



P6 ROVER OWNERS CLUB

P6 BRAKE SYSTEM OVERHAUL



The P6 Rover was, in its day, one of the finest braking systems ever used on a mass produced car. It was one of the features which contributed to the model's well deserved reputation for safety. As is well known, the P6 started out with Dunlop braking but this was replaced by a Girling system with Lockheed servo later in the life of the model.

Some export cars were fitted with a dual system with independent hydraulics for the front and rear brakes. The dual systems on the four and eight cylinder models were quite different from each other.

The brakes are probably the most important safety feature of a car and they will work properly only if the correct maintenance procedures are followed and suitable materials are used.

These notes apply particularly to Girling brakes, with which I am familiar, although they will be generally applicable to the Dunlop system. The information is supplementary to that in the maintenance manuals.

BRAKE FLUID

Unfortunately conventional brake fluid deteriorates as it ages so that a policy of 'leave well alone' will eventually result in brake failure.

Conventional poly-glycol based fluid is hygroscopic (it attracts water) which lowers its boiling point and makes it corrosive to steel and other metals. It also becomes contaminated with rubber particles and dust.

The brake manufacturers recommend a brake strip-down at three year intervals or 40,000 miles with inspection and replacement of any parts found defective. Few owners carry this out. They like to believe that the manufacturer is merely protecting himself from product liability claims. For safe driving the absolute minimum maintenance, apart from pad replacement, is to change the hydraulic fluid at the specified frequency and regularly inspect the pipes for significant corrosion, the hoses for cracking and the whole system for leaks. The fluid level in the reservoir should be checked frequently and the cause of any fluid loss determined.

Recently silicone based brake fluid has become available. This appears to have considerable advantages over conventional fluid as it is resistant to water contamination and protects against corrosion. It also has a higher boiling point and does not damage paintwork.

Unfortunately, silicone fluid has poorer lubricating properties than conventional fluid, whatever the advertisers might say! It may cause the servo to stick in the 'on' position, so that the brakes continue to operate after the pedal has been released. I discussed this, some years ago, with an engineer from Automotive Products, who had the license for this servo, and he told me that sticking was a known problem made worse by silicone fluid. So I can no longer recommend its use.

BRAKE FLUID RESERVOIR

The brake fluid reservoir on the Rover 2000 contains about 250ml of fluid. The level is monitored by a float switch which should be tested occasionally by unscrewing and raising the cap with the ignition switch on and the handbrake released. This should light the warning light. As the front brake pads wear the level in the reservoir will sink. This takes place slowly. If it is found that the level is falling rapidly and topping up is required then something is wrong and must be attended to urgently. If no external leak can be found then suspect an internal leak in the servo or into the rear brake caliper covers. Do not keep on topping up with brake fluid. Apart from the risk of catastrophic brake failure, fluid will, in the case of the servo, eventually be drawn into the engine with deleterious effect.

When the fluid is being changed, the reservoir should be dismantled and cleaned with methylated spirit. Meths is a safe solvent for cleaning hydraulic components provided they are allowed to dry. Rubber parts should be immersed briefly but not left to soak. Petrol, paraffin or other solvents must not be used as they will cause contamination which will damage rubber parts. Also never allow oily fingers, tools or cleaning materials to contact hydraulic components which should be laid on clean paper (not newspaper) during dismantling and reassembly. Hands, particularly finger nails must be scrubbed clean as quite minute amounts of oil can soften rubber seals.

MASTER CYLINDER

Before starting dismantling, the master cylinder should be dismantled, the hydraulic connection holes plugged and the exterior cleaned. The bore should be free from significant scoring or pitting. If the rubber seals are shiny with sharp edges and not sticky or swollen they are fit for further use. Cleaned or new parts should be lubricated with hydraulic fluid before reassembly.

THE SERVO

The vacuum servo employs atmospheric pressure to assist foot pedal pressure when the brakes are operated. A simple test of the servo function may be carried out from the driving seat. Before starting the engine the brake pedal should be pressed a few times to release residual vacuum. Press the pedal with moderate force and start the engine. If the servo is working properly, the pedal will be felt to sink slightly as the servo increases the pressure in the hydraulic lines. This test also works with modern non-hydraulic servos. Whilst carrying out a brake overhaul dismantle the servo and shake it.

Listen for fluid in the diaphragm chamber. If fluid has leaked into the chamber you will either have to strip down the servo and fit a new Lockheed seal kit, which presents no particular difficulties as it comes with clear instructions, or get a new or second hand unit. Always check a second hand unit from a scrap yard before buying and make sure, if the unit has been stored, that the hydraulic connections have been plugged to prevent moisture ingress. New servos are no longer available and seal kits are not cheap. Reconditioned units are available and they are a safer bet than one bought second hand from the scrap yard. There is a laminated paper air filter in the small plastic diaphragm housing on the side of the unit. Snap off the cover and wash the element in methylated spirit, allow it to dry and replace it.



