

गठकथा

Part 7 of 9





Welcome to **Get To Know Your 7**. This is a download copy of a series of articles looking at the essentials of routine maintenance for your Seven. These first appeared in the Lotus 7 Club magazine 'Lowflying' between August 2010 and May 2011.

Each article will be a separate download and below is a table of contents as to which articles are in this series. The article you are currently looking at will appear in bold in the table of contents.

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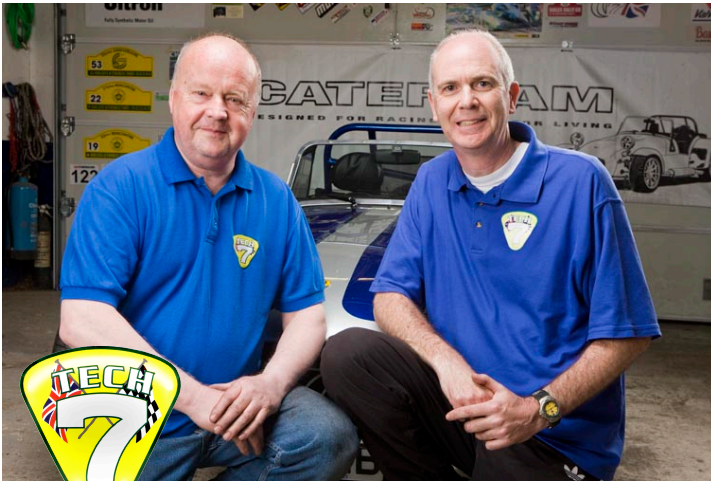
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In This issue we begin a major series looking at the essentials of maintaining your Seven. Even if you don't want to become a home mechanic, we hope this will encourage you to learn a little more about your car.

The notes for this series are prepared by **Andy Belcher, Rob Davis** and **Michael Calvert**, and the photographs are by **Jamie Jones**. *So, let us begin...*



Road & Track
Engineering Solutions

Andy Belcher (left) and Rob Davis

Introduction

Owning a Seven can bring you a wide range of experiences; one of these is the opportunity to carry out the servicing of the car yourself. Although many prefer to entrust the maintenance of their 'pride and joy' to one of the many specialist garages available, carrying out your own servicing can save you money, provide immense satisfaction and bring you a step closer to understanding the running of your car.

Over the coming months, this series of articles will build upon the theme of the Get to Know Your Seven (GTKY7) experience days which have been regularly organised through the Club, and extend into providing an overview of the basic tasks and procedures required to maintain your Seven.

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During this series, we'll be looking at the following:

Raising and lowering the car

- including front and rear axle stand positions and trolley jack lifting points

Engine and transmission oil

- oil change for dry sump and wet sumps,
- oil filter removal and re-fitting,
- checking and topping-up gearbox oil,
- changing gearbox oil (specific models),
- checking and topping-up differential oil,

Front wheel bearings

- checking bearings for excessive play

Wheel and tyres

- checking tyre condition and tread depth,
- wheel nut re-tightening torques

Brakes

- checking condition of discs,
- checking brake pad thickness,
- changing brake pads,
- handbrake operation

Suspension

- general suspension security checks,
- lubricating trunnions (where appropriate),
- A-frame bush

Prop-shaft

- greasing universal joints on prop shaft (Series 3 and SV)

Fuel system

- checking fuel lines for security and leaks
- changing fuel filter
- carburettor balance and idle settings

Fluids

- checking coolant, brake and clutch fluid

Air filter

- checking and changing air filters

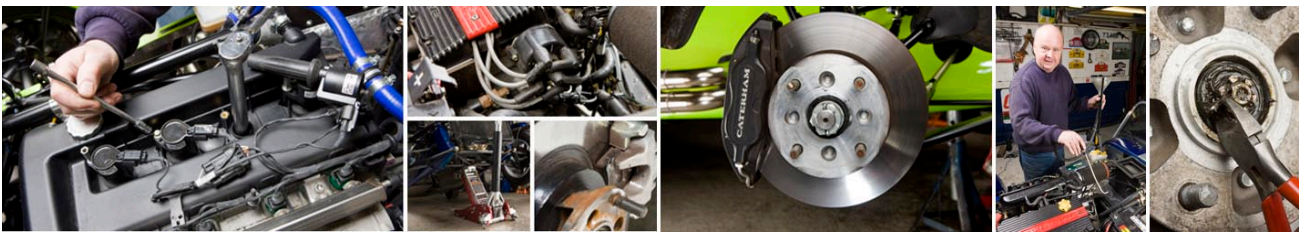
General inspection items

- exhaust condition, lights and bulbs, CV gaiters, hose condition and security, drive belts, headlight alignment, battery condition, engine mounts, wiper condition, seatbelts

Steering

- steering wheel alignment and play in steering rack

Vehicle underside condition



Safety is a very important issue when working on the car, so you must take the appropriate precautions; specific examples of this will be emphasised as part of this series. It goes without saying that no work on any safety related area should be undertaken unless the person undertaking that work is fully confident in being able to complete the tasks to the required standard. Certain more complex jobs, outside of routine servicing, should only be tackled by a competent professional, or at least with experienced help. If in doubt, a request for help on BlatChat or at your local Club meeting is more likely than not to result in the offer of assistance.

The CSR benefitted from many technical developments over Caterham's more traditional variants, including inboard front suspension, independent rear suspension (and a Cosworth-developed engine); the csr presents certain particular servicing considerations over the more familiar Series 3 cars. But as far as possible this series is targeted at the broad spectrum of Caterham owners across Series 3, SV and CSR variants.

