ASSEMBLY GUIDE

LIVE AXLE CHASSIS FITTED WITH VAUXHALL VARIANTS

MODELS COVERED

SEVEN CLASSIC
SEVEN SCHOLARSHIP / ACADEMY

ENGINES COVERED

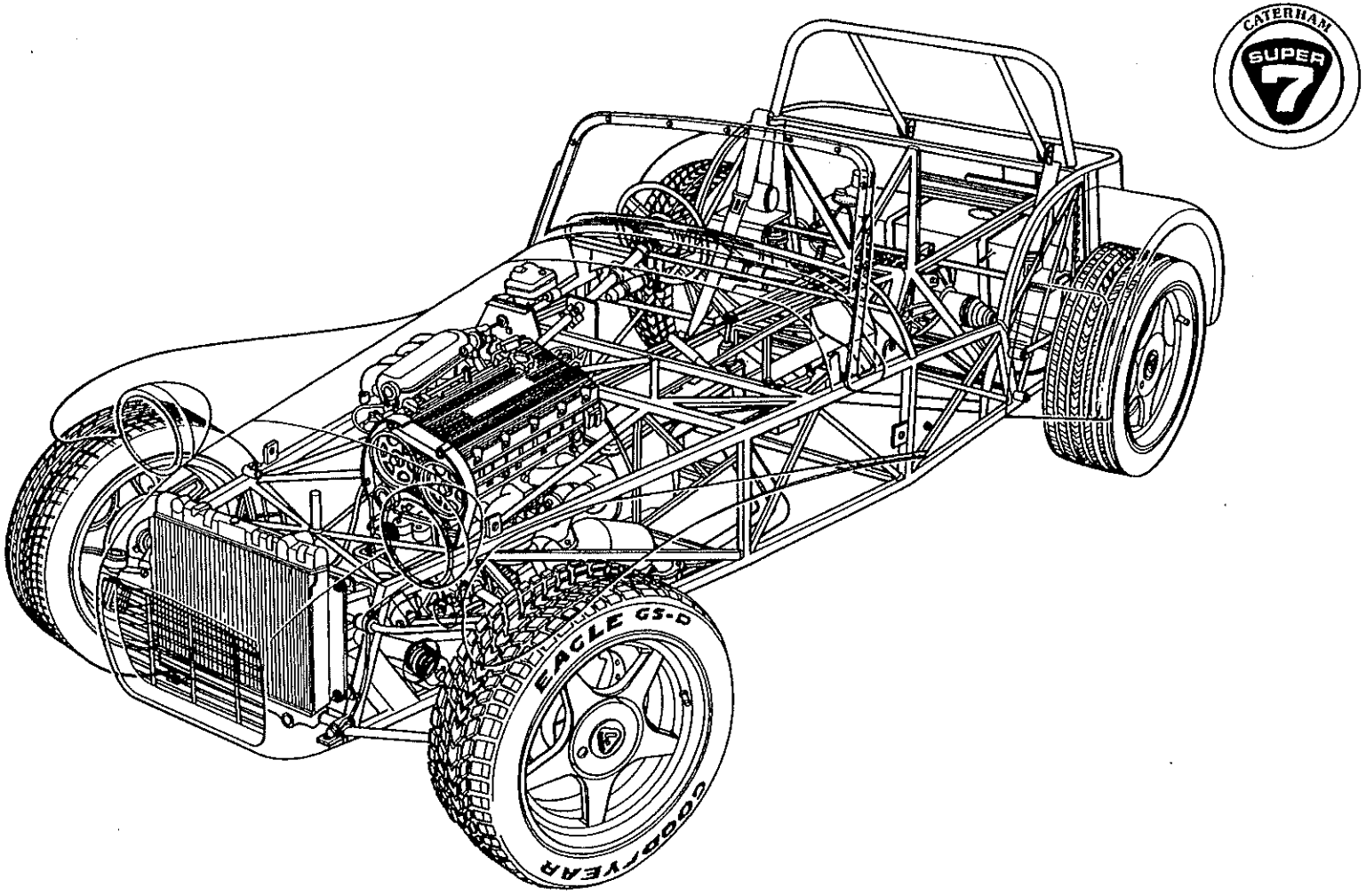
1600 8V
1800 SUPERSPRINT

Revised: November 1999

REAR AXLE – SP COMPONENTS SERIAL Nº 3533
TEL Nº 01527-894232
RATIO 3.9:1

RADIATOR FAN SWITCH 8239594 81F (819760)
RADIATOR CAP GRC 1184 (UNIPART)
RADIATOR CONRAD HEAT TRANSFER LTD, COVENTRY, CV5 6BN
SERIAL Nº N10200, 16/06/2000 PART Nº 73315.
EXPANSION TANK ROVER EAP 8713
AXLE BREATHER ROVER 21H 6060

PROP SHAFT PART Nº 72288 – BAILEY MORRIS LTD.
CLUTCH LEVER FORD 71BB 7541 KA
STEERING WHEEL – MOUNTNEY R23FPLB 12" 3 SPOKE
FLAT RADIUSED POLISHED LEATHER BLACK
BOSS ADAPTOR KIT — 029 TRIUMPH.
COIL BOSCH 90350587 — ON UNIT WB 0221 600 060 53
FUEL FILLER COVER 78017 – (PLAIN ALU)
SPEED TRANSDUCER TES 1800-3029
SPEEDO DRIVE COG FORD 1 546 881 (23 COGS)


CATERHAM
SUPER
7
EAGLE GS-D
GOODYEAR

DISCLAIMER

The Seven is supplied for amateur construction.

The builder must assume that all nuts, bolts and fasteners may be loose and take the responsibility to ensure road worthiness.

Sound engineering principles must always be followed.

A free Post Build Check is available from the factory or from one of Caterham Cars' agents.

If technical help is required please call this number – 01322 625802.

SECTION 1

INTRODUCTION

The Lotus Seven was originally launched to the public at the Earls Court Motor Show in 1957 as a successor to the highly successful, though relatively low volume, Lotus 6 which ceased production in 1955.

The original Series 1 Seven was produced with a Ford sidevalve engine and a 3-speed gearbox although later models were available with the Coventry Climax 1097cc engine or the BMC 948cc engine from the Austin A35, with the 4-speed BMC gearbox.

In 1960 after around 240 Series 1s were completed the Series 2 was introduced and remains outwardly unchanged to this day. This had a lighter spaceframe, a revised fibreglass nosecone and clamshell front wings were fitted for the first time.

Engine options followed on from the Series 1 although the 100E engine was soon phased out in favour of better BMC engines from the Austin Healey Sprite and the Ford 997cc 105E engine as fitted to the newly introduced Anglia.

Further options included the Ford Classic 109E 1340cc engine in 1961 and the 1498cc 116E engine from the Cortina followed in 1962. These later models were known as Super Sevens and in Cosworth tuned form made shatteringly fast road/club race cars for their day.

The Series 2 introduced the 'A' frame rear suspension which is still in production today and were made in considerably greater numbers than other Lotus Seven models, a total of some 1310 being built.

It was not until 1968 that the Series 3 Seven was launched and in appearance looked similar to the Series 2 except for wider wings to accommodate wider wheels and tyres. The chassis frame, however, was considerably stiffer and the 1600cc Ford 2265E crossflow engine and Ford Escort rear axle became the basic specification. This axle, incidentally, replaced that from the Standard 10 dating back to the early fifties which somehow Lotus had continued to use in the Series 2 right until the end. Axle failures were not uncommon!

The Super Seven was now available with the Lotus Twin-Cam for the first time and this, especially in 125 BHP Holbay form, became the fastest production Seven yet. Around 265 Series 3s were made.

By 1970 it was felt that the Seven, after 12 years, had become very dated and a successor, intended to reach the fast growing Beach Buggy market as well as that currently accommodated, was launched. This, of course, was the Seven Series 4.

Although intended to retain the character of the Seven it was very different in appearance, having a simpler steel ladder frame chassis with stressed steel side panels

enclosed by a fibreglass body. Engine options were carried over from the Series 3 and around 600 cars were built by 1973.
Colin Chapman had for many years wanted to phase out the Seven from an increasingly upmarket range and indeed, without the efforts of Graham Nearn it would probably have been dropped as early as 1966.

Seven production had continued erratically for some years, firstly at Lotus Components and then at Lotus Racing which closed in 1971.

Series 4s were manufactured in a corner of the main factory for a while, alongside Elans and Europas, before the impending launch of the new Elite. Increasing financial difficulties at Hethel finally spelt the end of the car.

In May 1973 Graham Nearn's Caterham Cars took over all the remaining Seven parts, jigs, moulds and, most importantly, the manufacturing rights from Lotus. Subsequently about 40 Series 4 Caterham Sevens were sold until it was phased out largely due to problems with component suppliers in 1974.

Much interest continued to be expressed in the classic Series 3 Seven, however, which enthusiasts had always preferred over the heavier and less agile Series 4. As a result, Caterham introduced an improved version of the Series 3 with a considerably strengthened chassis and numerous detailed modifications to upgrade the car in every way whilst preserving its appearance and character.

The Caterham Seven has therefore continued outwardly unchanged. Its specification has changed notably in respect of its engines and transmissions as suppliers and motor manufacturers have updated their products.

Initially Caterham Sevens were fitted with Ford Escort axles, but supplies of this axle dried up in 1981 with the introduction of the FWD Mk III Escort. The replacement Morris Marina/Ital axle was fitted to approximately 500 Caterham Seven Series 3s between 1981 and 1986 when it too ceased to be available. Seeing that the writing was on the wall for small beam axles Caterham then designed their own De Dion rear suspension, based on Ford Sierra parts, which was introduced in 1986. This in turn saw further improvement with the fitment of rear disc brakes in 1988 along with a sealed pedal box and adjustable pedals.

For 1991 the De Dion chassis was revised incorporating a double wishbone front suspension and revised rear suspension derived from the Vauxhall engined race series cars to further improve handling. Bilstein dampers replaced Spax. Provision was also made to accommodate inertia reel safety belts and, in redesigning the rear of the car, more boot space was achieved.

The De Dion chassis was again revised for 1994 to further improve chassis performance, ease of build, and serviceability. Removable upper engine bay diagonals improve access to the engine bay and at the same time the length and width of the pedalbox was increased, improving comfort.

By the mid eighties supplies of Ford Escort Sport semi-close ratio gearboxes also dried up so the chassis was re-engineered to accept the 5-speed gearbox from the V6 Sierra. Caterham have designed and manufactured their own special bellhousings to mate this gearbox, in close ratio form, to both the Rover and Vauxhall 16 valve engines.

Caterham have now engineered a close ratio six speed gearbox for the Seven, with ratios chosen specifically to suit the character of the Seven and the engines used in it. The gearbox is a direct replacement for the Ford five speed gearbox and can be retro-fitted in cars fitted with the five speed box.

When Lotus Twin-Cam engines ceased to be manufactured Caterham first turned to Vegantune who were making their own version of this unit. Around 40 Sevens were fitted with this VTA engine of which 30 were exported.

Demand for an engine developing more power than the standard Ford 1600GT led Caterham to introduce their 'Sprint' specification, basically the 1600GT with twin Weber 40 DCOE carburettors and a mild performance camshaft. In 1984 the 'Supersprint' version of the same Ford engine was launched, this time bored out to 1690cc with larger valves and a high lift camshaft to produce some 135 BHP with minimal loss of tractability.

However the public continued to demand even more power and in addition sophistication, so the Ford Cosworth BDR with double overhead camshafts and 16 valves was made available in 1985 followed by the even faster 'HPC' specification in late 1986. This engine was then replaced by the 2 litre 16 valve Vauxhall engine which provided even more power and, along with the Rover K Series unit, enabled the Seven to meet emissions legislation.

As the EEC developed their transport regulations in the late eighties it became obvious that Caterham would have to move with the times in order to sell throughout Europe – let alone the rest of the world. This meant embarking on a rigourous program of Type Approval testing including crash testing, noise, emissions, seat belt anchorages, brakes and many more. The need for a modern fuel injected engine increased as emissions and noise regulations became more and more stringent. With the introduction of engines capable of meeting these new drivetrain regulations Caterham re-established existing markets throughout Europe. Subsequent years saw Caterham consolidate these markets with the bigger more powerful engines and also appeal to new customers in different countries.

The lightweight all alloy Rover K-Series engine became available to Caterham in 1991. The first installation featured the 1.4 litre version and its light weight gave the Seven a new feel combined with the driveability of a modern fuel injected engine – no more pumping the throttle prior to starting the engine! In conjunction with Rover a 'Supersport' specification was designed which consisted of a re-designed inlet system, longer duration camshaft and re-mapped ECU. These modifications boosted power to 124 bhp with no loss of driveability. In 1996 Caterham offered the 1.6 version of the engine. In standard form power was improved to 115 bhp with a stronger torque curve. A plastic one piece inlet manifold replaced the cast aluminium

item found on the 1.4. The 1.4 engine was discontinued by Caterham. The 1.6 soon received the 'Supersport' treatment, this time producing 133bhp – again with better torque than the 1.4.

By early 1998 the 1.8 and 1.8 VVC K-Series engined Sevens were in production. Again the increased capacity saw an improvement in power and torque – 124 bhp (standard 1.8), 138 bhp (1.8 Supersport) and 153 bhp (1.8 VVC). In addition to this the 1.8 VHPD (Very High Power Derivative) was launched following a joint program between Caterham and Rover. This engine produces 193 bhp and features a big valve head, forged pistons, throttle body injection and an optimised exhaust system.

Whilst modern engines have progressed the development of the Seven, chassis development has continued apace. In 1996 the chassis stiffness was increased – particularly with modificaions to the transmission tunnel. These modifications also allowed the handbrake to be moved onto the tunnel - finally replacing the last item of Lotus chassis. Both the front suspension (re-positioned pick-ups incorporating anti-dive geometry), anti-roll bars (reduced diameter front/deleted rear) and the dampers were revised. These modifications allow for a better ride quality and improved tyre contact with the road surface. Inside the car new seats offered more support and improved accommodation for taller drivers/passengers. They were also considerably lighter!

During mid 1996 a 'Supersport' suspension update was devised which utilised a wider front track (to equal the rear). This, in conjunction with a larger front anti-roll bar, a rear anti-roll bar and firmer damper settings, provided a less comfortable road ride but a better set up for track days, etc.

The Superlight, when introduced, proved to be the lightest modern Seven ever weighing only 475kg. This was initially launched with the 1.6 Supersport engine – the 1.8 VHPD was added a little later. In standard form Superlights are supplied without any creature comforts (such as windscreens, hood, heater,etc). These are available as options with the price expressed as both pounds sterling and pounds weight! Further revisions to the rear suspension in 1998 led to a Watts linkage system being adapted to the De-Dion rear end. This became standard on Superlight 'R' road and race cars.