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FRONT BRAKES

When working on the calipers take care not to breath dust from the brake pads. This contains asbestos fibres which can cause lung cancer later in life. A disposable face mask can be cheaply obtained from a tool shop and offers useful protection.

The Girling front brake calipers are simple in design and similar to those fitted to many British cars of the period. If the discs are rusted so that the effective braking area is significantly reduced, they should be replaced or skimmed. Specialist firms will do this and leave a very good surface finish. More important, they will know how much material may safely be removed without risk or weakening the discs. Before refitting the discs to the hubs clean the surfaces to ensure that the disc sits truly on the hub.

The pistons should be removed carefully from the calipers using compressed air. A foot pump and Schrader valve soldered to a bit of hydraulic pipe is useful here. Do not separate the two halves of the caliper as they cannot be reassembled again! The design of the rubber dust covers or boots was change in 1969; so the correct replacement kit is needed. My car was built in April of that year and had the old pattern on one side and the new on the other!

If the pistons are pitted by rust, as can happen if the boots are split, then it is advisable to fit new pistons. These can be hard to find and they are no longer stocked by Unipart. Girling brake specialists are the most likely source. The caliper bores may be cleaned with a knife, taking care not to scratch the surfaces.

REAR BRAKES

The rear brakes of the P6 are infamous for their inaccessibility. I have fairly small hands and have always managed without too much difficulty to remove and fit pads and to dismantle the calipers. Should you find it impossible to work in the confined space then you have two options. You can remove the discs by disconnecting the drive shafts or you can lower the final drive unit allowing it to hang on the drive shafts. (Disconnect the hydraulic hose first!) Should the discs be badly corroded they may be skimmed or replaced.

Instructions for the removal of the calipers may be found in the manuals, but there are some points to watch. When you lie under the well supported car working on the rear brakes, your face will be showered with black dust. As mentioned earlier, this may contain asbestos fibres, which are potentially lethal. Protect your nose and mouth with a mask or even a handkerchief tied on bandit fashion! The bellcrank mechanism must be removed before the calipers. The pins and links should be checked for free movement and greased. Note the anti-rattle spring between the crosslink and one of the caliper covers.

The calipers are complicated but the seal kit comes with an excellent instruction sheet. If you reassemble using the old seals and do not buy a seal kit, try to re-use the grease which is black (probably molybdenum grease). Copper grease used sparingly on the ratchet, push rod and other moving parts should be satisfactory as it is well suited to high temperature applications. The hydraulic seal and cylinder should be lubricated with a spot of hydraulic fluid. If the moisture absorbent paper is to be re-used then it is worth drying it, by heating it in an oven or on a hot radiator, before inserting it in the caliper.

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The hand brake cable should not need adjustment but if it is found to be very loose when the calipers are replaced then the slack may be taken up using the adjuster at the rear of the exposed cable above the transmission shaft.

PIPES AND HOSES

The brake pipes are made of steel and plated to reduce corrosion. However, rusting is inevitable at the more exposed pipe runs such as the short lengths connecting to the front calipers, the pipe run across the front chassis member and the rearmost portion of the pipe serving the rear calipers.

Ready made copper pipes may be obtained from specialist suppliers. These come cut to length with brass fittings and correctly flared ends. Copper/nickel pipes are better as they do not fatigue. Alternatively a coil of steel pipe may be bought which can be cut to length and formed using the old pipes as models. A flaring tool is required to form the ends. Care must be taken to cut the ends square and chamfer them correctly. Avoid getting swarf in the pipe and blow it through with a foot pump in any case. The tools must not be lubricated with oil; hydraulic fluid may be safely used. Remember to put the nuts or screws on to the pipe before forming the flares!

I always wrap the ends of the pipes with paper secured by adhesive tape whilst mounting them on the car to avoid ingress of dirt. The clips which secure the pipes should be replaced or at least the rivets should be drilled out and replaced otherwise the pipes may vibrate and fail through fatigue or abrasion. If it is not well secured copper pipe is particularly prone to fatigue cracking.

The rubber hoses harden and may split with age but they are easily replaced. The nuts which secure the hoses corrode, but do not be tempted to use penetrating oil if you intend to re-use the hoses. Always use two spanners when tightening coupling or fixing nuts on the hoses. This is essential to avoid twisting the hose or damaging the supporting tab.

Bleeding the brakes is a necessary operation to remove air from the pipes and cylinders. It should be continued until all air has been expelled from the system. The correct sequence is to release air from the driver's side front caliper, the rear caliper (one nipple) and lastly from the passenger's side front caliper. The correct procedure is described in the handbook. It is possible to bleed the brakes without pressing the brake pedal, relying on gravity to push the fluid through the pipes. It takes longer, but you can do it alone and it uses less fluid as the fluid does not spurt into the cylinders and form air bubbles.

A brake overhaul is a major task costing quite a sum, but provided you carry it out carefully with a high standard of workmanship you can have the satisfaction of knowing your brakes have been returned to "as new" standard and if you use copper or copper/nickel pipes you can extend the period before more work becomes necessary.

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