0.25 in.) at the point of minimum clearance. (see Fig. G45m)

Note
The washer fitted to the end of the spring guide rod must not act as the parking brake 'off stop' as this will cause caliper pad misalignment.

6. Connect the rear brake cable to the actuation lever.

7. Ensure that the parking brake is in the fully 'off' position. Adjust the rear cables at the equaliser on the intermediate linkage until the caliper 'off stops' are just clear of the caliper. Measure the gap beneath each 'off stop' and lengthen the cables at the adjusters by this amount.

Note
The cables must be adjusted so that the equaliser tranverse link, lies at right angles to the centre line of the car with the parking brake in the 'off' position.

8. Raise each rear wheel in turn so that it is free to rotate. Turn the caliper adjuster clockwise until the parking brake pads grip the brake disc. At this point it should only just be possible to rotate the wheel by hand. Turn the adjuster anti-clockwise a quarter turn (three clicks on the nut) to obtain minimum clearance between the pads and disc.

9. Ensure that the centralising straps are forcing the pads away from the disc when the parking brake is in the 'off' position. If not, remove the retaining bolt securing the straps; bend the straps outwards then re-assemble.

10. When new brake pads have been fitted carry out the pad bedding operation as described under Parking brake pads -'To bed-in'.

Parking brake pads - To renew

1. Securely chock the front wheels.

2. 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 struts

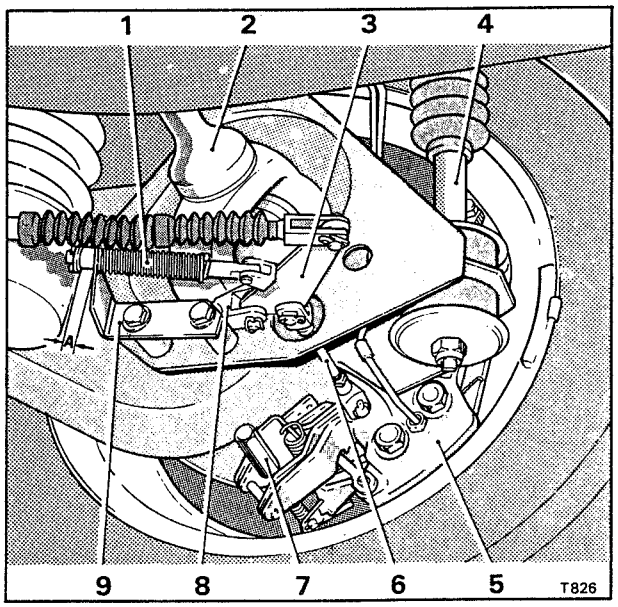

Fig. G45m Parking brake caliper and cable adjustment
1 Guide rod and return spring
2 Half-shaft
3 Actuation lever
4 Suspension strut
5 Brake caliper
6 Actuation rod
7 Caliper adjuster
8 Mounting bracket
9 Spring abutment bracket

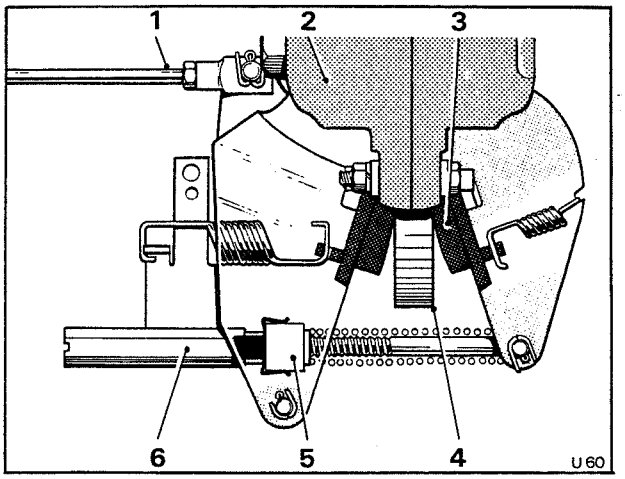

Fig. G46m Parking brake caliper
1 Actuation rod
2 Brake caliper
3 Parking brake pads
4 Brake disc
5 Adjuster clicker block
6 Adjuster

to support the full suspension load.

3. Remove the rear wheels.

4. Release the parking brake to the 'off' position.

5. Disconnect the caliper actuation rod from the caliper lever.

6. Unscrew and remove the caliper adjuster. Collect the adjuster clicker plate.

7. Unhook the pad retention springs from each brake pad; note that the larger spring is fitted to the inner parking brake pad.

8. Lift out the parking brake pads from the caliper and remove the retention springs.

9. Fit the springs to the new pads, then locate the pads in position. Hook the springs onto the caliper levers.

10. Complete the assembly by reversing the removal procedure and adjusting the calipers and cables as described under Parking brake cables and calipers - To adjust.

Parking brake pads - To 'bed-in'

When new parking brake pads are fitted to the car the following 'bedding-in' procedure should be carried out.

1. Drive the car at 48 k.p.h. (30 m.p.h.) and apply the parking brake to bring the car to rest. The parking brake should be applied in such a way that the retardation of the car is constant without locking the wheels. This operation should be carried out nine times, allowing at least one minute to elapse between applications to prevent overheating.

2. Re-adjust the parking brake caliper as described in Operation 8 of Parking brake cables and calipers - To adjust.