Single Vehicle Approval was also introduced in 1998 and has meant that every Caterham Seven has to be inspected by a Department of Transport run test station prior to registration. This has neccessitated several detail changes to the car (repeater flashers on cycle winged cars being the most obvious) – though many of these are simple push on items of trim or bolt head covers.

Caterhams' racing tradition continues with the Roadsport 1600 K-Series Championship providing excellent racing alongside the equally exciting but faster Superlight 'R's. The Caterham Scholarship provides a cost effective introduction to motorsport with a multi-discipline series for beginners.

The Clubsport model was launched at the 1998 Motorshow and was designed with both road and track in mind. It features improved silencing for all circuits, safety

equipment plus softer tyres with 'Supersport' suspension and Watts linkage rear. Through its 'Caterham Motorsport Club' Seven drivers can drive on race circuits all over the country; an excellent place to learn about the limits of your car without frightening horses on backroads!
In its earliest days the Seven was sold in kit form to avoid purchase tax which in the late 1950s was about 40%! This practise continued throughout the car's long production history, although the imposition of Value Added Tax meant that the savings were no longer so great, and the level to which a car had to be disassembled to become a kit rather than a car were the subject of constant negotiation with Customs and Excise.

Completed Cars are sold in both the U.K and overseas markets, but Caterham have traditionally sold cars in Component and Kit form for those customers wishing to save money or enjoy building the whole car themselves by using new or used parts of their choice.

This Assembly Guide has therefore been produced to give the non-expert comprehensive instruction as to how a car can be built to the same standards as those produced by Caterham Cars. For more experienced builders this guide may be somewhat elementary in its detail. However, no doubt some sections will be helpful and we wish all our customers many hours of pleasure building a car that both they, and we at Caterham cars, can be proud of.

The Super Seven is sold to customers all over the world so individual specifications are likely to vary according to the legislation of the country where the car is to be registered. This guide is aimed primarily at UK customers although differences, other than left hand drive, are likely to be minor. If there is any doubt, Caterham Cars should be consulted.

SECTION 2

PRE-ASSEMBLY INFORMATION

Contents

IT IS RECOMMENDED THAT YOU READ THE ENTIRE ASSEMBLY GUIDE BEFORE COMMENCING BUILD. THIS WILL ALLOW YOU BOTH TO PLAN AHEAD (PROCUREMENT OF TOOLS, CONSUMABLES, ETC) AND TO UNDERSTAND THAT MANY OF THE BUILD PROCESSES CAN BE SIMULTANEOUS.

2.1 Package Contents

The following listings detail the main contents of each of the packages that make up a complete kit. Due to the large range of packages and options available it is impossible to list every permutation.

Chassis / Body Unit: Chassis, body panels, pedals, master cylinder(s), instruments, switches, wiring loom, windscreen, windscreen wipers, fuel tank, fuel pump, fuel lines, ignition module.

Front Suspension: Springs and dampers, upper and lower wishbones, anti-roll bar and fixings (for uprated front suspension), front upright assemblies including brakes, cycle wing stays (where applicable).

Steering: Steering rack, rack clamps, upper and lower columns, column bush, column clamp, track rod ends.

Rear Suspension: Springs and dampers, radius arms, A frame.

Live Axle Package: Live axle complete with all brackets and brake parts.

Miscellaneous Pack: Handbrake lever, cable, interior mirror, battery cables, throttle cable, clutch cable, wheelbrace, speedo cable, propshaft and bolts, gearlever, extension and knob, toolbag, nosecone badge, engine mounting brackets and rubbers, scissor jack, battery, windscreen washer kit, stainless steel brake hoses, horns, steering wheel, roll over bar, rear wing protectors, spare wheel wishbone, fuel filler neck and cap.

Engine Kit: Complete engine and clutch.

Exhaust Kit: Manifold, collector, silencer, exhaust guard, mounting brackets and bobbins.

Cooling Package: Radiator, coolant hoses, water rail, cooling fan, heater (if specified), bobbins.

Gearbox Kit: Gearbox, bellhousing, clutch release fork, release bearing, reverse light switch, speedo drive, mounting rubber.

Lighting Kit: Headlamp units, headlamp brackets (cycle wing only), indicator pods, indicators, number plate lamp, reversing light, fog light, side repeaters.

Interior Trim: Covered tunnel top, tunnel side carpets, footwell carpets, seat back carpet, seats.

Weather Equipment: Hood, sidescreens, hoodsticks, hoodstraps, exterior mirrors (x2), boot cover.

Wheels and Tyres: 5 wheel and tyre assemblies, wheel bolts, centre caps.

2.2 Basic Definitions

a) During this assembly guide we frequently refer to 'left hand side' or 'right hand side'. For all purposes the right hand side of the car is the side that the driver sits (UK RHD).

b) The chassis and packages supplied have been engineered to enable a Vauxhall 1.6 litre 8 valve or Caterham 1.8 litre Supersprint single overhead camshaft engine to be installed in conjunction with either a Ford Type 9 close ratio 5 speed or Caterham 6 speed gearbox. If you have not purchased your entire kit from Caterham you should ensure that you source the correct parts by calling Caterham for further information.

2.3 Tools/Equipment

Kits supplied by Caterham Cars are specifically designed for the amateur car builder with basic facilities. The following are the tools that are required:

Socket set (metric and imperial)
Spanner set (metric and imperial)
Screwdrivers (flat and phillips)
4 axle stands
Torque wrench (up to 200 lbft)
Drill with metric and imperial sizes
Engine hoist
Allen Keys (metric and imperial)
Allen key – 10mm (to be cut down to access gearbox oil filler plug)
Plastic/Rubber hammer
Circlip pliers

Bench vice
Measuring tape
Rubber lube
Copper Slip (anti-seize assembly compound)
Loctite; thread locking fluid
Silicone sealant
Masking tape
Hacksaw
Rivet gun
Fabric/Trim adhesive
Eye protection, goggles
Engine oil - buy at least 5 litres (see Section 9 for recommended oil type)
Gearbox oil – buy 3 litres (see Section 9 for recommended oil type)
Brake fluid – buy 2 litres (see Section 7 for recommended fluid type)
Antifreeze (mix or solution to make up to 6 litres)

The engine hoist will only be required for a short time and these are usually available for short periods of hire.

With the engine and gearbox installed there is very little working space in the transmission tunnel. In order to access the gearbox filler plug it will be necessary to modify a 10mm Allen key. The 'short end' of the Allen key needs to be cut down to 15mm.

We suggest that when you get the kit home, the chassis is supported on 4 axle stands which will give stability for both safe working and ready access. Ideally these should be positioned at the outer ends of the second chassis cross-tube adjacent to the rear wishbone mounting, at the front (see diagram 2.1), and at each end of the chassis cross-tube supporting the front of the fuel tank at the rear (see diagram 2.2).

A work bench for sub assembly jobs would be helpful along with a good vice for both holding items stable and lightly pressing parts into position. Although brute force will never be necessary if assembly is carried out in the correct sequence, a soft copper/hide or plastic/rubber hammer will be useful to tap items into place without causing damage.

Please make a note of your order number as this is the reference by which we know you and your kit, and will ensure that, no matter how long you take to assemble your car, subsequent packages will be compatible.

The following points are useful tips to bear in mind when assembling your kit.

2.4 Nuts, Bolts and Washers

1. The chassis uses Imperial fasteners and the drivetrain uses Metric fasteners.

2. Always assume that bolts and fasteners are not properly tightened until they have been specifically checked.

3. Apply the correct tightening torque. Where not specified, please use table 2.1 as a guide. Critical torque values are specified at the end of most sections. Always follow the advice given in each section. Over-tightening can often cause more problems than under-tightening, such as sheared bolts and studs, and incorrect stresses.

4. All safety critical fastenings supplied by Caterham Cars are high tensile conforming to British Standards 1768 (Imperial) and 3692 (Metric). Customers supplying their own should only use high tensile fasteners marked with "8.8", "10.9" or "12.9" on the head, particularly when attaching suspension, steering, upright and axle kits. Any unmarked bolts should not be used. Please note that when tightening a bolt into an aluminium part much lower torques should be used.

Spanner Size	A/F	Metric	Torque(Nm)	Torque(lb/ft)
1/4 UNF/UNC or M6	7/16	10mm	4-7	3-5
5/16 UNF/UNC or M8	L/2	13mm	16-20	12-15
3/8 UNF/UNC or M10	9/16	17mm	27-34	20-25
7/16 UNF	5/8 or 11/16		41-48	30-35
1/2 UNF or M12	¾	19mm	55-61	40-45

Table 2.1 General Bolt Fastening Torques

5. The majority of fastenings are secured with the help of washers inserted between the nut or bolt head and the item to be secured. As a general rule particular washers are used in the following circumstances, otherwise washers should not be used:

a) To protect the surface and spread a load when attaching to a soft material such as glass fibre or aluminium, use a plain washer.
b) To lock a thread where there is a possibility of the nut working loose use a spring washer, but not under a nyloc nut which serves a similar purpose.
c) To adjust the spacing of one component to another use plain washers of appropriate external diameter.
d) To spread a load onto very thin material use a large diameter thin plain washer.
e) To prevent the migration (sideways movement) of rubber bushes and to ensure that they fail safe, larger than the outside diameter of the bush.
f) To present a uniform surface on which to tighten a fastening onto a rough or irregular surface use a plain washer.
g) To enable the use of a bolt smaller than the hole through which it passes use a plain washer sufficiently large.

6. 'Loctite' thread locking fluid where the application prevents the use of nylon locking (Nyloc) nuts or spring washers.

7. In addition, particular care should be taken to measure the bolts and fastenings before using them since it is quite possible to use an over long bolt only to find that it is apparently "missing" later on when the only remaining bolts are too short. The instructions in each section detail the precise bolt sizes needed in each operation.

2.5 General Build Information

1. In order to ensure ease of assembly and subsequent maintenance we suggest the use of the following (exactly where will be detailed in the text):

a) 'Rubber Lube' or a spray equivalent to ease assembly and operation of rubber bushes and grommets.
b) 'Copper Slip' anti-seize compound where lubrication is not needed to ensure easy future disassembly.
c) 'Loctite' thread locking fluid where the application prevents the use of nylon locking (Nyloc) nuts or spring washers.
d) 'Silicone Sealant' to achieve a watertight seal. This should be used sparingly with a bead being applied initially then worked into the gap to be sealed with a wetted finger. Wipe up excess immediately though once set it will be possible remove cleanly. To prevent over application edge the gap to be sealed with masking tape. When used on gaskets ie water rail, a thin smear is adequate.

2. Due to the nature of the motor industry it is frequently necessary for us to change suppliers and/or make minor changes to the car's specification. If you come across something which significantly differs from these instructions please do not hesitate to contact us.

3. If you are intending to build your car over short period of time (up to 4 weeks) you should consider applying for your SVA inspection now. There is usually a waiting list of 2 to 3 weeks (at least) plus it will take up to a week for the Vehicle Inspectorate to process your booking. You will nonetheless be asked when you want the inspection to take place. Full details about applying for your SVA inspection can be found in Section 14.

4. Seven builders should take care to observe basic safety precautions whilst assembling their kits since tools, parts, and materials incorrectly handled can cause injury. In particular your attention should be brought to the following:

a) **NEVER** work underneath a car without supporting it on axle stands or equivalent. **DO NOT** rely on a jack alone.

b) The electric radiator cooling fan is controlled by a thermostat which operates when the ignition switch is in the "on" position. If you are working in the vicinity of the fan with a hot engine we recommend that the engine is switched off before starting work.

c) Cars fitted with electronic ignition systems have much increased voltages compared with conventional systems and there is a real danger of electric shocks if you work on the system with the ignition on, particularly in damp conditions. The ignition should be switched off before touching any part of the ignition system.

d) Engine Oils - Health Warning
i) Prolonged and repeated contact may cause serious skin disorders including dermatitis and skin cancer.
ii) Avoid contact with the skin as far as possible and wash thoroughly after any contact.

iii) Keep out of the reach of children.
iv) First aid treatment should be obtained immediately for open cuts and wounds.
v) We advise the use of barrier creams, applied before starting potentially oily jobs, to help the removal of oil from the skin. Wash with workshop cleansers (Swarfega etc) and water to ensure all oil is removed (skin cleansers and nail brushes will help) and do not use petrol, diesel fuel, thinners or solvents for washing skin.

e) Used Engine Oils - Protect the Environment
It is illegal to pollute drains, water courses and soil. Authorised waste collection facilities including civic amenity sites and garages provide facilities for the disposal of used oil and used oil filters. If in doubt contact your local authority for advice on disposal.

f) Where there is a risk of particles getting into your eyes, for example when working underneath your car or while drilling or filing, some form of eye protection is recommended.

2.6 Suggested Build Order

The following order is one that is followed by the majority of Factory personnel. It encourages a logical build whilst at the same time offering a little variety. The Assembly Guide deals with the assembly of individual packages ie front suspension, rear suspension, axle, etc. However the limitations of this sequence is that a certain amount of assembly from other sections must or can be carried out at the same time. For example, the miscellaneous package contains items relating to the rear axle, engine, gearbox, braking and interior. In the following list where a generalisation is used ie front suspension it is recommended that the whole front suspension is fitted. Reminders are also included (fill with oil, etc)

Front suspension
Steering (including upper and lower columns but not steering wheel)
Horns
Front brake pipes
Screen washer pipe
Rear suspension
Rear brake pipes
Handbrake
Bleed brakes
Seat back, transmission tunnel and footwell carpets
Knee trim panels
Seat belts
Rear wings
Boot carpet and fuel filler cover
Roll over bar
Heater
Fitment of gearbox to engine
Installation of engine and gearbox
Fill engine and gearbox with oil
Start up

Tunnel top
Seats
Steering wheel/horn push
Headlights and front indicators
Rear lights
Reverse and fog lights
Rear number plate light
Cycle wing with indicator repeater
Flared wing and indicator repeater
Weather equipment
Nosecone/nosecone badge
Interior mirror
Scuttle edge trim
Windscreen wipers
Wheels

It can be seen from this list that you can be tackling several tasks at the same time, therefore if you have assistance building the car someone can be fitting the gearbox to the engine whilst you or another are fitting rear wings.

2.7 Shortages

The kits provided by Caterham (from the factory at Dartford) include all the items needed to build the car however, due to the sheer number of different components it is sometimes possible that parts are omitted or duplicated. If there are any shortages please telephone Paul Newman at the factory at Dartford on 01322 625827.

2.8 Technical Help

The golden rule must be **'WHEN IN DOUBT - ASK'**. Caterham Cars happily provide technical back up when required. Phone the factory at Dartford on 01322 625802.

