Plate tectonics

Light-alloy brake calipers – as fitted to many Porsches during the 1980s and 1990s – can suffer from corrosion, which makes it difficult, if not impossible, to fit new friction pads, and can cause other problems, too. But renovating them isn't a particularly difficult job, reckons Philip Raby. Photographs by the author and Peter Robain

During the 1980s Porsche began gradually to switch to Brembo aluminium four-piston brake calipers in place of the earlier cast-iron units (although aluminium items of a simpler design were seen as early as 1969 on the front of the 911S).

There were several reasons for this, but it was done primarily in order to reduce what is known as unsprung weight (see page 99) and thus improve the cars' road-holding. In addition, aluminium is a much better conductor of heat then cast-iron.

But aluminium is also a relatively soft material, so these calipers feature thin, stainless-steel plates above and below each pad. These are designed to spread the operating load over a wider area and, as a result, to prevent the pads digging in to the metal when the brakes are applied.

The problem, however, is that over a long period of time the aluminium beneath (or above) each plate begins to corrode, the situation made worse by the presence of road-salt and other impurities, and not least the considerable amount of heat that can be generated within the caliper.

This corrosion forces the plates away from the caliper body. This can cause the pads to bind slightly and perhaps to squeal when the brakes are applied, but you're unlikely to be fully aware of the problem until you come to install new pads and find that they won't fit. You could (and some do) grind material off the pads' metal backing plates, but this isn't recommended, and the corrosion will only continue to worsen.

The solution, then, is to dismantle each caliper, clean off the corrosion, and fit new stainless-steel plates. If all goes well you're looking at about three hours per corner. It's not an expensive job, either. New plates and screws come in a kit for

Repair kit consists of plate and two special screws – you'll need four kits per car

What you'll need

- Caliper repair kit (stainless-steel plates, special screws)
- Brake pads with anti-squeal shims and wear sensor wires and clips
- Reasonably large vice
- Gas-powered blowtorch
- Two mild-steel plates cut roughly to size of brake pad (see text)
- 4mm hexagonal key ('Allen' key) and/or 4mm Torx drive
- Fine-grade file
- High-temperature copper grease
- Thread-locking compound

around £26 (plus VAT) per caliper.

It's rare that the job isn't straightforward. Occasionally, however, the screws retaining the baseplates simply won't budge, or the heads are damaged. If this happens you might be able to drill them out, but you risk damaging the thread in the aluminium caliper body. You're better off cutting your losses and obtaining a reconditioned caliper for a cost of around £150 each.

Always renovate calipers in axle pairs (and ideally as a set of four). If you tackle just one side it could adversely affect the car's stability under heavy (or even moderate) braking. And brakes are a critical safety feature, so if you are in any doubt at all about your capabilities then you must entrust the work to a qualified specialist.

We took our 964-model 911 Carrera 4 to Oxfordshire-based independent Porsche specialist Autofarm, where technician Chris North showed how the job is done. ■

This is a front caliper from our 964-model 911 Carrera 4. The stainless-steel plate on the left of the photo has clearly lifted away from the aluminium caliper body beneath. It would be impossible to fit new brake pads in this situation without grinding material from the pads' backing plates – which certainly isn't recommended

Once you've removed the brake pads you need to undo the two screws holding each plate in place. They're secured with thread-locking compound, so you'll have to heat them in order to release them. Protect the pistons and their rubber seals with steel plates (cut roughly to the size of the brake pads) and direct a blowtorch on the screw head until it's red-hot. You can then remove it with a 4mm hexagonal key (or possibly a Torx driver if the screw has been renewed before; more on this in a moment)

Once the screws are out of the way the plate should be free to move. But you might still need to lever it away from the caliper using a screwdriver (take care not to damage the aluminium, though). Our 964's calipers weren't badly corroded but, as you can see, the plate has clearly seen better days and is fit only for the bin

page 98 ➤

Got one of these?

If you own one of the Porsches listed below then this feature will be of potential interest to you.