Undertaking a yearly service will require you to have a basic knowledge of the workings of the car—however it does not require you to be a mechanic or expert. This series of articles will take you through the service procedure, identifying any specific tools and parts required. Relevant pictures will add to the understanding of the steps, along with particular safety instructions. For owners who have not undertaken such tasks before, or maybe are not confident at this stage, we hope to provide encouragement in understanding the workings of the Seven and a better understanding of what a garage would do on your behalf as part of the service regime.

We begin with a resumé of the main chassis types of the various Caterham cars—as those differences in configuration can dictate some differences of procedure.

The essential differences...

The Caterham Seven has many different chassis and engine variants, so it is not possible to comprehensively cover every type here in great detail. Therefore, we will discuss general procedures and checks which should be applicable to most cars, highlighting where they are relevant only to certain cars. The most important thing to understand initially, therefore, is which car chassis and engine type you have...

The Series 3 chassis has traditionally been the main version supplied by Caterham, but many designations have been used for different models within the Series 3 range, based on combinations of engine, major components and interior—these include the model names such as Supersprint, hpc, Classic, Supersport and Superlight.

The basic dimensions of Series 3 chassis can trace their origins to the Lotus Seven Series 3, although improvements such as the option of a 'Long cockpit' chassis from 1982, to improve comfort for the taller driver, and the introduction of the 'de Dion' rear suspension from 1985 in place of the 'live axle' were just some of the changes implemented by Caterham over the years.

Engines offered with the Series 3 chassis have been many and varied, but most popular over time have been Ford Crossflow (or 'Xflow'), Vauxhall 16v and 8v, Rover K-series, and most recently Ford Sigma.

The SV ('Series 5') chassis, whilst sharing similar external proportions to the Series 3, has increased length and width to provide added cockpit and storage space. These cars also use the de Dion rear suspension and are powered by Rover K-series and Ford Sigma or Duratec engines.

The CSR represents the latest chassis development (apart from subsequent detail changes to the s3) introduced in 2005 and is of different construction to the Series 3 or SV, with fully independent rear suspension and inboard, push-rod type, front suspension. The engine fitted to this car in the uk is the 2.3 litre Ford Cosworth Duratec; internationally, the 2.0 litre is now also available in eu4 variant.

We begin the series, with something straight forward but fundamental: getting the car off the ground, and sitting secure and stable for you to examine, explore or progress to other tasks.

Part 7: Raising the front and rear of the car



In this instalment we look at a variety of routine checks and service procedures: suspension, prop shaft, fuel system, carburetor balance, fluids, air filter etc.

Due to the number of variations of the Seven within the range of s3, sv and csr models, you may well find slight differences between your own car and some of the pictures and descriptions used here but the principles are the same.

Suspension checks

This procedure comprises a visual check of the front and rear suspension for security and any deterioration of components. It is necessary to raise the car onto axle stands and remove the road wheels for ease of access. Starting at the front of the car, check that the suspension bolts are secure. Methodically check, with a spanner or socket that all bolts are tight. Each derivative of Seven will be slightly different. For example, the csr has inboard suspension at the front; however the same checks can be undertaken. Also check for visible signs of leakage of fluid from the dampers. If leaking, then the units most likely require replacement.

Repeat this series of checks at the rear.

Lubricating the prop shaft

The prop shaft universal joints on the Seven require periodic greasing to ensure their longevity. On the s3 /sv these are accessible from beneath the car. However, the csr's prop shaft is boxed-in with a

Safety Points:

Take care if the car is to be raised; safe use of jack and axle stands was covered in Part 1 of this series.

Equipment required:

Tools:

- Trolley jack
- Axle stands
- Inspection lamp
- Grease gun
- Small battery torch

Parts:

- Grease (eg: Castrol LM)
 - Coolant anti-freeze
 - Brake fluid
 - Clutch fluid
- (check the owner's handbook for specifications of fluids)
- Air filter element (if required)
 - EP90 gear oil (for trunnions if fitted)

