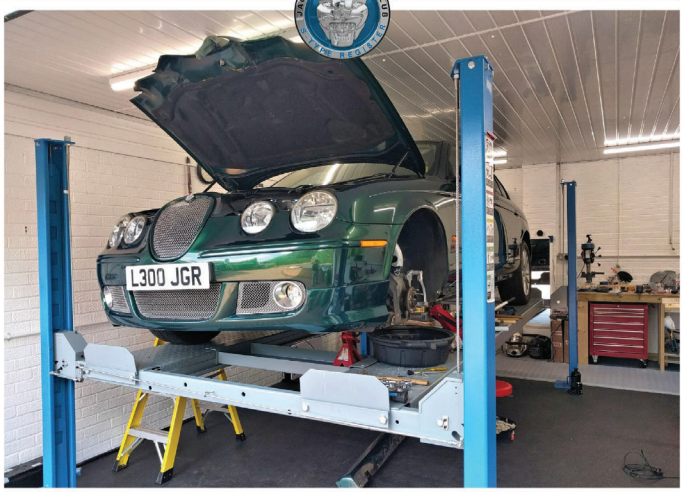



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Brian Burgess has some expert advice on the safe way to carry out routine maintenance on your S-Type's brakes at home



Looking after safety-critical items on our cars, such as the braking system, is often a task entrusted to a local dealership or specialist. However, there is no reason why you shouldn't tackle normal wear-and-tear maintenance on the brakes involving the replacement of pads and discs yourself, assuming you are moderately competent.

The brake mechanism arrangement on the modern S-Type, like that of many modern cars, is straightforward and accessible. Service parts are easily obtained at competitive prices and are generally well supported by aftermarket sources, many of which are worth considering. A good online source – *www.autodoc.co.uk* for example – offers a wide range of aftermarket parts to suit all applications and budgets. That said, I would always use and recommend original equipment manufacturer (OEM) parts on safety-critical systems – and yes, they are vastly more expensive! A good source of OEM brake parts is eBay and I generally buy these as they become available and store them away in readiness for when they are needed.

The tools required for a basic brake overhaul include a range of metric spanners and sockets, along with a brake caliper piston retractor (wind-back) toolkit. A kit can be purchased on eBay for as little as £14. Additionally, you will require an ample supply of brake cleaning fluid and abrasive hand-tools (for buffing up the calipers).

REPLACING PADS AND DISCS

When should you replace brake pads and/or discs? Put quite simply – when they are worn down to or beyond the manufacturer's minimum safe operating limits.

There are other conditions apart from normal wear that might also require replacement. Distortion or warping (technically referred to as 'run-out') can occur in discs, although this is more likely with cheap aftermarket discs than with OEM ones. Disc distortion can exhibit itself as abnormal side-to-side movement (judder) of the steering during braking. If the brake mechanism has picked up contaminants such as road grit, this can become embedded in the surface of the pads resulting in uneven furrows and damaging both the disc and the pads. If this condition is spotted early enough you may be able avoid further damage by simply replacing the pads.

Another thing to look out for is brake fluid contaminating the pads. This can be caused by a leaking caliper piston seal and will, of course, render the brakes unsafe and require remedial work on the caliper piston seals and the hydraulics.

This article covers the replacement of front and rear pads and discs, along with the disc backplates and cosmetic treatment. The vehicle is a 2005 S-Type 3.0 SE within VIN range M45255 to VIN N52047. The front discs have a diameter of 300mm, although these were uprated to 320mm on later builds of this model.

BRAKE MECHANISMS

We'll begin with a brief description: the standard front brake caliper has two retaining bolts that attach the caliper to the anchor plate. These are of double floating caliper 'sliding-rail' type, which ensures that equal effort is applied through both brake pads. The anchor plate is attached to the wheel knuckle with two bolts and serves as a retaining cradle for the two pads. The caliper has two unequal-diameter pistons. The smaller of the two pistons is located to the 'leading' side of the caliper in order to provide a progressive braking action. The pads are bevelled on the leading edge with the aim of eliminating brake 'grab' or 'squeak'.

The standard rear brake calipers are of the single-piston floating caliper sliding-rail type, which also incorporates the park brake mechanism. The caliper is both hydraulic and mechanical and will require a mechanical 'piston reset'. The park brake may also require an electronic reset/recalibration after fitting new pads.