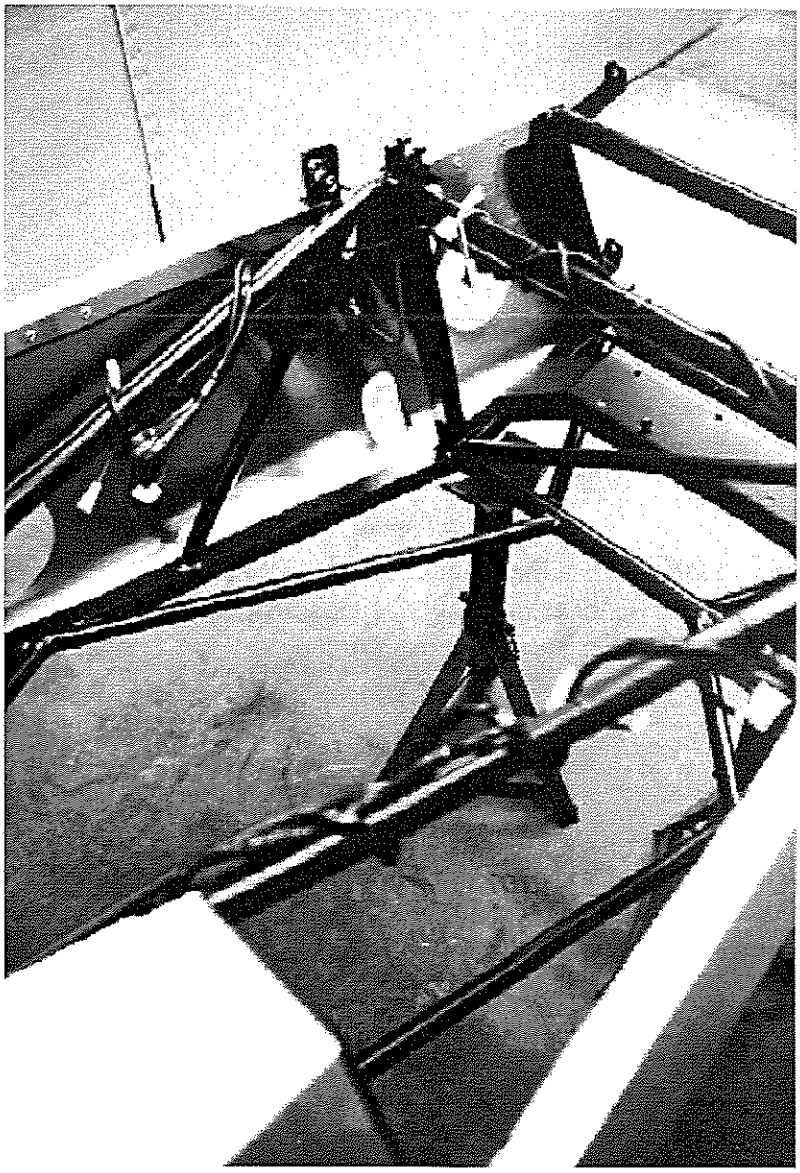


Diagram 2.1 – Front axle stand points.

The car should be jacked at the front under the towing eye located under the front right corner of the chassis. To jack the car in a central location use the lower cruciform – protect the powder coating on the chassis before doing so.

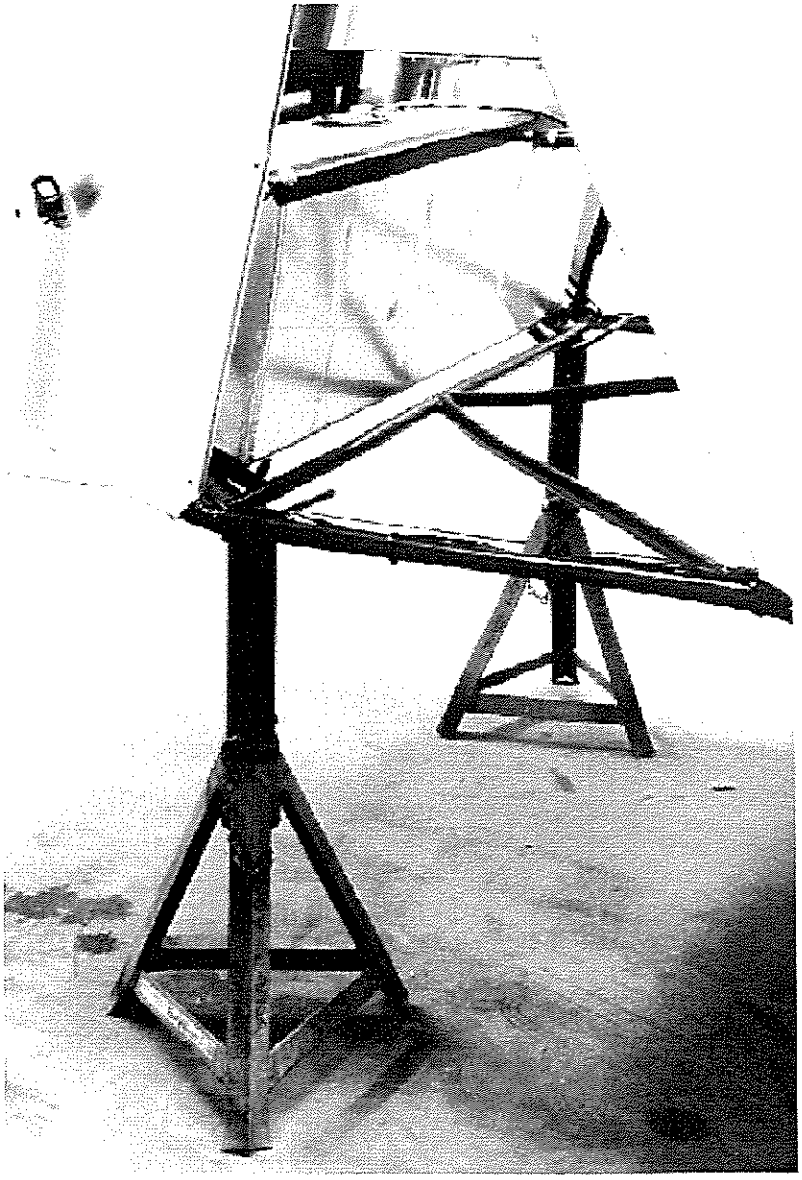


Diagram 2.2 – Rear Axle Stands and Jacking Points.

SECTION 3

FRONT SUSPENSION

Contents

3.1 Preparation

Before fitment of the front suspension a small amount of preparation will be necessary.

a) If front flared wings are being fitted these should be left off until after the engine is installed in order to ease access and to prevent any damage.

b) When assembling the front suspension, there is a risk that the aluminium body skin can be damaged, especially when fitting the top mounting bolt. It is therefore advisable, particularly with painted cars, to protect the bodywork with layers of masking tape in key areas.

3.2 Standard Front Suspension Assembly - Upper

Refer to Diagram 3.1.

Note that unlike the spring damper assemblies, the top links are handed and when fitted should be angled forwards with the ball joint facing downwards.

a) Using a 1/2" x 4" bolt, plain washer and nyloc, assemble the coil spring damper unit and the top suspension link onto the upper mounting bracket on the chassis. The bolt head should face forwards with the plain washer between it and the damper and great care should be taken not to damage the body skin. DO NOT tighten at this stage.

b) The anti-roll bar should be fitted next. Smear the half bushes with rubberlube and push onto the threaded ends of the roll bar (larger diameter end first). The ends of the anti-roll bar locate through the holes provided in the top links and are held in place using the other halves of the bushes, 1/2" plain washers and 1/2" UNF nyloc nuts. DO NOT tighten yet.

c) Assemble the aluminium blocks onto the front of the chassis (these are machined as two pairs) capturing the anti-roll bar (pre-grease the mating surfaces). Bolt into place using the four 5/16" x 2 3/4" bolts and nylocs with washers next to the bolt heads, with the blocks drilled to take a grease nipple outwards. Insert the grease nipples, lightly tightening with a 9/32" AF spanner, and once the main locating bolts are tightened (~15 lbft) fill with grease using a grease gun.

3.3 Uprated Front Suspension Assembly - Upper

Refer to Diagram 3.2.

The uprated Classic front suspension (supplied as standard on the Scholarship / Academy cars) replaces the effective top wishbone, produced by the top link and anti-roll bar, with a true top wishbone and independent anti-roll bar. This improves the stiffness of the top wishbone and increases control over the top upright ball joint position resulting in more consistent behaviour during braking and cornering.

3.3.1 Front Suspension Assembly – Upper

a) Ensure that a hole has been cut in the forward upper corner of the side panel where the additional link fits. If this hole is not present please contact the factory.

b) **Note that unlike the spring damper assemblies, the top links are handed and when fitted should be angled forwards with the knuckle joint facing downwards**

c) Using a 1/2" x 4" bolt, washer and nyloc, assemble the coil spring damper unit and the top suspension link onto the upper mounting bracket on the chassis. At this stage you must fit the **headlamp bracket** (cycle wing cars only) as they pick up on the back of the forward wishbone mount. The bolt head should face forwards with the plain washer between it and the damper and great care should be taken not to damage the body skin. DO NOT tighten at this stage.

d) Loosely fit the forward half of the additional link to the chassis pivot bracket using a 3/8" UNF x 2" bolt and nyloc. The additional links are not handed but the chassis pivot brackets are.

e) Pass the pivot bracket through the hole in the chassis sideskin and fit the opposite end of the additional link into the top link. It is secured with a 3/8" UNF x 1" bolt passed from behind the top link, through the tapered aluminium spacer and into the additional link. This bolt should be Loctited and torqued to 20lbft with the assembly in the horizontal position.

3.3.2 Front Anti-roll Bar Attachment

a) The anti-roll bar is attached to the front of the chassis using special mounting brackets and cotton reel shaped rubber bushes. Fit the bushes into the brackets using plenty of rubberlube and, again using lube, slide both brackets over the ends of the anti-roll bar and round until they align with the holes drilled in the front face of the chassis tubes.

b) When these mountings have been fitted onto the bar, the rubber boots should be slid over the anti-roll bar, (the larger diameter of the boot should face outwards). Apply Loctite to the threaded studs and fully tighten into the ball ends. Now screw the threaded studs and plastic balls into the ends of the anti-roll bar and tighten with protected grips.

c) Liberally coat the balls with grease. Assemble the anti-roll bar onto the chassis by pushing the plastic balls, one end at a time, into the mounting cups in the top wishbones. Hold it in place using 5/16" x 1 3/4" bolts passed forward through the chassis pivot brackets and the vertical chassis tubes, and into the captive nuts on the mounting brackets again using Loctite. Tighten these bolts now to 12-15 lbft.

d) The rubber boots are slid over the plastic balls and secured to the top wishbone using ty-wraps which fit into the grooves provided. A smaller ty-wrap is used to hold the boot onto the anti-roll bar itself.

3.4 Front Suspension Assembly - Lower

Refer to Diagrams 3.1 and 3.2 according to type of front suspension.

The forward mounts for the lower wishbones are threaded and care should be taken to avoid cross threading. We suggest that the bolts are tested in these holes prior to actual assembly. Great care must be taken to avoid damage to the bodywork at this point and protection with masking tape is advised.

a) The front lower wishbones are handed and you should note that the damper location should end up lower than the front upright.

b) Select the appropriate wishbone and secure its forward end into the chassis using a ½" x 2½" bolt with a large plain washer and spring washer next to the bolt head. Tighten to 40lbft with the wishbone held in the horizontal position as this will preload the bush in the correct position.

c) Secure the rear lower wishbone mounting with ½" x 4" bolt, washer, and nyloc, inserting the bolt from the rear with the large plain washer against its head. Use large plain washers to fill the gap between the chassis leg and the rear wishbone bush and again tighten to 40lbft with the wishbone in the horizontal position.

3.5 Final Assembly

If cycle wings have been opted for, the stays which locate onto the front upright should be fitted at this stage. Remove the stub axle nyloc and plain washer and fit the wingstay. The plain washer is replaced by the wingstay and should not be re-fitted under the nyloc. Replace the stub axle nyloc and torque to 60-65 lbft.

Note: When assembling both the uprights and damper units onto the wishbones the fit will be a little tight. Do not be tempted to use an ordinary hammer to help line up the mountings since this can cause damage, but use a soft copper/hide or plastic/rubber hammer instead. Final lining up can be carried out using a screwdriver. Avoid hammering the mounting bolts into place since this can damage the threads.

a) Attach the coil spring damper units to the lower wishbones and secure with the ½" x 2 ½" bolts and ½" nyloc nuts, noting that the bolt head faces rearwards. DO NOT fully tighten at this stage.

b) Locate the front upright assemblies (which are handed with their arms facing forward) onto the lower wishbones securing through the lower brass trunnion with the 3/8" x 2½" bolts with plain washers each end and nyloc nuts. DO NOT fully tighten at this stage.

c) Finally attach the top of the uprights to the top links securing with the 7/16" AF nyloc nuts provided with the top link/knuckle joints, do up fully and tighten to 20-25 lbft.

d) This completes assembly of the front suspension except for final tightening which should be done with the engine in the car and the wheels on the ground. It is important to have the wheels on the ground as the rubber bushes in the suspension should not be incorrectly preloaded by being stressed when not in the normal running position. Thus premature wear and slight handling irregularities will be avoided. This point is especially important if the car is to be used for competition purposes.

e) When carrying out final tightening please refer to the Table 3.1 for torque values. However the 1/2" nyloc nuts securing the anti-roll bar to the top suspension links should be tightened to no more than 20 lbft in order to obtain the correct preload in the bushes.

f) The front tracking should be set to 20 minutes Toe in ± 10 minutes.