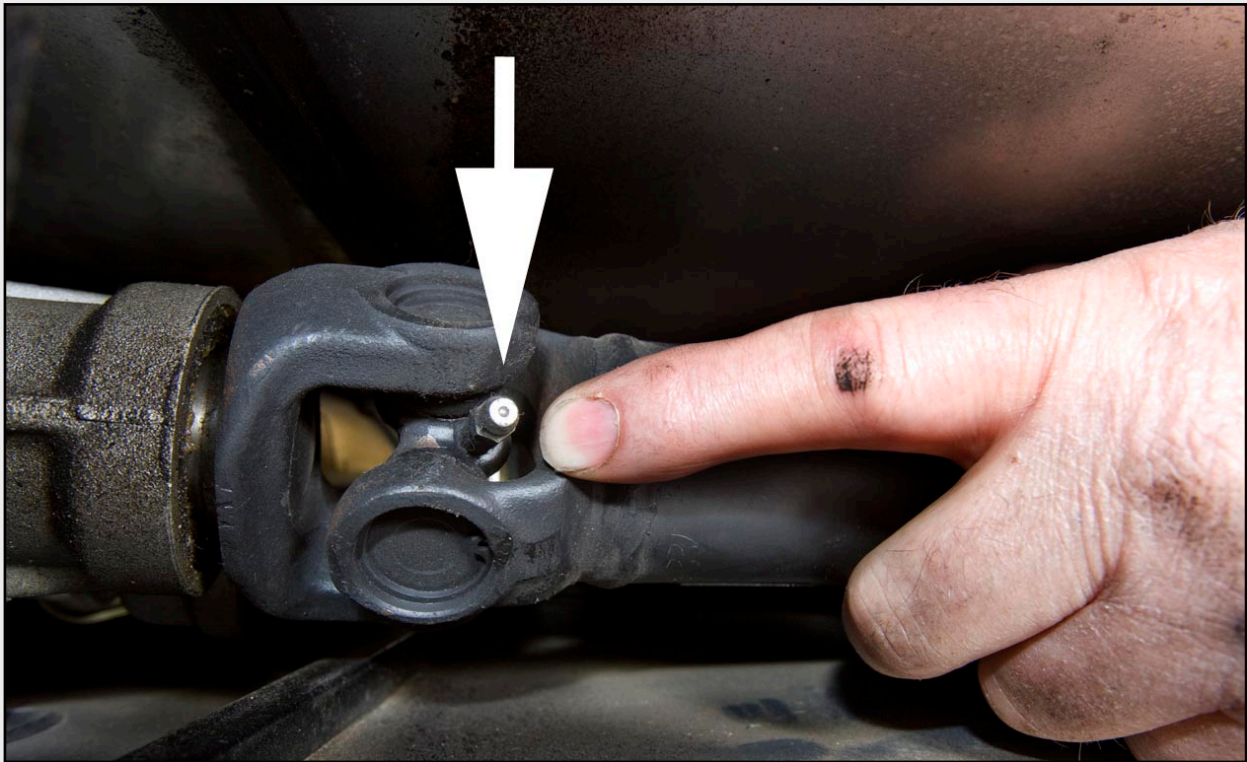


Fig 1: between the yokes of the universal joints of the prop shaft are the grease nipples (one for each joint); this is the rearward joint, just ahead of the differential...

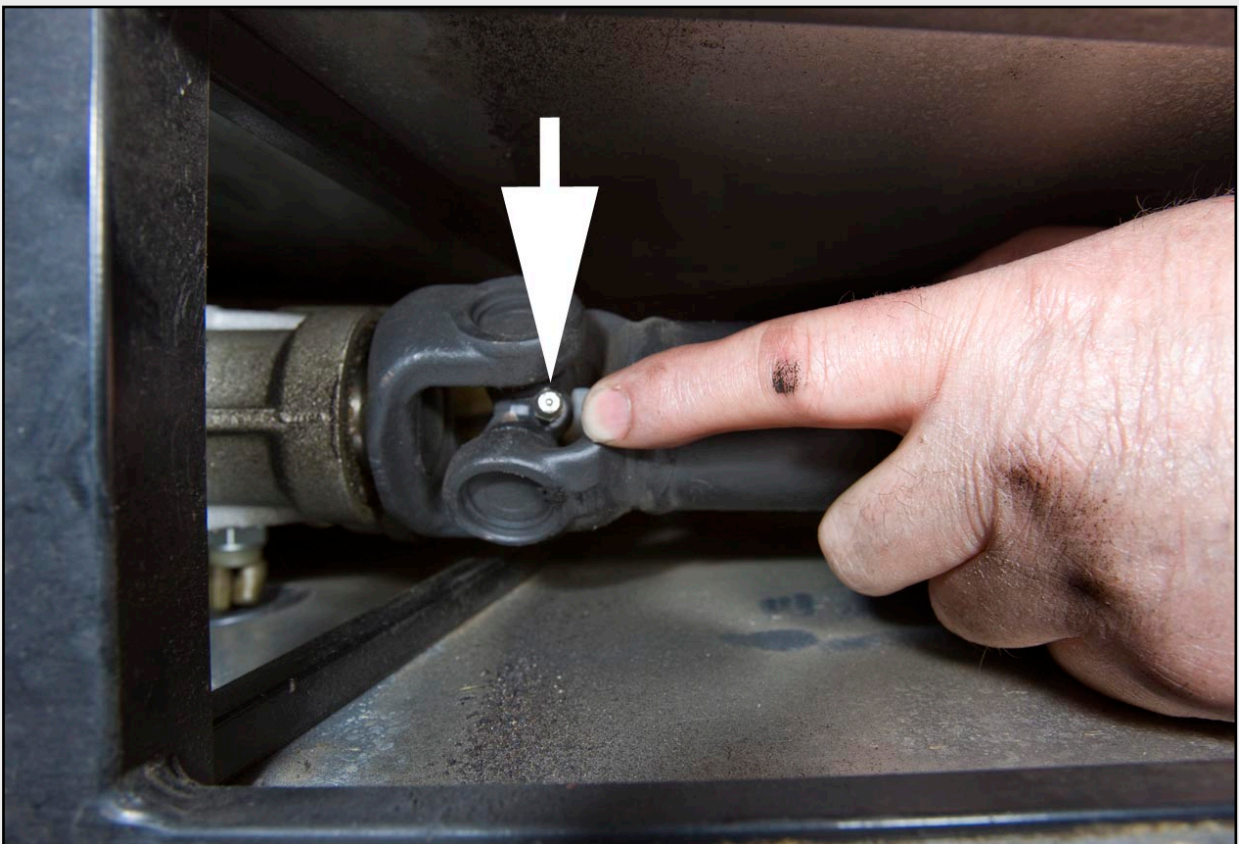


Fig 2: and this is the forward joint, just behind the rear-most part of the gearbox casing. Looking from beneath car, up into the transmission tunnel.

riveted cover plate along its total length; this prevents access to the ujs for frequent maintenance. It is likely

that the car is able to cover in excess of 20,000 miles before this is a problem, at which time removal of the cover plate may be necessary. Alternatively, access to the grease points could be achieved whilst undertaking any work that requires the engine to be removed.