The standard front and rear brake discs are manufactured from cast iron and are of the vented type. Both are retained on the hub by two retaining clips and the wheel studs.

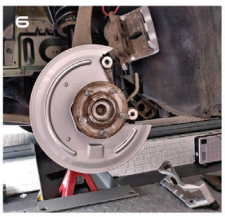
PREPARATION

In addition to the hand-tools mentioned earlier, you will need a trolley jack or equivalent lifting device, along with axle stands and wheel chocks. While I had the benefit of a four-post car lift, which allowed me to work with the car at a comfortable standing height, this also introduced a bit of a problem. I found that at this height (1 metre from the ground) I was faced with lifting the wheels from the car to the floor and back four times.

To make life a bit easier, I constructed a floor-standing mobile cradle with two forward-facing arms that slide under the wheel when the car is raised. On removing the wheel nuts, I am able to slide the wheel back along the two arms and move the cradle and wheel to one side.


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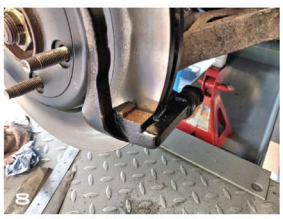

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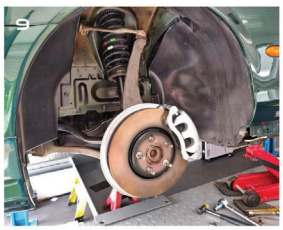
Facing page, top: *Front nearside brake work in progress with the help of a lift*

Facing page:
1 *Home-made mobile wheel cradle solves the problem of lifting the wheel off when the car is raised on a ramp*
2 *Offside front brake before disassembly*
3 *Nearside front brake shown stripped*

This page:
4 *Nearside rear brake shown stripped*
5 *Nearside front brake painted*
6 *Nearside front with new backplate fitted*
7 *Offside front with new pads and disc fitted*

SAFE BRAKE KNOW-HOW


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FRONT BRAKES OVERHAUL

With the wheel removed, undo and remove the two bolts holding the caliper to the anchor (cradle) plate and lift away the caliper. Using a suitable tie, such as a length of strong wire or string, hang the caliper on the upper wishbone. Be careful not to damage the hydraulic pipe. Remove the two brake pads, noting their orientation. Remove the two bolts that hold the anchor plate to the wheel knuckle and remove the plate.

To remove the disc, pry off the two steel stud retaining clips and remove the disc.

If you are replacing the backplate, then drill out/remove the 6mm blind rivets from three positions, being careful not to damage the alloy knuckle casting. You may need a 5mm parallel steel drift to aid in the removal of the rivets. On refitting the backplate, use 6mm stainless-steel nuts and bolts in place of the blind rivets.

At this stage you might choose to perform some cosmetic work. I fitted new backplates, which I primed and painted with Silver for Wheels aerosol paint. I cleaned the caliper and anchor plate with brake-cleaning fluid and buffed them up with a Dremel rotary attachment made of the same green abrasive material as Scotch scouring pads.

With the caliper still attached to the upper wishbone, retract (wind back in) both pistons using the correct size adaptor tool from the wind-back kit to their 'home' position – i.e. level with the dust covers. Monitor the fluid level in the master cylinder reservoir because pushing the pistons back will cause the fluid level to rise.

Remove, clean, regrease and refit the two sliding rails on the anchor plate, being careful not to damage the rubber dust covers. Fit the new disc to the hub ensuring that the mating surfaces are clean. I used a smear of copper grease between the two faces. Whilst holding the disc in position, fit new retaining clips to two of the studs. A small hollow steel tube or socket can be used to assist fitting.

At this stage you can paint the caliper and cradle with smooth silver Hammerite paint if you choose. When the paint has hardened (I left mine overnight), refit the cradle and tighten the two retaining bolts. Fit two new brake pads, ensuring that the bevelled leading edges are correctly orientated. Add a smear of copper grease to the surfaces of the anchor plate where the pads slide towards and away from the disc during operation. Apply a smear of copper grease to the faces of both pistons and refit the caliper in position over the pads and cradle. Ensure that grease does not contaminate the friction surfaces of either the pads or disc. Tighten the two retaining bolts. Apart from replacing the wheel – that's it! However, before you put the wheel back, double check that all mounting bolts are secure and the hydraulic lines are in place. Operate the foot brake to normalise the fluid level and to check brake operation. This procedure is the same for both front brake assemblies.

