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Part 1 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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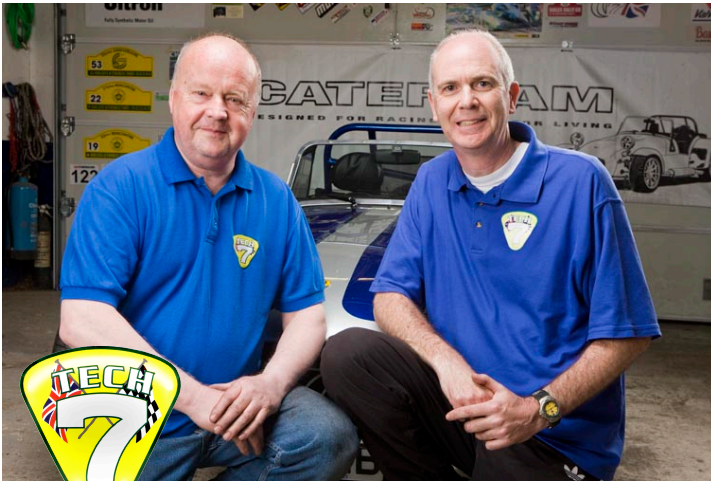
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- Andy Belcher (Tech 7) for his technical advice and loan of his workshop**
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In This issue we begin a major series looking at the essentials of maintaining your Seven. Even if you don't want to become 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

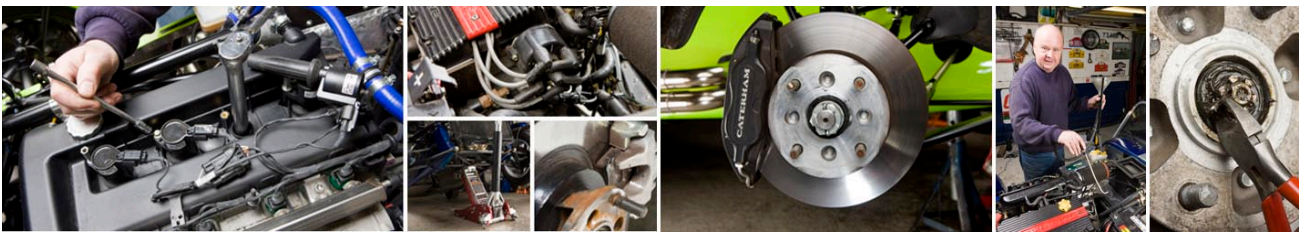
General inspection items

- 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 1: Raising the front and rear of the car



This article covers the procedure for raising the car, front and rear, and placing onto axle stands to enable the vehicle under body to be accessed easily. The tools required for this are typically four axle-stands and a trolley jack (two jacks can be particularly helpful if working on a csr). Axle stands (used here to support the car by the tubular structure of the chassis) of two tonne capacity are typically available in motor accessory outlets, and are more than sufficient to carry the car weight of, which is approximately 600kg.

To reduce the risk of damage to the powder coating on your car's chassis tubes, it is worthwhile placing a square of carpet or corrugated cardboard on top of each axle stand, which can be glued in place, or secured with cable ties.

A word about trolley jacks...

Purchasing a trolley jack requires a little upfront consideration: jacks start at approximately £30 with a typical minimum 'saddle height' (i.e. minimum clearance) of approx. 13cm. For many Sevens, particularly if fitted with 13" wheels and low-profile tyres, this may not be low enough to fit under the chassis without the car first being lifted in some other way, (driving onto planks of wood is a popular solution).

Minimum saddle height is therefore a key consideration when choosing a jack to purchase lower jacks are available, but tend to cost more, perhaps upwards of £70, but are a good investment for ease of use.

Again, it is good practice to cover the jack's saddle with carpet or other soft material to reduce the risk of damaging the car's powder coated frame.

Safety Points:

A few precautions need to be observed for your vehicle and your own personal safety –when attempting to work under the vehicle:

- Never, under any circumstance work underneath a vehicle when the lifting jack is the only method of support.
- Make sure the jack and axle stand positions are on firm and level ground.
- Position the axle stands appropriately, to secure a stable vehicle.
- When the car is raised, it may be advisable to place a spare wheel under the car for added security should an axle stand become dislodged or fail.
- When using a trolley jack, the car should have the handbrake off, and be out of gear. As the car is lifted or lowered, either car or the jack's wheels need to be free to move as the end being lifting follows its arc.