With the car securely supported on axle stands, the grease nipples can be seen on either end of the prop shaft, see **Figs 1 and 2**.

Wipe any dirty grease or road grime from the nipple and then, using a grease gun, inject grease at these points – taking care not to damage the nipple.

Checking fuel system for leaks

Note: this operation must only be undertaken in a ventilated area; any light source used should be sealed and – obviously – no naked flames or smoking in the vicinity! Checking the fuel system for leaks is an important but simple procedure.

The use of a small, bright, sealed battery torch is invaluable here. Starting at the rear of the car, visually check the fuel tank for signs, or smells, of fuel leaks.

Work methodically from the fuel tank, its entry and exit hoses and connection joints, tracing the visible route of the fuel pipes to the fuel filter (typical example in **Figs 3 and 4**).

Continue forward from the fuel filter (not applicable to all models) along the length of the car to the engine compartment, again looking for any signs of leaks. The fuel pipes may not be visible for the entire routing.

Any signs of leaks need to be fully investigated and remedied by a competent and experienced person. If in doubt, seek assistance!

Changing the fuel filter is a relatively simple operation, although in some set-ups access can be a little awkward. This needs to be undertaken with care due to the flammable characteristics of petrol. It's recommended that this is undertaken by a competent person.

Fluid levels: coolant

Checking and maintaining the correct coolant levels in the engine is an important but simple procedure on the Seven. Using the correct antifreeze specification (and correct concentration) is important for the longevity and protection of the engine components. The cooling system may need to be drained and refilled at specific intervals (approx. 4 years); check the owner's handbook for details.

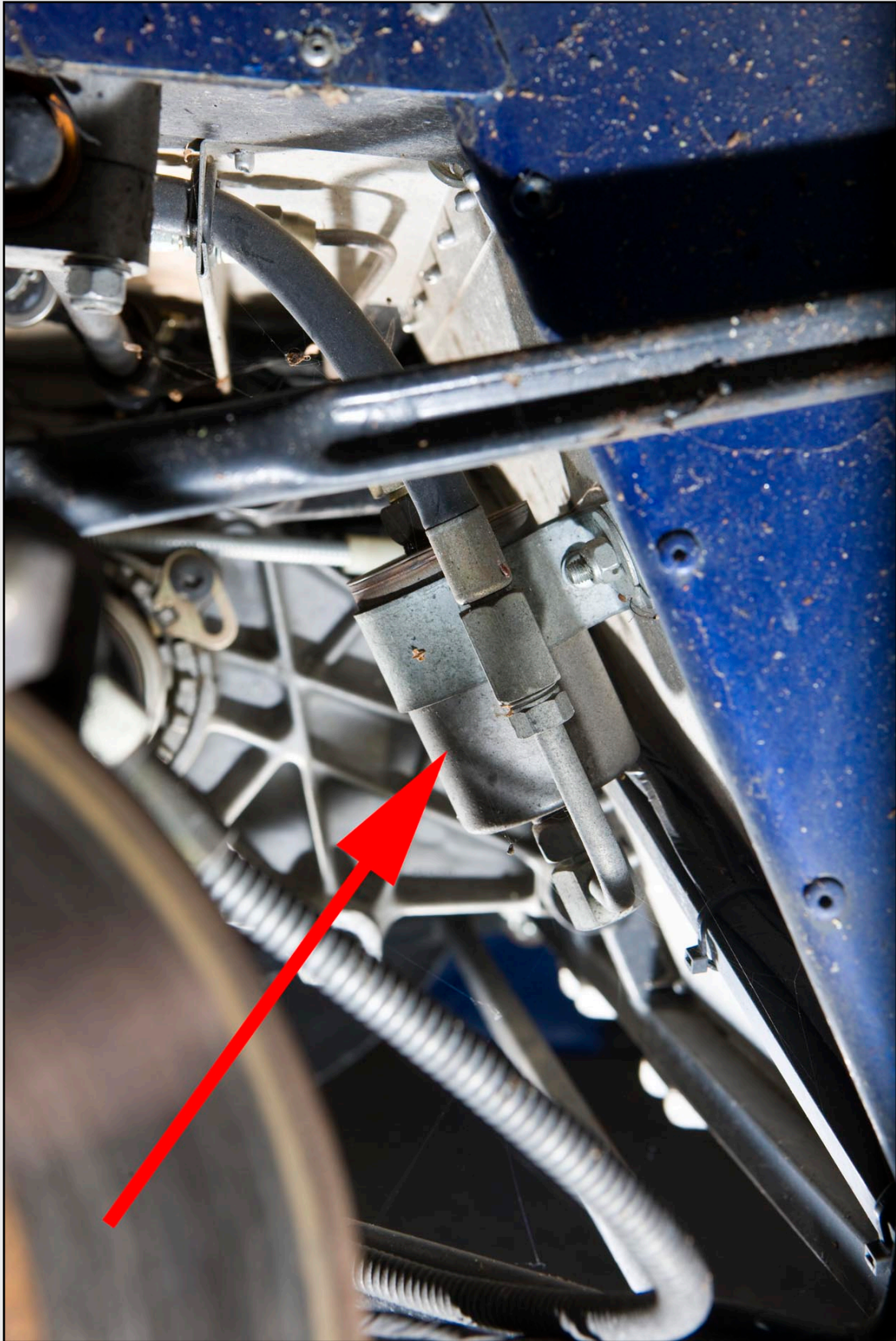


Fig 3 Above and 4 Next Page: the fuel filter (arrowed)... this is the typical installation for a Rover K-series engine car, mounted on the back of the cockpit bulkhead behind the seats... ..and this is the canister of the filter removed from car. If you are confused by this view, we are looking through the right rear wheel arch, ahead of the brake disc.