Bolt Size	Usage	Torque	Torque
½"UNF x 4"	Damper & upper link to chassis	55-61Nm	40-45 lbft
5/16"UNF x 2¾"	Anti roll bar blocks	16-20Nm	12-15 lbft
½" nyloc	Anti roll bar to upper link	27Nm	20 lbft
½"UNF x 4"	Lower wishbone rear mount	55-61Nm	40-45 lbft
½" UNF x 4"	Lower wishbone front mount	55-61Nm	40-45 lbft
½"UNF x 2 ½"	damper to lower wishbone	55-61Nm	40-45 lbft
3/8" x 2 ½"	wishbone to upright lower brass trunnion	41-48Nm	30-35 lbft
7/16" nyloc	Toplink to upright	41-48Nm	30-35 lbft

Table 3.1 Classic Front Suspension- Torques, Five and Six speed cars

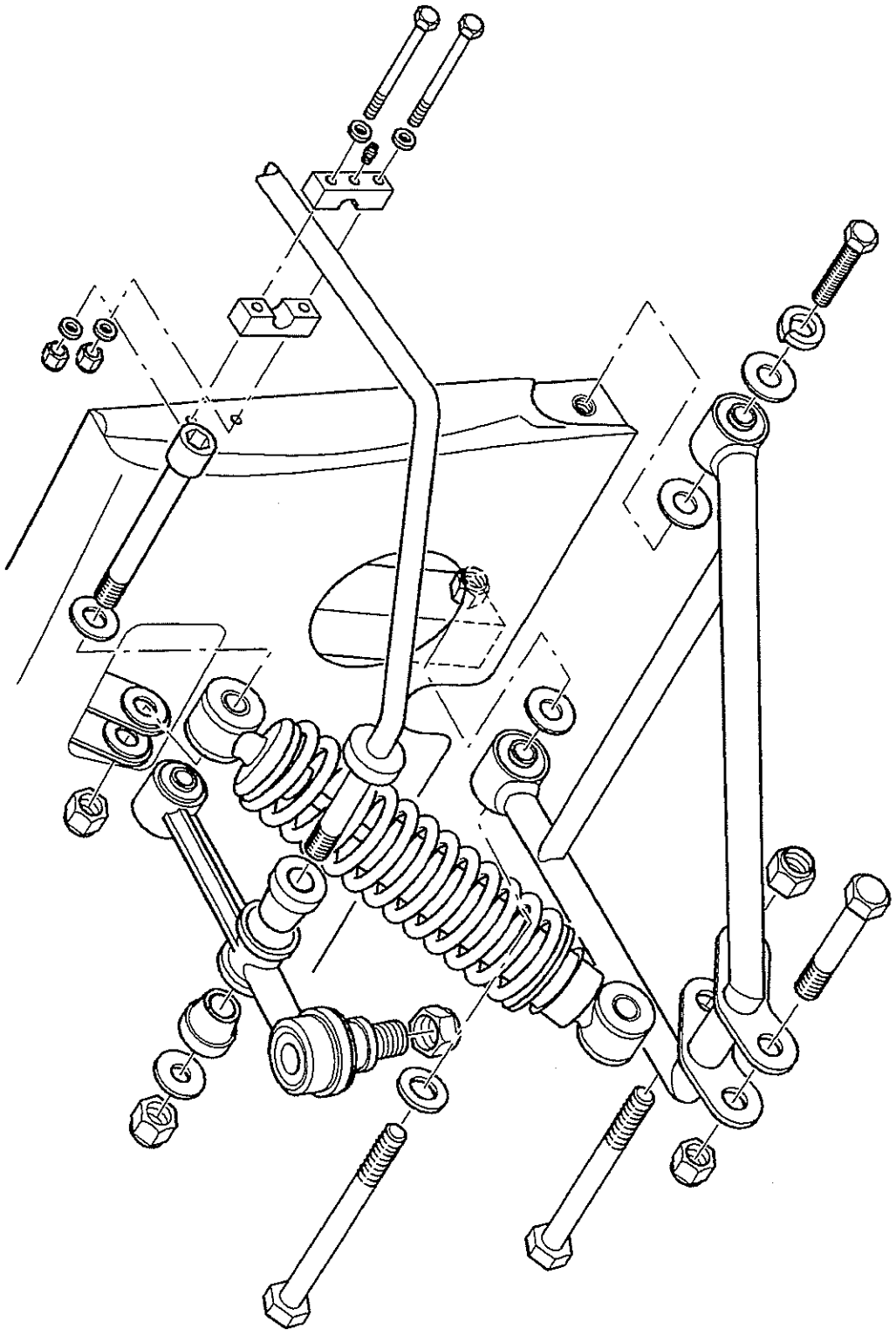


Diagram 3.1 – Classic Front suspension.

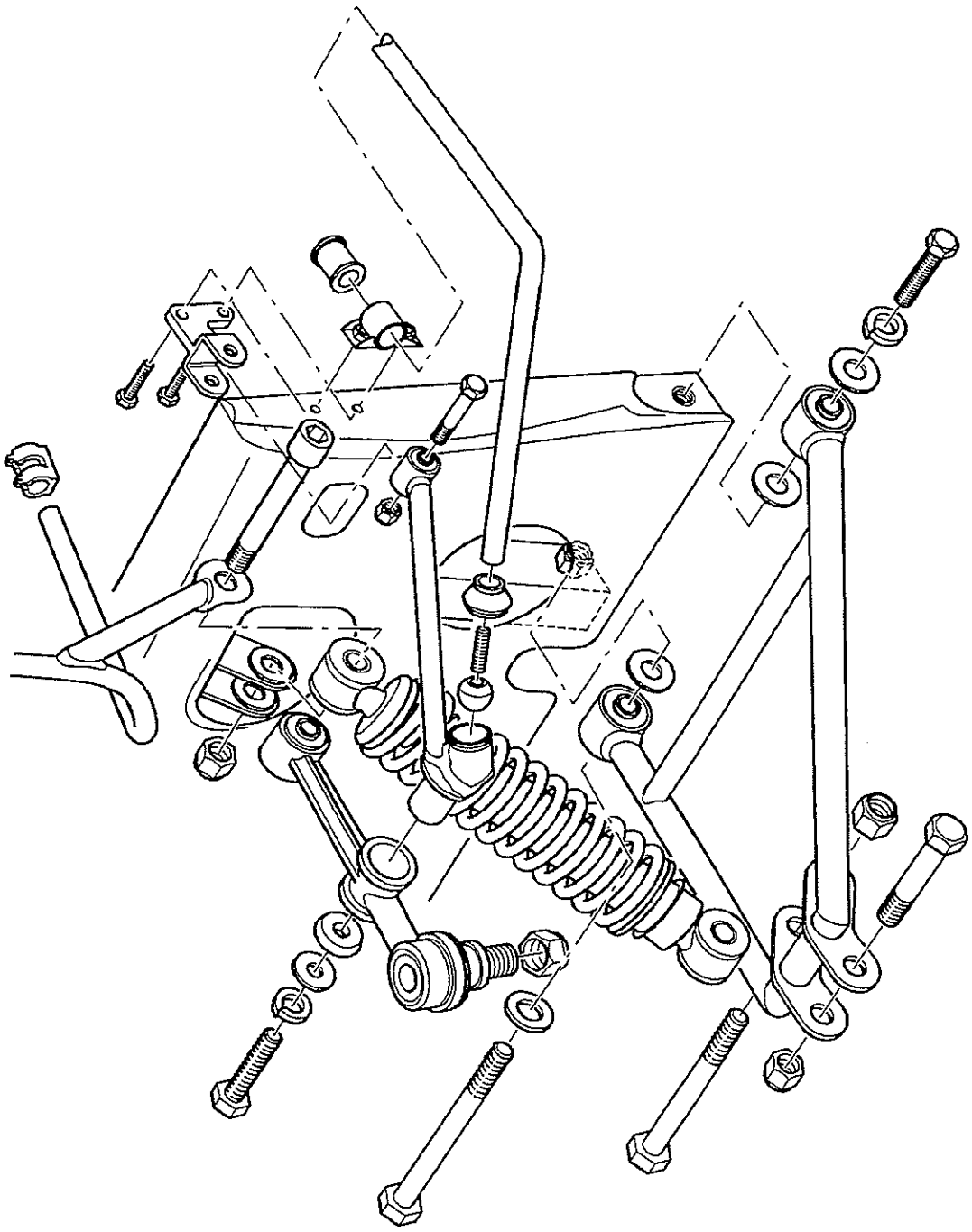


Diagram 3.2 – Uprated Classic Front Suspension.

SECTION 4

STEERING

Contents

The steering column assembly on the Seven has a telescopic section where, in the event of a frontal impact, the lower column slides inside the upper column greatly reducing the intrusion of the column into the cockpit. When a Caterham supplied wheel is fitted with a pad as supplied the whole assembly meets both the requirements of ECE Regulation 12 and SVA.

4.1 Steering Rack

a) Before fitting the steering rack it is advisable to protect the outside of the aluminium body around the circular openings through which the rack protrudes. Masking tape is sufficient for this purpose.

b) The steering rack is held in position by two aluminium mounting blocks which are drilled as pairs, see figure 4.2. These blocks clamp the rack in position as they are bolted in place on the front rack platform. Ensure that the spacer is placed between the lower block and the platform. Clamp the rack into place loosely using the 1/4" x $2^3/4$" bolts, nylocs and washers ensuring that a washer is placed between the steel bolt heads and the aluminium blocks. The rack will be tightened later when the column is correctly positioned.

c) Screw the lock nut onto the steering rack arm and fit the track rod end. This should be screwed on 11 full turns to give an approximate tracking setting. Pass the track rod end down through the steering arm on the upright. Tighten the 9/16" nyloc as per table 4.1. Add the flexible SVA cap to the nyloc. For SVA a length of rubber hose (2" long) is required to cover the track rod end lock nut – this hose should be split and placed over the lock nut – secure with ty-wraps. This must be in place at the time of the SVA inspection.

4.2 Steering Column

The assembly instructions for the quick release steering column are the same as below:

a) Remove the lid of the pedal box.

b) Supplied with the chassis kit is a flat aluminium plate. Insert the large rubber grommet into the circular hole in the plate. This is used to seal the hole in the front of the footbox through which the steering column passes.

c) Before fitting the lower column the plate should be slid over it, but not secured to the front of the footbox at this stage. Smear the inside of the grommet with rubber lube to both prevent wear and ensure water tightness.

d) Similarly, a folded aluminium box (known as the "cheese wedge") fits over the steering column at the back of the pedal box. Insert the an identical rubber grommet and again smear this with rubber lube. DO NOT secure at this stage (see fig.4.3).

Temporarily fit the lower half of the column in order to drill and secure the flat aluminium plate and cheese wedge in the correct alignment, then remove until later. The remaining sections in the steering section should be completed after installation of the engine otherwise installation clearances are limited.

e) The lower half of the column should be positioned first. Slide the column into position through the dashboard, under the brake master cylinder, through the pedal box and down towards the rack, splined end downwards.

f) Attach the universal joint to the splined end of the column noting how the clamping 5/16" x 1 3/8" bolt and nyloc fit into the cutaway provided. If insertion is difficult the universal joint can be prised open by inserting a flat blade screw driver into the split and twisting.

g) To ensure linearity of response we advise that the yoke of the universal joint is positioned with the cross vertical/horizontal when the steering wheel is in the straight ahead position. Fit the lower end of the universal joint onto the rack, again clamping with the bolt and nyloc and tighten both bolts to 15 lbft. The universal joint should be run as straight as possible (ie continuing along the same angle as the column) and the rack can be turned in its blocks to achieve this.

h) A small amount of preparation is advised before fitting the upper half of the column. The column is located into a tube within the dashboard by two rubber/metal/nylon bushes. In order to ensure free movement it will be helpful if you polish the column where it locates into the bushes with some fine wet and dry paper.

****

Quick release column

Please note that the upper steering column bush must be fitted prior to inserting the upper column into the steering column lock tube. The method for assembling column and the bush is the same as for the standard column.

****

i) The lower column bush will have been fitted by Caterham but care must be taken when sliding the upper half of the column down through the dashboard. **It is all too easy**

to push the inner plastic sleeve out of the bush – use plenty of grease on the column to help ease it through.

j) Fit the upper bush into the locating tube under the dashboard, noting how the raised rubber sections on the bush locate it to the lower dashboard tube. If the rubber is lightly greased it should push into place easily, but if trouble is encountered it will help to chamfer off the inner edge of the rubber bumps with a sharp knife.

k) Telescope the upper column over the lower half. The two halves are held together by the locking clamp. Before tightening this clamp you need to fit the steering wheel boss onto its spline to ensure that the boss does not foul the dashboard. Slide the upper column/boss away from the dashboard to achieve clearance.

l) Now tighten the clamp starting with the two outer 1/4" x 1 1/2" bolts(8–10lbft with a plain and a spring washer under the head of the bolt) with the grub screw loose. Afterwards tighten the grub screw with an Allen key to eliminate any free play in the steering. **Lock the assembly with the 7/16" locknut.** See diagram 4.4.

m) The steering rack clamps can now be tightened down to the correct torque as shown in table 4.1.

n) Now that the steering column assembly is in place the aluminium sealing plate and box (cheese wedge) can now be fitted. As they are pre-drilled the only drilling required is in to the front and top of the footbox/pedalbox. Use the rubber grommets to ensure the column passes through the plates centrally and mark and drill 5/32" holes in order to pop-rivet them into place. Silicone sealant should be sparingly applied to the plate and box to ensure waterproofing.

4.3 Steering Wheel Fitment

There are three steering wheels that comply with SVA requirements - **Mountney**, **Motolita**, and **Momo**. The Mountney and Motolita wheels have a central push cap which activates the horn, whilst the Momo wheel has a horn button mounted on the dash. Each wheel type uses a different mounting boss. It is recommended that you leave fitting the steering wheel until you have fitted the entire interior trim (including seats). This increases access to the interior.

Motolita

a) Before fitting the steering wheel, it will be necessary to fit the horn contact ring into the top of the steering column bush in the chassis. This is an interference fit and will need to be gently tapped into place. The electrical lead from this ring must be connected to the black/purple lead in the wiring loom adjacent to the steering column.

b) Attach the steering wheel to its boss using the small screws and nuts provided taking care not to damage the front faces of the screw heads or to scratch the black anodised finish on Motolita wheels. Slide the horn contact pencil into the hole in the boss. See diagram 4.1.

c) It is difficult to exactly establish the straight ahead position of the road wheels. It is therefore likely that it will be necessary to re-centre again after your first road test. Nevertheless, do not be tempted to leave the steering wheel loose!

d) Align the road wheels by eye as straight as possible and fit the steering wheel (ensuring that it is centred) onto the column over its splines. Lock the steering wheel in this position with the ½" half nyloc nut and washer and tighten firmly.

e) Feed the wire from the horn contact pencil through the SVA pad and connect it to the underside of the spring loaded steering wheel centre cap.

f) Push the SVA pad firmly into the boss and then insert the horn push into the pad ensuring that the contact touches the copper strip.

Mountney

a) Before fitting the steering wheel, it will be necessary to fit the horn contact ring into the top of the steering column bush in the chassis. This is an interference fit and will need to be gently tapped into place. The electrical lead from this ring must be connected to the black/purple lead in the wiring loom adjacent to the steering column.

b) Attach the steering wheel to its boss using the small screws and nuts provided taking care not to damage the front faces of the screw heads. Slide the horn contact pencil into the hole in the boss. See diagram 4.1.

c) It is difficult to exactly establish the straight ahead position of the road wheels. It is therefore likely that it will be necessary to re-centre again after your first road test. Nevertheless, do not be tempted to leave the steering wheel loose!

d) Align the road wheels by eye as straight as possible and fit the steering wheel (ensuring that it is centred) onto the column over its splines. Lock the steering wheel in this position with the ½" half nyloc nut and washer and tighten firmly.

e) Connect the wire from the horn contact pencil to the underside of the spring loaded steering wheel centre cap and finally clip the centre cap into position. The SVA pad hooks over the spokes of the wheel.