Equipment required:

- Four axle stands, safe lift-capacity 2 tonne per pair.
- One hydraulic trolley jack (two jacks are advised for the CSR)



Fig 1a: S3 or SV, jacking position at rear



Fig 1b: CSR jacking position at rear



Fig 2a: S3 or SV, axle stands at rear (see detailed picture below)



Fig 2a Close Up: axle stand supporting rear of S3 or SV (right-hand side), just ahead of the fuel tank



Fig 1b Close Up: of the CSR jacking position at rear with the saddle of jack under centre of chassis



Fig 2b: CSR axle stands at rear when the jack has been removed

Preparation

The trolley jack and axle stand support positions for the Series 3 /sv and csr frames vary significantly. The Series 3 construction covers the Roadsport and Series 5 the sv, whilst the CSR frame design is unique to that model.

If the road wheels are going to be removed, it is prudent to slacken the wheel nuts a little (turning them anticlockwise) before jacking the car up as this will be difficult once the vehicle is elevated. (Likewise, if you intend to simply change a wheel with the car supported by the jack alone, slaken the wheelnuts first or you risk pulling the car off of the jack.)

Raising the rear

Starting at the rear of the car, release the handbrake and position the trolley jack saddle as shown in Fig 1a for the s3/sv, or Fig 1b for the csr. Take particular note of the lifting point on the car frame. Raise the car to allow the axle stands to be offered under the supporting points on the car frame.

The axle support points for the csr and s3/sv de Dion cars are significantly different due to the frame construction. Note that when you start to raise the jack, at first only the de Dion tube will rise as the springs compress.

The support positions are shown in Fig 2a and Fig 2b respectively. Since the axle stand positions for the csr are closer together compared to the s3 , it is recommended—purely as a precaution that people do not sit in the car whilst it is supported.

When raising the front of the car, it is very important to allow the trolley jacks to creep rearwards during the jacking operation.

This will happen due to the arc of travel of the jack saddle, especially near the top of its height. Clearly, the car cannot move towards the jack as the rear is fixed, supported on axle stands. Therefore the trolley jack(s) must be allowed to move rearwards.

Check that the feet of the rear axle stands remain in contact with the ground as a precaution during this operation.

Raising the front, S3 or SV

The typical front jacking point is the center of the cruciform, the cross of tubes between the main chassis members as shown in Fig 3a.

An alternative location, as recommended by Caterham in certain documentation, is to jack under the single front towing eye. However, this to one side of the chassis and can make subsequent positioning of the axle stands challenging.

Once the front is lifted to the appropriate height, axle stands should be positioned under the main chassis cross member as in Fig 4a.



Fig 3a: S3 or SV, jacking position at front



Fig 3b: CSR jacking positions at front



Fig 4a: S3 or SV, jacking position at front



Left: The square of carpet or other padding fixed to top of axle stand



Fig 4b: CSR axle stand at front



Left: The jack positioned under towing eye at front of CSR

Raising the front, CSR

To raise the csr, two trolley jacks are used placing the saddle of each jack under each of the tow eyes at the front of the car. This is shown in Fig 3b, in the main and inset photographs. Two jacks have been used rather than one, to avoid the possibility of excessive torsion, or twisting forces, on the car's chassis.

Simultaneously raise the car on the two jacks to the height required on the axle stand. One axle stand is then placed under the car frame at the cruciform beneath the lower suspension mount, as shown in Fig 4b.

It is recommended that the two jacks are left in place as supplementary supports in addition to the axle stand during maintenance, as an added safety precaution since only one axle stand has been used.

Lowering the car

Before lowering the car back to the ground, ensure that the wheels are replaced with the wheel-nuts loosely tightened, and double check that everything has been removed from beneath the car.

Lower the car in the reverse sequence to raising; that is, front first. The same precaution needs to be taken for allowing the trolley jack to move-forwards this time-keeping a watchful eye on the rear axle stands.

Important: once the car is sitting on its wheels again, remember to tighten the wheel nuts to the appropriate torque: 55 lb/ft for s3, sv or csr, and 45 lb/ft for a live-axle car.

In issue 2, we'll be looking
at oil and filter changes.