Fig 3 Previous Page and 4 Above: the fuel filter (arrowed)... this is the typical installation for a Rover K-series engined car, mounted on the back of the cockpit bulkhead behind the seats... ...and this is the canister of the filter removed from car. If you are confused by this view, we are looking through the right rear wheel arch, ahead of the brake disc.



Fig 6: brake fluid reservoir (seen here on S3).



Fig 7: air filter on CSR 260.



Fig 8: typical air filter for Rover K-series engined Roadsport (See Arrowed).

For cars with a sealed cooling system, check that the coolant level is between the minimum and maximum readings on the coolant expansion tanks, see Figs 9 and 10 (overleaf) the csr and s3 respectively. This should be done with the engine cold. If it needs to be topped up, add the appropriate mixture of antifreeze into the coolant expansion tank. The mixture is usually a 50:50 mix of water and antifreeze, but check that the supplied fluid hasn't already been premixed to this level.

It is worth checking that all visible coolant hoses are in good condition and do not show any signs of deterioration, such as cracking or leaks, particularly around any joints. If they require replacing, the cooling system will need to be drained. This is not a difficult procedure; however, refilling does require diligence to ensure that any trapped air pockets are purged from the system.

Fluid levels: brakes, clutch

The level of the brake fluid can be checked by unscrewing the cap on the master cylinder reservoir, (**Fig 6**). Care should be taken not to allow any brake fluid to get onto the paintwork, as it is an effective paint-stripper!

If the levels require topping up, ensure the correct grade of fluid is used. Brake fluid also has a 'life' and may require periodic replacement. This operation is best undertaken by an experienced person.

If a hydraulic clutch is fitted (as, for example, in the csr), the same procedure as for brake fluid top-up is used.

Air filter

The type of air filter element fitted to the Seven varies from model to model. On the csr there are two types; the one shown in **Fig 7** on the csr260, and a 'cone' type fitted to the csr200; a 'cone' type—one of the typical fitments for k-series engine for s3 or sv – is also shown (**Fig 8**).

Whichever type of filter is used, they are either the replacement type or can be cleaned and 'recharged' with a specific oil treatment. Check handbook for details of this.

Lubrication of trunnions

Note: This service item generally relates to older cars, as Caterham progressively phased out the use of trunnions –the swivel joint at the bottom of the front upright (a legacy from the small Triumph range of cars) in favour of a modified upright using a spherical bearing on new cars from approximately 1991 onward. However, various race and live-axle models continued to be supplied with trunnions for several years after that.