Momo

a) It is difficult to exactly establish the straight ahead position of the road wheels. It is therefore likely that it will be necessary to re-centre again after your first road test. Nevertheless, do not be tempted to leave the steering wheel loose!

b) Align the road wheels by eye as straight as possible and fit the steering wheel (ensuring that it is centred) onto the column over its splines. Lock the steering wheel in this position with the ½" half nyloc nut and washer and tighten firmly.

c) Use 6mm x 16mm countersunk Allen bolts to fit the wheel to the boss. The SVA pad is held in place by the velcro patches.

b) A purple extension wire is provided to make the connection from the push button to the black/purple lead in the wiring loom adjacent to the steering column. The other connection on the push button should be made to earth by connecting to the chassis.

****

Quick Release Column Wheel Centring

As the quick release column has a unique splined end (onto the quick release boss) the steering wheel must be centered by releasing the upper universal joint bolt, withdrawing the column, then turning the wheel and column to straight ahead. Re-engage the column to the universal joint and tighten the securing bolt and nyloc.

****

4.4 Alignment and Adjustment

a) The tracking should be set after the car has been fully completed (with suspension tightened) and lowered to the ground. If you intend to change the camber from the factory setting you must do this prior to setting the tracking. The tracking should be set to:-

Front:- 0°20' +/- 0°10' **TOE IN**

b) Initial toe-in setting for driving to a service agent for post build checking can be set visually by ensuring the outside edge of the front tyres lines up with a point on the rear tyres ~ 50mm in from the outside edge, with the steering wheel centred. This approximate setting will not cause either dangerous handling or unnecessary tyre wear for limited initial mileage.

c) The tracking is adjusted by turning the steering arms on both sides (using a spanner on the 11mm/7/16" flats on each arm).

Before driving the car on the road, recheck the tightness of all nuts and bolts in the steering system.

Location	Bolt	Quantity	Washers	Nut	Torque
Steering rack clamps	1/4" x 2 3/4"	4	Plain under head of bolt	Full nyloc	8 lbft/11 Nm
Column Universal joint	5/16" x 1 3/8"	2	None	Full nyloc	15 lbft/20 Nm
Column clamp	1/4" x 1· 1/2"	2	Plain under head of bolt	Thread in clamp	10 lbft/14 Nm
Track rod end to upright	Threaded rod end	2	None	Full nyloc	25 lbft/34 Nm

Table 4.1 Steering Component Torques

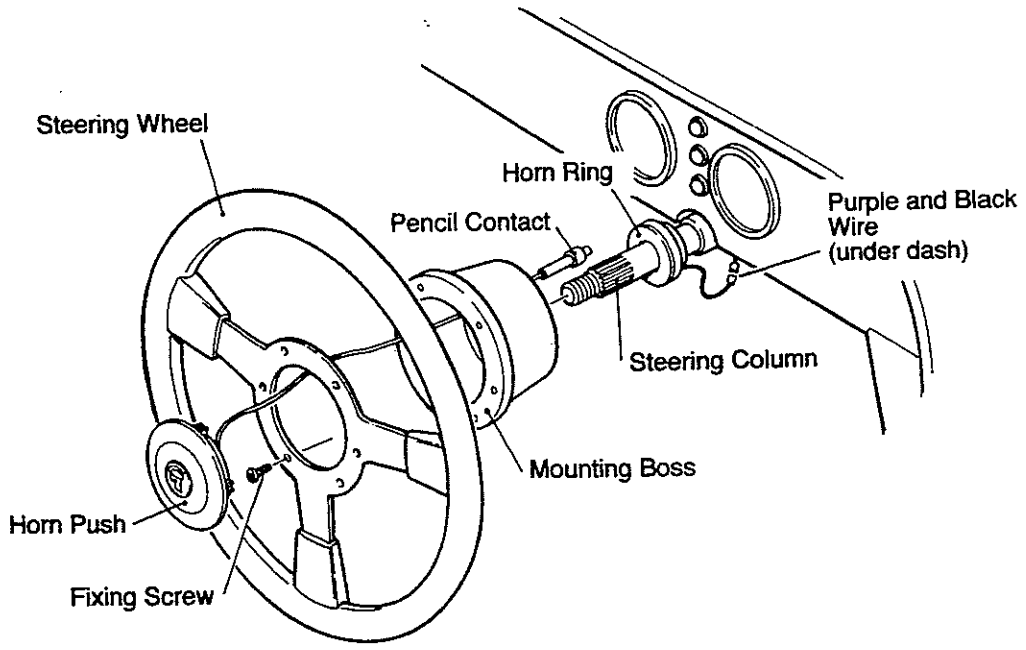


Diagram 4.1 – Horn push – Mountney and Motolita (S.V.A pads omitted for clarity)

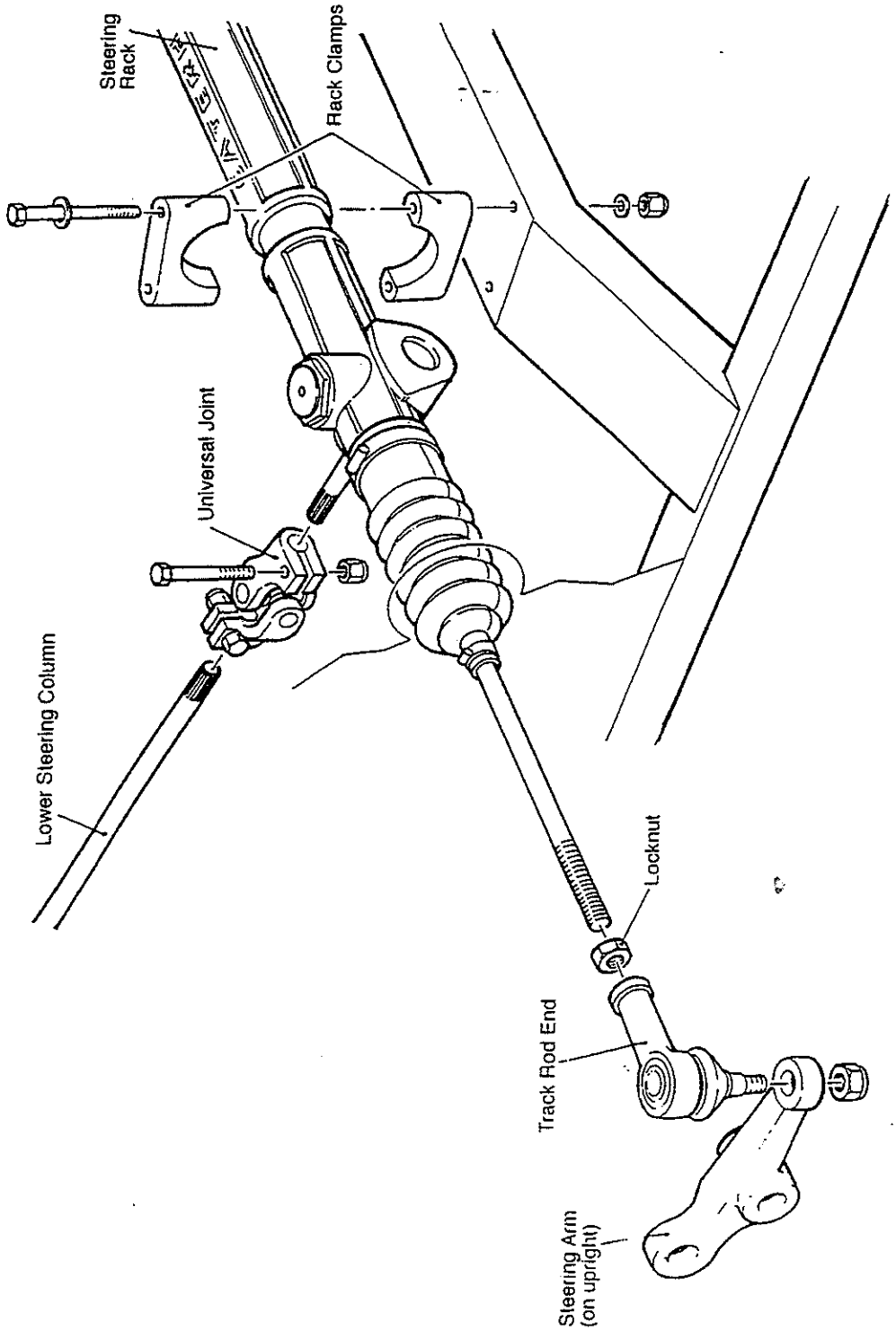


Diagram 4.2 – Steering Rack Assembly (SVA track rod end omitted for clarity).

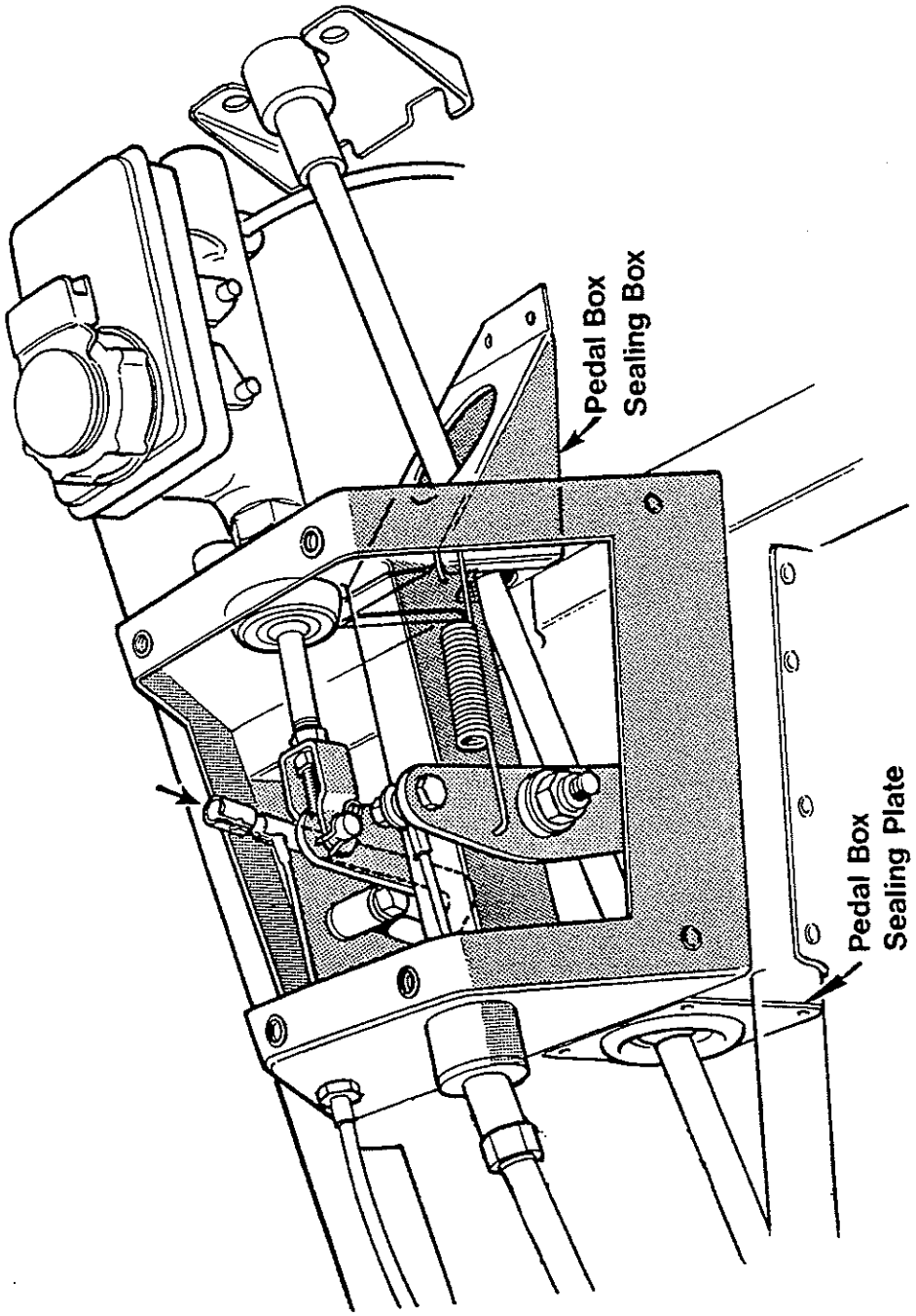


Diagram 4.3 – Steering Column and Pedal Box.

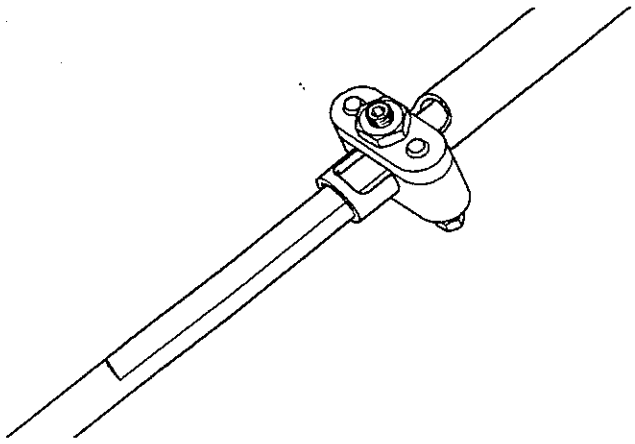


Diagram 4.4 – Upper steering column clamp

SECTION 5

REAR SUSPENSION – LIVE AXLE

Contents

The live axle suitable for the Caterham Seven is sourced from either a Morris Marina or Ital, neither of which are now available new. Manufactured items are available from Caterham Cars along with a range of service parts. The best Marine/Ital axles are from the 1.7, 1.8 or 2.0L versions that have a 3.64 final drive ratio.

9.1 Assembly of Axle before Installation

The miscellaneous kit contains all the parts necessary to install the axle into the Seven. It is recommended that the axle is not installed before certain tasks are completed. Refer to Diagram 5.1 'Preparation of the Axle'.

When bending brake pipes keep the union at the end of the pipe.

a) Drill the axle brace (6mm diameter) to accept the black plastic clips that secure the pipes in place (this may already be done).

b) Fit the hydraulic brake pipes to the axle, bending to the correct shape. The long pipe provided in the kit fits between the wheel cylinders and follows the contours of the axle.

c) As supplied, the axle is fitted with a left and right brake wheel cylinder. Connect the short brake pipe to the inlet part of the right hand brake cylinder.

d) Remove the bleed nipple from the right hand brake cylinder and discard it. Run the long brake pipe from this port to the inlet port of the left hand brake cylinder. The left hand cylinder retains its bleed nipple as this is used to bleed the entire rear brake system.

e) Attach the handbrake strap (with the split hole uppermost) and its backplate to the bracket provided on the left hand of the axle using two ¼" set screws, washers and nylocs (with the split hole upwards).

f) Fit the long handbrake rod to this strap (lower hole) with a nut, plain washer and shakeproof washer each side of the mounting hole after passing it through the mounting provided on the axle brace.

g) Attach the other end to the handbrake lever with a clevis pin and lock in place using a small R clip. See diagram 5.1.

f) Remove the silicon plug and screw the plastic axle breather into the axle casing in the threaded hole provided.