944 Turbo

944S2

968 (all variants)

964-model 911 Carrera 2 & 4

993-model 911 Carrera 2 & 4

928S4

928GT (above) & 928GTS

Later models of Porsche – namely the 996-model 911, the Boxster and now the Cayenne – have a different design of brake caliper that shouldn't suffer from the problem described – and rectified – in this feature. ■

Although the plate must be replaced, the caliper itself can almost always be reclaimed for another tour of duty. You'll need a fine file carefully to smooth off any corrosion in the area round the stainless-steel plate. It's important not to get too carried away, though, and remove good metal from the caliper, otherwise the pads won't be held firmly and could vibrate and squeal. Check that the new plate sits correctly

It's important to fit new anti-squeal shims. These have special self-adhesive pads that stick to the backs of the brake pads (so remember to peel off the backing paper before fitting the pads). The shims dampen any vibration, thus reducing the risk of noise during heavy or even moderate braking. Tit new wear-indicator wires and clips, too

Once you're happy with the condition of the surface, use a brush to spread a very thin coat of high-temperature copper grease around the area that the plate will sit on. Don't overdo it, though; you don't want grease finding its way onto the pads and discs. This will go some way to prevent corrosion recurring. Eventually, though, this will dry up and corrosion will set in again. You're looking at up to five or even 10 years, though

Now you can fit the new plates. It's essential to use thread-locking compound on the screw threads. Always use new plates and new screws; they come together in a special kit. Wipe off any excess grease at this stage

Taking the weight

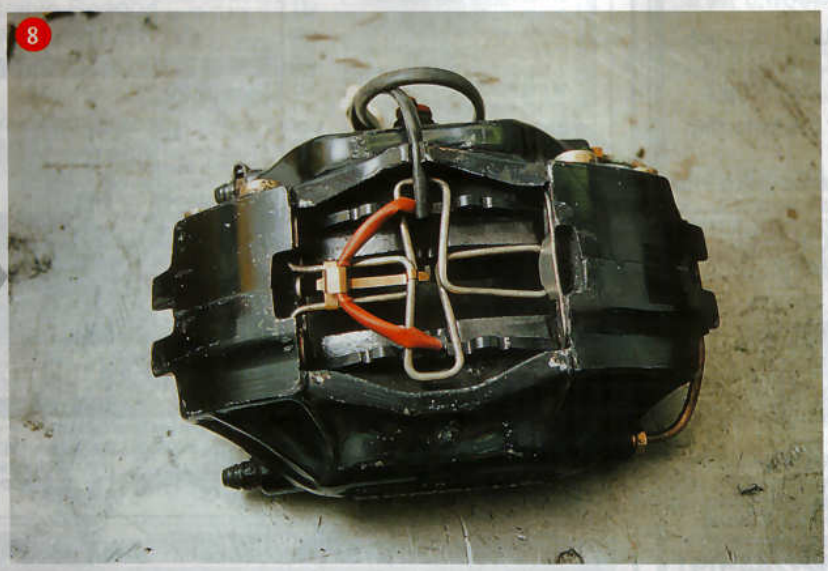
Sprung weight is defined as that which is supported by the vehicle's front and rear springs. Logical, really.

Unsprung weight, by comparison, is everything 'downstream' of the springs. In other words the hubs, brakes, certain parts of the suspension (those that move relative to the car, in effect), and the wheels and tyres.

As any car travels along the road the suspension is constantly moving up and down to compensate for variations in the surface, and during cornering to ensure that the wheels remain firmly in contact with the road.

The lower the unsprung weight, so the more quickly a wheel can accelerate as it moves up and down. This means that it will follow the road better. What's more, the suspension can stop the motion of the wheel more quickly if it has less mass to control.

In addition, reducing the weight of the calipers helps to reduce the overall weight of the car, thus offering better performance. ■



Here's the reassembled caliper complete with new pads. Note that the stainless-steel plate now sits firmly against the aluminium. The caliper shouldn't require any further attention – apart from routine fitting of new friction pads as required – for several years

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