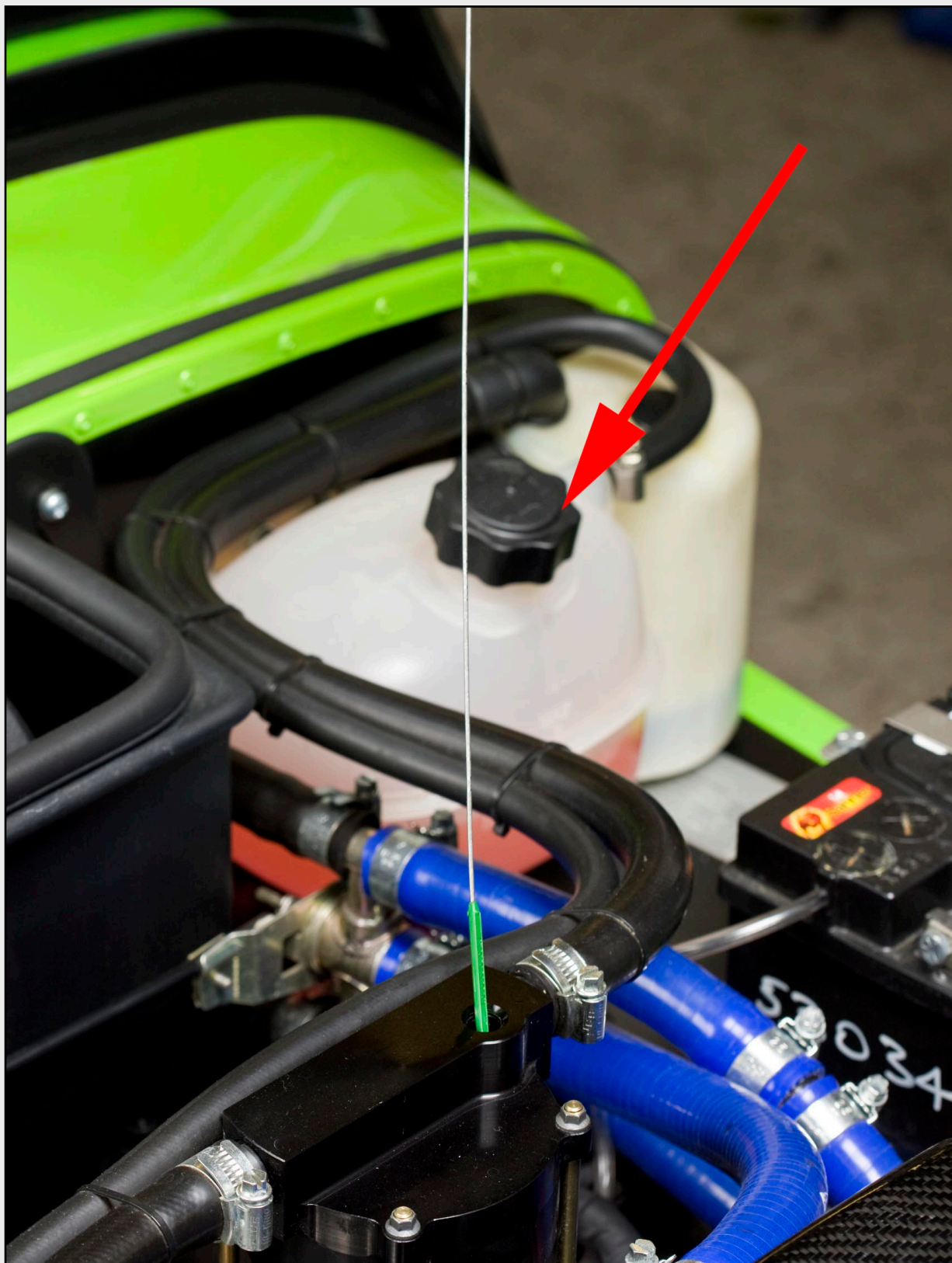


Fig 9: coolant expansion tank on the CSR 260. coolant expansion tank on the CSR 260.
(Arrowed in Red).



Fig 10: coolant expansion tank on K-series Roadsport. (Arrowed in Red).

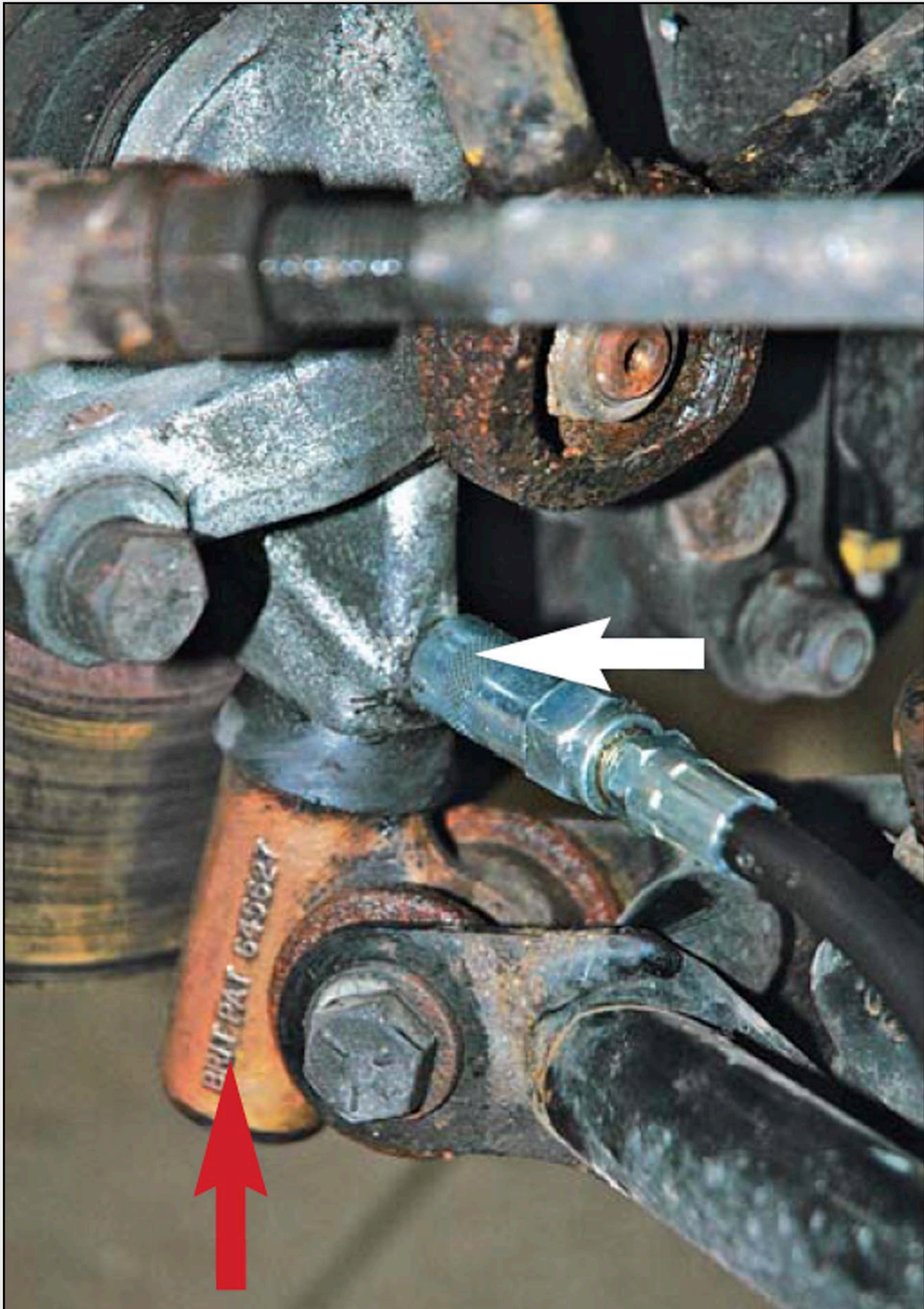


Fig II: the trunnion (arrowed in red) at the bottom of the front upright. Indicated by the white arrow is the grease gun nozzle applied to the grease nipple on the upright; but don't use grease – use EP90 gear oil.