5.2.1 Installation of Axle and Rear Suspension

IF FIA ROLLBAR IS SPECIFIED – THIS MUST BE FITTED BEFORE FITTING THE AXLE.

Refer to Diagram 5.2 'Installation of the Axle and Rear Suspension'.

a) You are advised to apply masking tape to the lower chassis tubes in order to protect them.

b) Install the axle into the rear chassis space with the central 'A' frame mount underneath , breather on top, and line up the damper mounts.

c) Hang the coil spring/damper units from the upper mountings provided on the chassis (and through the FIA rollbar mounting plate if fitted). Note that there should be a washer/rubber bush/washer combination both above and below and that there is one 3/8" UNF nyloc nut on each damper. **DO NOT** fully tighten at this stage.

d) Using the ½" x 4 ½" bolts passed from inboard out, fit the bottom of the dampers to the axle. The axle should now be suspended by the damper units.

e) Attach the radius arms to the outboard end of the same bolt ensuring that there is a plain washer either side of the bush. Secure with the ½" nyloc nut but DO NOT fully tighten at this stage.

f) Attach the forward ends of the radius arm to the chassis using the 3/8" x 3 ¼" plated hex head bolts, washers and nylocs, passing these bolts outward from the cockpit. Again, **DO NOT** fully tighten yet. There are plastic caps for the bolt ends to protect the exposed threads from corrosion.

g) Fit the 'A' frame to the chassis locating its forward end inside the main lower chassis tubes at the front of the rear axle bay. Note that the central mounting at the rear should face upward.

h) This 'A' frame locates the axle laterally and it is important that it is fitted centrally so as to ensure that the axle is also centred. Attach to the chassis using the ½" x 4" bolts, washers and nylocs, passing these in from the outside, and centre using the thin 7/8" external diameter washers provided. This should also be used to eliminate any side to side movement of the 'A' frame. There should be at least one washer on either side of a bush.

i) The 'A' frame is attached to the bracket welded onto the axle using a bolt and nyloc and the split metal/rubber bush. The two half tapered bushes locate in the tapered steel bush provided in the 'A' frame **with a ½" x ¾" washer in between** and then captured within the axle bracket. The two half tapered bushes need to be compressed together in order to make them fit. We suggest that you coat the outside

of the bushes with fairy liquid to make compression easier and, if further assistance is required, use a couple of strips of thin aluminium or steel to shoehorn the bush into place with either a jack, soft hammer or vice.

j) From the rear of the tunnel, the handbrake cable should be routed under the transverse bracing tube of the 'A' frame and over the diagonal tube of the A frame and around the differential before being attached to the axle. See Diagram 5.3.

k) The handbrake cable can now be fitted with its outer casing located into the split hole in the handbrake strap and the inner cable attached to the left hand brake lever with a clevis pin and R clip. See diagram 5.3 'Hand Brake Cable Installation'. Leave the adjustment slack for now.

5.4 Final Tightening

a) Before finally tightening the axle and rear suspension mountings it is advisable to support the weight of the car by the axle (axle stands under the axle are ideal) to ensure that there are no unwanted pre-loadings present in the bushes.

b) Using the 10mm nut, tighten the upper damper mountings to the chassis until the rubber bush assumes the same diameter as that of the washers holding it. Place a black rubber cap over the protruding thread.

c) Tighten all the bolts securing the axle to the following torque settings; the ½" bolts should be tightened to 40 lbft and the 3/8" bolts to between 25 and 35 lbft.

d) Finally, check the distance between the brake back plates and the lower chassis tubes on both sides. These dimensions should be equal to within a tolerance of 3mm. If they are not, the 'A' frame centring should be adjusted by moving spacing washers from one side to the other.

Bolt Size	Usage	Torque
3/8" half nut	Upper damper mount	See text
½" UNF x 4 ½"	Damper & radius arm to axle	50 lbft
3/8" UNF x 3 ¼"	Radius arm to chassis	25-35 lbft
½" UNF x 4"	A frame to chassis	40 lbft
½" UNF x 2 ½"	A frame to axle	40 lbft

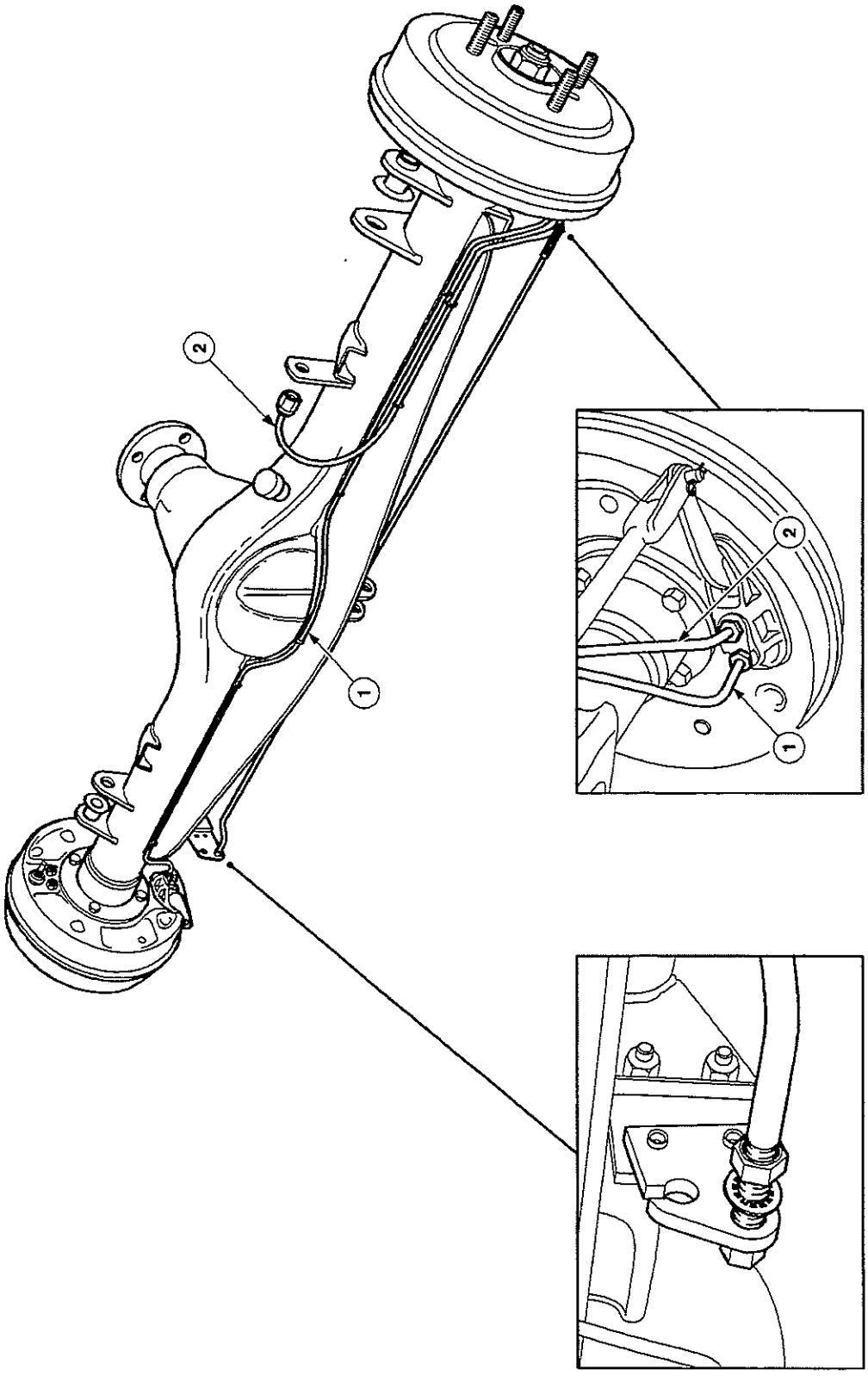


Diagram 5.1 – Preparation of the Axle.

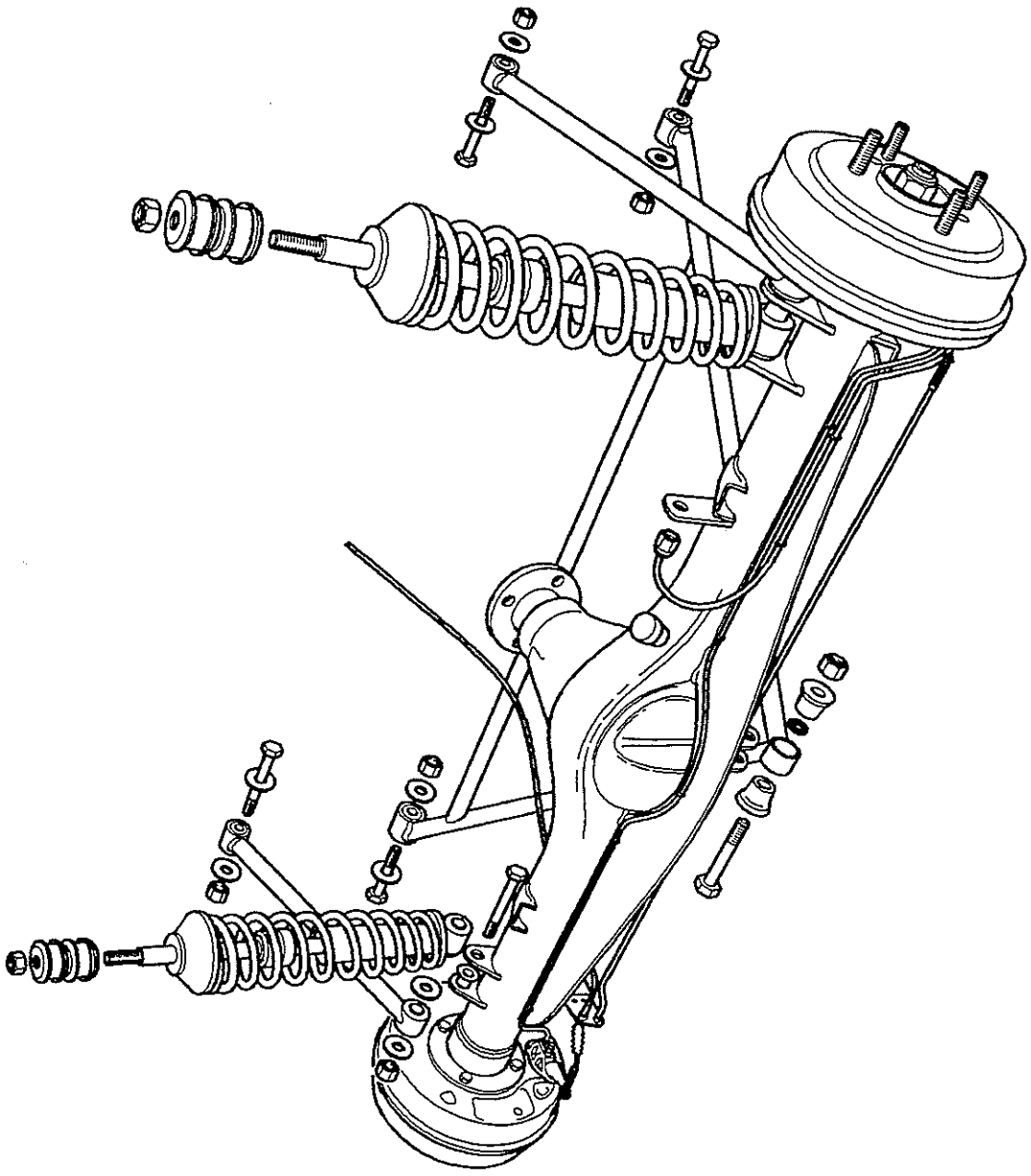


Diagram 5.2 – Installation of the Axle and Rear Suspension.

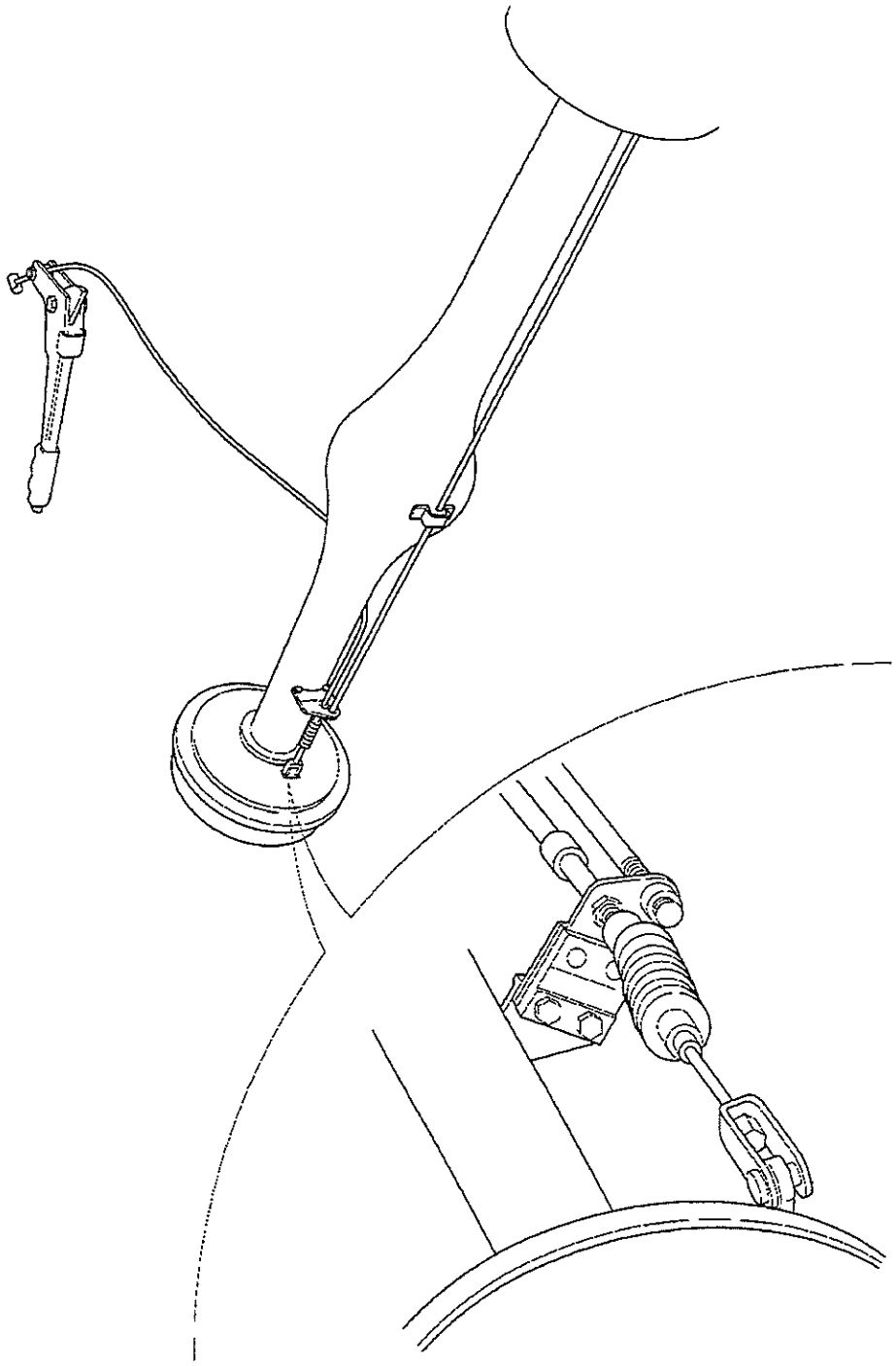


Diagram 5.3 – Hand Brake Cable Installation.