REAR BRAKES OVERHAUL

The rear brake unit is similar in operation to the front one when using the foot brake since it employs the same floating double sliding-rail caliper. However, the rear brake incorporates the electronically operated and adjusted park brake, so it requires a couple of additional procedures during the overhaul process.

This page:
8 *Anchor plate showing copper grease application area*
9 *Nearside front with new pads and disc fitted*
10 *Rear piston wind-in (reset) tool*
11 *Measuring rear brake piston wind-back clearance requirements*

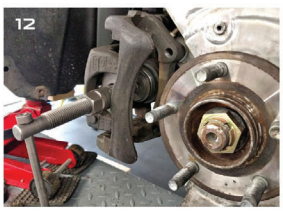
Facing page:
12 *Nearside rear: resetting caliper piston*
13 *Rear caliper piston showing 'home position' after reset*
14 *Offside rear brake with new pads and disc fitted*
15 *Nearside rear with new pads and disc fitted*

Before jacking the car and removing the rear wheel, place chocks under the rear of the front wheels. This will stop the car moving because the park brake has to be disabled before the brakes can be worked on safely.

Disable the park brake (i.e. release the handbrake) as follows: switch on the ignition; hold down the foot brake; press the park brake activation switch down until the dash warning light goes out; switch off the ignition; then release the foot brake. The rear wheels should now rotate freely so ensure that the front wheels are chocked securely before raising the rear of the car.

With the wheel removed, first confirm that the park brake has released and that the disc is not being restricted. Remove the two bolts holding the caliper to the anchor (cradle) plate and hang it up out of the way as you did for the fronts. Remove the two brake pads. Remove the two anchor plate bolts and remove the plate. Pry off the two disc retaining clips and remove the disc. The rest of this process, as you will see, is the same as for the front brake. I did not replace the rear backplates but merely cleaned, buffed and repainted them with smooth silver Hammerite. The difference between the front and rear calipers is the way in which the piston retraction procedure is performed. Unlike the front caliper pistons, that had to be pushed back into the caliper body, the rear piston must be rotated clockwise (screwed in) back into the caliper body. The wind-back kit will include the necessary adaptor, which is illustrated here.

To perform the wind-back, fit the correct adaptor to the caliper then bolt the anchor plate back onto the knuckle and bolt the caliper back onto the anchor plate. This enables the caliper to be held firmly whilst the piston is wound back in by the adaptor. I have read that if the piston is wound back in too far it can compromise the park brake re-calibration procedure, which may have to be performed when everything has been refitted. So, to measure exactly how much to wind in the piston, place the new pads either side of the new disc and measure their total width with a vernier gauge – a ruler would probably suffice. The resulting measurement should be circa 55.5mm (see image). The piston has a fine thread, so it does take quite a few turns before achieving the correct clearance. Refitting everything else after that is a reversal of the removal process. When the brake assembly is reassembled, turn on the ignition and press the footbrake. The park brake should re-adjust itself to the new position for the replacement pads. If a park brake error message appears then the Electronic Park Brake (EPB) will need to be re-calibrated (see the instruction box for how to proceed).


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ELECTRONIC PARK BRAKE INSTRUCTIONS

To reset/recalibrate the EPB module, proceed as follows:

1. Switch off the ignition; disconnect the battery for 30 seconds; then reconnect the battery
2. Start the engine
3. Firmly apply and release the footbrake five times
4. Confirm that the message 'NOT CALIBRATED' or 'APPLY FOOT AND PARK BRAKE' is displayed on the instrument cluster message centre. This indicates that the parking brake is in calibration mode
5. Lightly press the footbrake pedal
6. Apply the parking brake by using the EPB switch
7. Release the parking brake
8. Release the footbrake
9. Confirm that the brake warning lamp is no longer illuminated on the instrument pack and that the 'NOT CALIBRATED' message is no longer displayed in the message centre
10. Apply and release the EPB five times to ensure no error is present