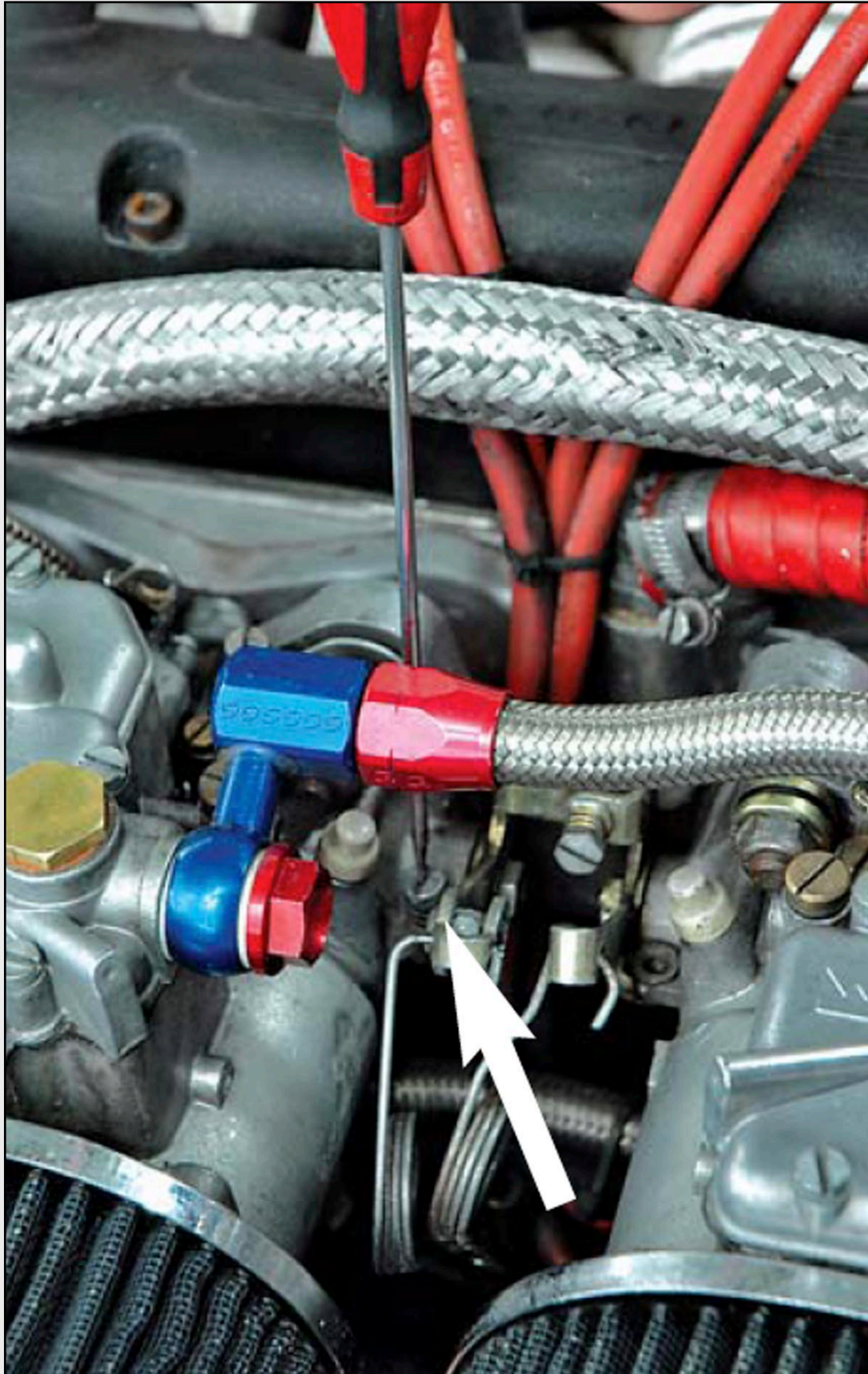


Fig 12: the idle speed adjustment screw on the twin Weber DCOE carburettor set up (with the typical throttle linkage, the screw is on the rear of the two carburetors). A long, flat-bladed screwdriver is needed here.