SECTION 6

INSTALLATION OF MISCELLANEOUS ITEMS

Contents

The miscellaneous kit consists of all the items necessary to complete your car which are not included in the other kits. (The propshaft however is part of the miscellaneous kit and this is required at the time of axle installation - see Section 5). This kit is not assembled as a unit and needs to be fitted in conjunction with other areas of your car. If you have not yet acquired this kit it will be possible to fit other kits first.

6.1 Front Brake Hoses

All brake connections should be kept spotlessly clean and contamination with oil, water and petrol must be avoided. Connections should all be finger tight initially. Use of a spanner may damage threads that will prevent a safe joint being made.

Three stainless steel braided brake hoses are supplied - two of equal length for the front and one of longer length for the rear.

a) Attach the inner threaded end of each brake hose through the hole provided in the aluminium body side. Plain washers should be fitted directly next to the aluminium body on both the inside and the outside of the panel. Secure in place with the 3/8" UNF nut provided, with the shakeproof washer between the nut and the plain washer. **DO NOT** tighten yet.

b) The outer end should be attached to the brake caliper using the special banjo bolt provided. The large copper washer sits next to the bolt head and the smaller washer between the union and the caliper. Be careful not to over tighten this (5-7 lbft).

c) The brake pipes from the Master Cylinder are located immediately inside the body and these are fitted with appropriate female unions. Tighten these connections fully (5-7 lbft) before securing the lock nut attaching the hose to the body side.

d) Turn the steering from lock to lock to ensure that the hoses do not foul on the suspension. If they do, a small amount of twist can be put into the hoses by adjusting the inner fixing onto the body side. It may help to undo the connection into the caliper and twist the hose through 180°.

6.2 Rear Brake Hose

All brake connections should be kept spotlessly clean and contamination with oil, water and petrol must be avoided. Connections should all be finger tight initially. Use of a spanner may damage threads that will prevent a safe joint being made.

a) The flexible rear hose can now be fitted. Attach one end of the hose to the 'L' shaped bracket which is located on the rear panel of the seat.

b) The other end of the hose is attached to the bracket on the axle with nut and lock washer, then connected to the union on the metal pipe to the wheel cylinder.

c) Finally, before filling with fluid recheck all the brake connections, including those already fitted by Caterham, from master cylinder through to each caliper or wheel cylinder and ensure that they are properly tightened.

6.3 Brake System - Filling and Bleeding

It is recommended that the wings are NOT fitted until the brakes are bled as access will be restricted.

Brake fluid used should comply with SA3J 17O3f DOT 4 specification and must be fresh. Once a container has been opened it is rapidly contaminated by moisture in the air that may ultimately lead to catastrophic brake failure.

As the master cylinder cap will be off during the entire operation wrap a cloth around the filler neck and over the surrounding scuttle paintwork to protect from any possible fluid leakage.

Brake fluid can be dangerous to eyes and may damage paintwork if it escapes.

a) The master cylinder should be filled first, with all bleed nipples closed. Carefully bleed the system using slow, positive strokes of the brake pedal starting at the LH rear, LH front and finally the RH front until a firm high pedal is achieved. It will probably be necessary to repeat this exercise a couple of times before all the air is bled away. Never let the master cylinder reservoir level drop below half full.

b) As a check on the system's integrity, get someone to press the brake pedal down firmly for about a minute whilst you check all connections and bleed nipples for any sign of leakage. The pedal should remain solid. If it slowly sinks, there is a leak somewhere in the system.

6.4 Handbrake Mechanism-Live Axle

a) Before assembly ensure that the handbrake lever has been bent through an angle of 20^{o} in order ensure clearance of the transmission tunnel. If not, this can be achieved with the aid of a bench vice.

b) Fit a rubber grommet into the hole in the top front of the transmission tunnel and feed the handbrake cable through this into the passenger compartment, locating the end of the inner cable into the lug under the front bulkhead.

c) Assemble the handbrake lever onto the cable, locating the cable outer with the handbrake barrel and bolt into place under the bulkhead. The 7/16" x 2 ¾" bolt and nyloc act as the handbrake pivot and the ratchet is located with a ¼" x 2 ¾" bolt and nyloc.

d) You will be working against the spring at the other end of the cable as this is installed under tension.

e) **Please note:** When assembling the handbrake barrel the longer end with a groove in it must face downwards. This is to enable the handbrake cover to be fitted. The cover is slid over the handbrake lever, after it has been fitted but before tightening the cable, and locates so that the handbrake barrel protrudes through the hole in the cover. Secure in place using the circlip provided.

f) The handbrake can be adjusted in two places - where the cable outer meets the strap on the rear axle and where the handbrake rod crosses from the same strap to the offside brake lever. Firstly adjust the rod until there is an even amount of slack at both brake levers and then adjust the cable itself until the handbrake locks both back wheels after about four clicks of its ratchet.

6.5 Screen Washer Kit

a) The bracket is pre-fitted on the lower right hand side of the engine bay in front of the driver's footbox.

b) Attach the clear plastic tubing to the plastic washer jet on the scuttle top and apply a light smear of silicon sealant to the base of the washer jet to help prevent water ingress. Slide the tubing down through the hole in the centre of the scuttle and push home securely.

c) Route the tubing through the wiring loom behind the dashboard to prevent it falling down into view and pass it through the large rubber grommet above the steering column. Attach it to the washer motor, trimming to length as necessary. Dip the end of the tube in boiling water as this softens the tube sufficiently enough to ease fitment.

d) The motor is connected with the green/black wire to the (+) terminal and the black to the (-) terminal. These wires emerge from the loom adjacent to the pedal box on the right hand chassis tube. Alternatively the loom may be fitted with a two pin plug that pushes on to the washer motor.

6.6 Horns

a) The twin electric horns fit behind the steering rack and are secured to two studs welded to the rack using the attached straps. It is likely that you will need to loosen the 13mm nut in the centre of the horn – this will allow you to rotate the horns so that the electrical connections are closer together in order to prevent stretching the wire between them. Ensure that it is not possible for the horns to touch as it produces a very annoying rattle!

b) The horns are connected using one purple wire to each horn and are earthed to the chassis.

6.7 Trim Items

Scuttle Edge Trim

This strip is designed both to ensure a tidy finishing on the edge of the scuttle around the dashboard and to protect occupants from the hard aluminium edge. It will need to be trimmed to length. **This must be fitted** – it is an SVA requirement.

Nose Badge

The circular nose badge is self-adhesive and has two locating pins. Before removing the paper to reveal the adhesive on the underside of the badge, trial fit to make sure that the badge will sit square. The pre-drilled holes may have filled a little with paint and polish so may need cleaning out before finally fitting the badge.

Mirrors (on centreline)

This is stuck by its self-adhesive pad to the windscreen as high up as possible on the centreline of the car. Note that the mirror can be inverted on its stalk to minimise the windscreen area obstructed. The area to which the mirror is stuck should be wiped clean to aid adhesion. A centre mounted mirror is a legal requirement and **must be fitted**.

6.8 Seat Belts

a) The static lap seatbelts should be fitted according to the instructions supplied with the belts.

b) When fitting a standard 3-point belt and roll-bar, the roll-bar is attached using the same bolts as for the seatbelt. The roll-bar is fitted underneath the thinner seatbelt spacer bush.

Four Point Harnesses

These should be fitted after fitment of the boot cover.

a) The top harnesses should be fitted after the seatback carpet, and the inner side harness should be fitted after the tunnel carpet (if carpets have been specified).

b) The fasteners supplied are specific to four point harnesses - two should be fitted to the threaded mountings in both sides of the chassis at the lower rear seat position.

c) On the top rail of the chassis (behind the seat position) there are six mounting bushes (three at each outer edge). The outer bushes are used when fitting harness belts **except when fitting an FIA roll bar**. (When an FIA roll bar is fitted the outer holes cannot be used because the position of the diagonal tube does not allow sufficient clearance to fit one of the harness bolts – see Section 13.2).

6.9 Windscreen wipers

These should not be fitted until the wiper motor has been run and allowed to park in order to avoid damaging the paintwork. Once fitted the arms should be bent by hand to a position that leaves them near horizontal when parked, and twisted to ensure the blade is perpendicular to the screen. In use the blades should flip without 'bouncing'.

6.10 Front and Rear Wings

To ensure ease of access the brakes should be bled before fitting the wings.

6.10.1 Front Clamshell (flared wings)

a) It is recommended that flared wings are not fitted until the engine bay is completed in order to prevent wing damage and to ease accessibility.

b) When drilling fibreglass use tape on the surface over the drill hole to prevent excess cracking of the hole edge. Take extreme care to avoid damaging the gel coat or painted finish - slow drill speeds should be used.

c) Please note that the front wing stays are handed and when in place the headlamp brackets should face forward. Remove the ½" half nyloc nuts (loosely fitted to secure the shock absorbers/top front suspension) and ease the bolt forward.

d) Attach the front wing stays, which also incorporate the headlamp mounting brackets, by sliding the upper tube into the sleeves fitted to the chassis and locate the slotted lower mountings into the suspension aperture securing with the mounting bolt.

e) Refit the half nyloc nut. Cut a length of self adhesive foam strip (approx 6") and attach it to the top outer edge of each wingstay to act as a vibration damper.

f) The wings are pre-drilled to line up with the rivnuts fitted to the side panels and each is attached with a combination of two 5/16" bolts; one being at the rear, and a number of 5mm x 20mm bolts, all with 3/4" plain washers.

g) Cut the rubber piping in half and fit between the wing and the body. A series of 'V's will need to be cut into the piping to allow for the wing bolts. The flat strip should be clamped between wing and body while the beading should be positioned on top of the joint to provide a neat finish. **Do not over-tighten the wing fixings as this can cause the rivnuts to rotate in the side panels.**

h) With the wings in place, adjust the front stays to provide adequate equal seating on both the left and right wings for the indicator repeaters.

i) Fit the four pinch bolts holding the stays to the chassis and tighten to 15 lbft.

j) The wings are attached to the wingstays using the bolts that also attach the front indicator repeaters, see below.

Front Indicator Repeaters - Flared wings

i) Dismantle the repeater assemblies, removing bulb and lens and remove the studs from the unit. These are replaced with 5mm bolts and nyloc nuts.

ii) The repeater assemblies are attached to the outer edges of the front wings and are located in order that the forward 5mm mounting bolt passes through the wing and holds the wing onto the wingstay. These should be aligned to suit the wingstay and ensure symmetry on both sides.

iii) Drill through the front wings at the appropriate points with a 5mm drill for the outer holes and a 9/16" drill for the centre hole where the bulb-holder locates. The forward hole should be drilled down through the wingstay so that the repeater, wing and wingstay are all in alignment.

iv) Bolt the repeaters into place using 5mm x 16mm Posidrive screws and nylocs. The black earth wire is attached to the forward mounting screw and should first be shortened and refinished with a ring terminal.

v) The green wire that comes from the repeaters needs to be directed through the hole in the wingstay and for the moment left hanging from the wingstay where it is clamped to the chassis. Replace the bulb and lens.

vi) There will now be six wires protruding out of the wingstay/headlamp bracket with male econoseal crimps on them. These crimps have a grey rubber seal backed onto them. Push the wires into the male black plug so that the correct coloured wiring matches up with that on the main loom. Once all the crimps have located into the plug the yellow cover can be inserted and the male/female plugs can be pushed together.

NOTE: If the two econoseal plugs do not locate properly it is probably due to the crimps not being pushed in far enough.

6.10.2 **Cycle Wings**

When drilling fibreglass use tape on the surface over the drill hole to prevent excess cracking of the hole edge. Take extreme care to avoid damaging the gelcoat or painted finish - slow drill speeds should be used.

Cycle Wing Size:

13" wheels Cycle wing measures ~78cm over the circumference

a) Fit the front indicator repeaters to the wings prior to fitting the wings to the wingstays. Dismantle the repeater assemblies removing both bulb and lens.

b) Gently tap out the studs in the base – these are replaced with M5 x 16mm caphead bolts, plain washers and nyloc nuts.

c) The repeater assemblies are attached to the outer corners of the front wings and the points where the wings should be drilled are already marked. The electrical connections are made later. Drill through the front wings at these pre-marked points with a 5mm drill for the outer holes and a 9/16" drill for the centre hole where the bulb holder locates.

d) Feed the wire through the hole then bolt the base plate into place using M5 x 16mm bolts, washers and nylocs. Replace the bulb and lens.

e) The front cycle wings bolt to the tubular wingstays that are rigidly mounted to the front suspension uprights as supplied. 5mm x 35mm caphead bolts are used for the wings, passed downwards through the wing and the round tube of the wingstay.

f) The wing will have been marked with the positions for the front two mounting bolts for each wing. These should be drilled through with a 5mm drill, taking extreme care to avoid damaging the gelcoat finish - slow drill speeds should be used.

g) With the front wheels fitted, place the wing in position on the stay, ensuring that the bolt holes are over the centreline of the forward round wingstay tube in order that the wing is centralised over the tyre. The wing can be 'held' in place by masking tape. Mark the positions for the bolts onto the wingstay. It is likely that the wing stays will need to be bent to allow the cycle wings to fit centrally over the tyre.

h) Remove the wing. Remove the wheel/tyre and drill the holes through the stay. To prevent the drill from wandering, centre-punch the wingstay then drill the two holes to 6mm. **TAKE CARE TO AVOID DAMAGING THE TYRES.**

i) Loosely refit the cycle wing and wheel/tyre to check the alignment of the wingstay relative to the wheel, then again remove the wing. Place a strip of masking tape across the tyre underneath the drilled tube of the wingstay and mark onto this the lateral positions of the two holes. Rotate the wheel so that the masking tape is under the rear tube of the wingstay and transfer the bolt hole positions to the tube. Centre-punch and drill to 6mm as before.

j) Refit the cycle wing, loosely bolting it at the front and aligning it over the tyre, then carefully remove the wheel without disturbing the wing. Mark the underneath of the wing with the bolt hole positions, then remove the wing. Drill a small pilot hole from underneath, taking extreme care to avoid damaging the gel coat then, once you have checked that these are correctly positioned, drill through from above to 5mm.

k) Stick a strip of self adhesive foam across the top of the wingstay. Fit the wings to the stays with 5mm x 35mm caphead screws, plain washers, rubber washers and nylocs, ensuring that the rubber washer sits against the wing. Tighten until the rubber washer is the same size as the adjacent washer.

l) From the repeater, route the green wire along the wingstay shielding the wire as much as possible. Secure with small ty-wraps. From the wingstay the wire must be routed over to and along the rear of the balljoint and top wishbone itself. Again, use small ty-wraps at 30mm intervals for security and neatness.

m) Once inside the aluminium sideskin the green wire should be fitted into the 6 pin econoseal plug along with the other wires from the headlamp. To avoid confusion connect at the same time as the headlamp (dealt with in Lighting, Section 10).

n) The black wire from the indicator is the earth and is attached to one of the screws fixing the cycle wing onto the wingstay. Ensure that there is a good contact.

o) Finally, fit the small rubber piping around the rim of the cycle wing, securing at intervals with silicone sealant on the underside of the wing. **This is an SVA requirement.**

6.10.3 Rear Wings

a) Rubber piping is provided and this should be cut into 'V's as appropriate to allow it to sit flat between the wing and the body.