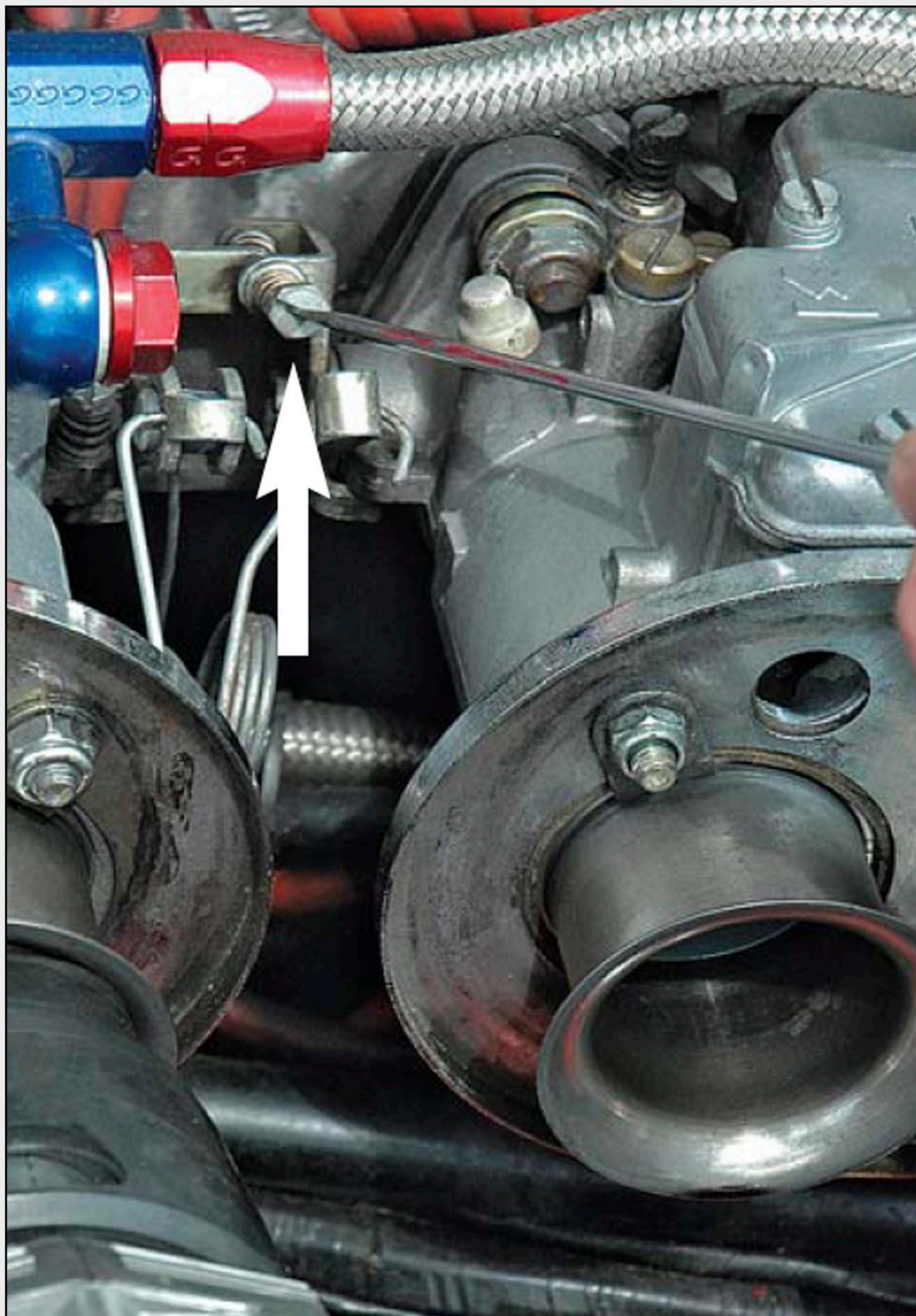


Fig 13: the balance adjustment screw.

The trunnion is the brass-coloured 'capsule' about two inches tall at the bottom of the upright just inboard of the front wheel; this is shown in **Fig 11**.

If your car has these fitted, then regular oiling is necessary. This is done via the grease nipple just above the trunnion on the inboard face of the upright – but it should be filled with ep90 gear oil, not grease!

A good quality grease gun should be used – access to the nipple can be fiddly, but is easier if the front of the car is lifted onto axle stands, and the steering put on full lock.

This can be a bit messy – oil should be pumped in until it starts to seep out of the rubber cap at the top of the trunnion, but regular oiling is essential for both safety and durability and it is recommended you do this every 3–6 months.

Carburettor balance and idle-speed setting

One key maintenance task for cars fitted with twin carburettors (that's primarily cars powered by Ford Xflow engines and original Vauxhall models) is to check the balance of the airflow of the two carburettors. Over time, this tends to drift, causing a reduction in performance, higher fuel consumption and emissions and, often, spitting and hesitation. Full tuning of twin carbs is beyond the scope of this article and should really only be attempted by an expert, preferably with access to a rolling road.

However, simple balancing can often achieve significant improvements. This is best done using a 'synchronometer', which is an airflow meter which should be available for between £25–£40 – a worthwhile investment for anyone with a carburettor-equipped car; it should pay for itself in efficiency and improved running fairly quickly.

Firstly, identify the idle speed adjustment screw, marked in Fig 12, and the balance linkage screw, shown in **Fig 13**; **note** that none of the many other possible adjustments that these carburettors offer should be touched without some experienced guidance.

Run the engine up to normal operating temperature, then switch off.

Remove the air filters from the carbs – these will simply be attached by one or two screws, depending on the filter model.

Start up the engine, and turn the idle speed adjustment screw clockwise until the revs are approximately 1500.

Push the synchronometer in turn into the inside inlet trumpet of each carburettor, noting the airflow reading for each.

The balance screw adjusts the relative airflow between the carbs, the aim being to get the same reading at both trumpets. Turning the screw towards the carb reading the lowest airflow will increase its draw.

Once the airflow is equal between the two trumpets, the carbs should be balanced.

Turn the idle speed adjustment screw anticlockwise to reset the desired tickover speed (normally between 900–1000 rpm) Refit the air filters and you're done!

Next time we'll conclude with a look at an assortment of regular checks to keep your Seven in a good, safe and reliable condition.

In issue 8, we'll conclude with a look at an assortment of regular checks to keep your Seven in a good, safe and reliable condition.