Fit the wing protectors before fitting the rear wings to the car – this reduces the opportunity to damage the bodywork – see below.

b) The rear wings are secured using 5mm x 20mm bolts and ¾" plain washers into rivnuts at the front and the same bolts and washers with nyloc nuts at the rear. The wings are pre-drilled but it is advised to ensure that it is possible to pass the bolts through the holes before fitting the wing to the car. The bolts for nyloc should be passed from inside the boot outward. All fasteners should be fitted loosely before finally tightening.

6.10.4 Rear Wing Protectors

These are standard on all models bar Superlights that have carbon fibre wings. The standard material is polished stainless steel with carbon fibre available as an option.

If your material is stainless steel the plastic protective material should be removed before fitting. This protected side should face outwards.

a) The panels are attached to the lower front of the rear wings with 5/32" pop rivets. These are supplied flat and will need to be gently bent to suit the contour of the wings. In the case of a stainless steel wing protector the pop rivets should have a natural aluminium finish, whilst with carbon, black rivets should be used.

b) Cut the rubber wing piping strip to fit around the lower outer and upper edges, cutting darts in its flange in order to take up a smooth curvature.

c) With the panels pressed against the wing piping strip between the rear wing and body panel, drill through the existing holes and rivet the panels into place on the wing capturing the beading. It is easier to drill the inside holes with the wings away from the body – if you have chosen to fully tighten the wing take care when drilling and riveting. You are recommended to protect the body with several layers of masking tape.

6.11 Standard Roll bar

This is best fitted after any work required in the boot and before fitment of the boot cover. The roll bar attaches on top of the seat bulkhead and inside the rear of the boot.

a) 5/16"UNF x 1" set screws and spring washers are used into the seat bulkhead, tighten to 20-25 lbft. The rear legs locate into the chassis brackets in the boot and are secured using 5/16"UNF x 2" bolts, washers either side and nylocs, again tighten to 20-25lbft.

b) Fastening of the forward ends is dependent on the type of seat belts being fitted.

Static three point lap and diagonal belt:

The rollbar is secured using the same bolt as used by the top seat belt mount. The rollbar is fitted underneath one of the thinner seatbelt spacer bushes. The seatbelt bolts are tightened to 40-45 lbft.

Static four point harness:

The rollbar is secured at the front by 7/16" UNF x 1" set screws and spring washers. Tighten to 20-25 lbft.

SECTION 7

ASSEMBLY OF GEARBOX AND FITMENT TO ENGINE

Contents

Caterham supplies the correct Sierra XR4i (V6) five speed gearbox with the items necessary to complete the installation and can provide these items on better terms than a Ford dealer. Alternatively, Caterham supplies its own six speed gearbox as a direct replacement for the Ford five speed gearbox.

7.1 Assembly of Gearbox Kit – Ford 5 Speed and Caterham 6 Speed

The gearbox kit includes all the items necessary to prepare the gearbox for installation in the Seven with the Vauxhall 8 valve and Caterham tuned 1.8 Supersprint engines.

7.1.1 Fitment of the Reverse Light Switch and Speedometer Drive

a) It is advisable to lightly lubricate or grease the following moving parts before assembly. The small oil seal fits over the output spindle and should be gently pressed or tapped into place using a suitably sized socket as a drift.

b) Fit the plastic speedometer drive into the rear left of the tailshaft housing, and the steel cap (with silicone around the lip) is tapped in to secure it.

c) The speedometer cable right angle drive is fitted next. Firstly screw in the brass adapter. Insert the short square cable into the spindle and slot the right angle drive into the hole provided. Secure the angle drive to the gearbox with the circlip ensuring that it sits home in its groove.

d) **Attach the speedometer cable, this must be fitted before installing the engine and gearbox.**

e) Lightly screw the reversing light switch into place on the rear right-hand of the tailshaft housing ensuring that you only **gently** nip it with the spanner.

7.1.2 Fitment of the Clutch Arm Pivot

a) Gently tap the clutch arm pivot into the hole provided inside the nearside of the bellhousing capturing the rubber sleeve. (In most cases this is already fitted for you).

b) Insert the clutch arm over the first motion shaft with its inner end clipped over the pin and the outer end protruding through the end of the bellhousing to accept the cable.

c) Clip the clutch release bearing into place. Push the yellow plastic cable bush into the hole provided in the bellhousing for the clutch cable from the front. See figure 7.1.

7.1.3 Fitment of Bellhousing to Gearbox

a) The bellhousing should be bolted to the front of the gearbox using the four special 12mm x 60mm bolts (metric fine thread) and spring washers. On the 5 speed, a gasket (with a thin layer of silicone sealant applied on either side) should be fitted between the gearbox and the adapter.

b) **No gasket is fitted on the 6 speed**, instead an 'O'ring around the selector rod on the front face of the gearbox takes the place of a gasket. A small bead of silicon sealant should be applied around the 'O' ring. These bolts should be torqued to 45 lbft.

7.1.4 Fitment of Clutch Cable

a) The clutch cable is threaded through the cable bush in the bellhousing and then through the hole in the gaiter.

b) Connect to the arm and clip the gaiter in place with its metal clip. (The hydraulic slave cylinder used on left hand drive cars locates in the same way, its adjusting rod substituting for the cable).

7.2 Fitment of Gearbox to Engine

a) Bolt the metal/rubber/metal gearbox mounting, chamfered edge rearward, to the underside of the tailshaft housing using the 12mm x 25mm bolt and lockwasher. Torque to 45 lbft.

b) Caterham recommend bolting the engine and gearbox together out of the car and then inserting them as an assembly.

c) Slide the gearbox into place on the rear of the engine. It may be necessary to turn the crankshaft using the bolt on the front pulley in order to line up the gearbox first motion shaft splines with the clutch.

d) Once the gearbox is in place on the engine connect the two together using four M12 bolts with spring washers and two M10 bolts with spring washers.

e) Two 40mm bolts pass forward from the top of the bellhousing into the back of the cylinder block and two 60mm bolts, with plain as well as spring washers, pass backwards through the 'ears' on the bearing ladder of the engine into the bellhousing.

f) The two M10 x 55mm bolts pass through the bellhousing into the sump.

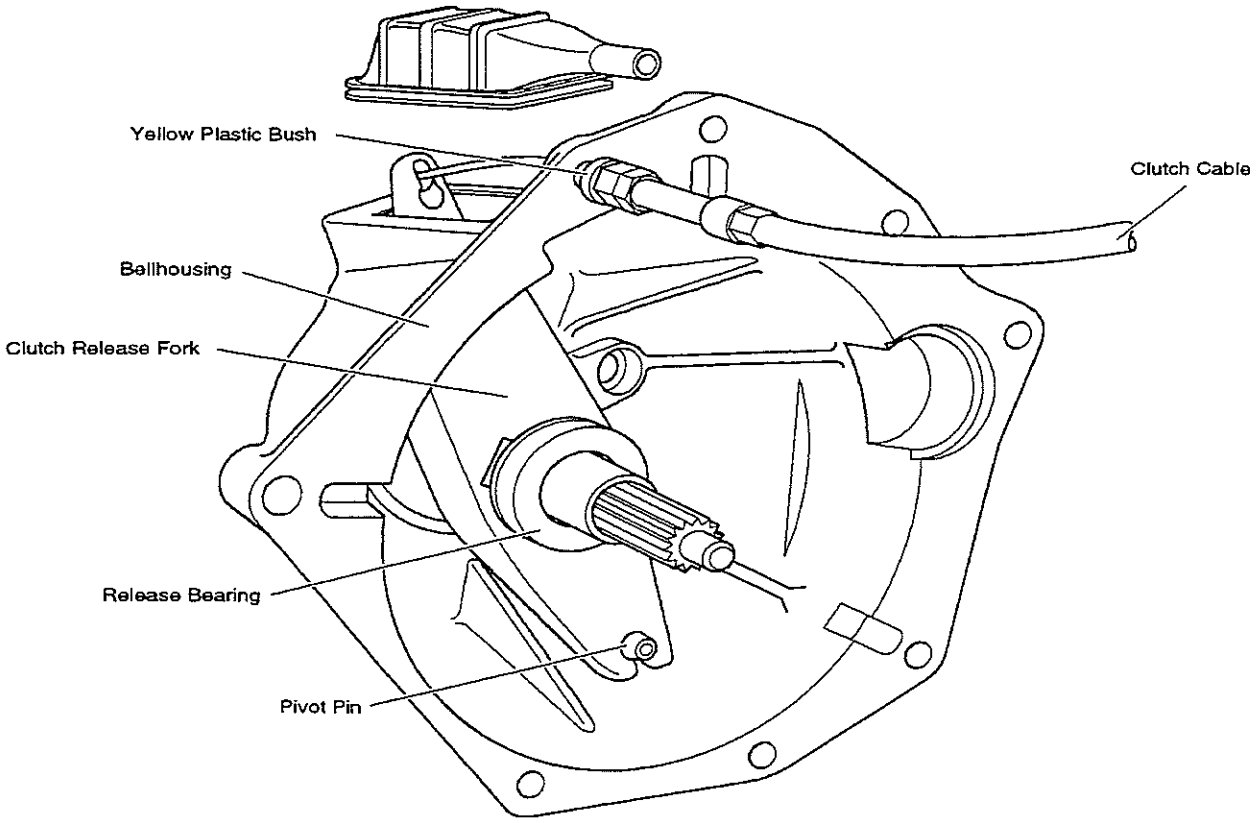


figure 7.1 5/6 Speed Bellhousing and Clutch Arm Assembly

SECTION 8

INSTALLATION OF ENGINE AND GEARBOX

Contents

8.1 Preparing Engine for Fitment in Car

a) It is recommended that the exhaust manifold and engine mounting brackets are left off at this stage to avoid the risk of damaging the fragile body side panels. This will mean that the alternator also has to be left off.

b) Before being fitted to the chassis, the gearbox and bellhousing need to be fitted to the engine. Slide the gearbox into place on the rear of the engine. It may be necessary to turn the crankshaft using the bolt on the front pulley in order to line up the gearbox first motion shaft splines with the clutch. Once the gearbox is in place on the engine, connect the two together using 6 M12 x 40mm bolts with spring washers where possible and Loctite where not. An M12 x 60mm bolt passes through the starter and engine flanges to secure the top of the starter. Two M10 x 40mm bolts pass through the bellhousing into the sump.

c) Caterham supplied gearboxes will be empty of oil as supplied. It is possible to fill the gearbox before it is fitted in the car, however some of this oil may leak out of the rear of the gearbox casing before the propshaft has been fitted. The gearbox will therefore need to be topped up with oil after fitment. Alternatively the gearbox can be filled with oil after it has been fitted in the car. Access to the filler hole is extremely tight in the tunnel therefore we suggest that you remove the filler plug prior to installation of the gearbox. In situ the filler plug can be reached with a cut down allen key. The gearbox is full when the oil level reaches the filler plug.

d) Before fitting the engine/gearbox assembly, the following operations must be carried out;

i) Fit the clutch cable into the bellhousing.

ii) Fit the metal/rubber engine mountings to the chassis using four 5/16"x 1¾" bolts, plain washers and nylocs, but do not tighten at this stage.

iii) Fit the 'J' shaped water pipe to the water pump on the right of the engine.

iv) Connect the heavy red lead to the top stud on the starter solenoid. (NB Not for cars fitted with a battery master switch eg. Academy car).

e) We recommend protecting the chassis tubes in the engine bay with masking tape or padding while fitting the engine.

f) The engine and gearbox assembly should be installed with the carburettors in place.

8.2 Fitting Engine/Gearbox into Car

a) In order to avoid damaging the paint on the chassis tubes we recommend protecting the upper engine bay diagonals with padding to avoid damage.

b) Using a suitable hoist, lower the engine and gearbox assembly into the chassis with the gearbox end pointing at an angle of approximately 30^{O} below horizontal. Taking care to avoid touching the fragile speedometer drive unit against the chassis, insert the gearbox assembly into the transmission tunnel and slide it back with the tailshaft housing sliding over the end of the propshaft. It may be necessary to turn the propshaft slightly before the splines engage.

c) Continue to slide the gearbox rearward until its mounting locates onto the rearmost mounting position provided in the chassis.

d) With the engine still suspended attach the engine mounting brackets to the cylinder block. The left-hand mounting bracket is attached using two M10 x 25mm and one M10 x 45mm bolt. The right-hand mounting bracket is attached to the block using two M10 x 45mm bolts and the two cylindrical aluminium spacers provided are positioned between the mounting and the cylinder block.

e) The engine can now be lowered onto its mountings and secured with two ½" UNF x 2 ½" bolts and lockwashers. If the engine mountings do not align it may be necessary to temporarily loosen the bolts holding the rubber mounts to the chassis rails in order to get a little more movement.

f) It is easiest to fill the gearbox when **all** the engine and gearbox mounts are in place but not fully tightened. Push the gearbox as far over to the right as possible in order to facilitate the best clearance around the gearbox fill hole.

g) Fill up the gearbox. Fit and secure the plug when the oil begins to dribble out of the gearbox fill hole.

h) Push the gearbox back onto centreline and adjust in the tunnel using its slotted mountings to achieve equal clearance on both sides within the transmission tunnel. Secure the gearbox mounting to the chassis with two 5/16" x 1" bolts and nylocs.

i) Fully tighten the engine mounting bolts. Do not forget to check the bracket to engine block bolts, the bracket to rubber mount bolts and the rubber mount to chassis bolts.

j) The gearlever is attached to the top of the gearbox tailshaft housing using three M8 x 16mm screws - no washers are used here. Torque to 15lbft/20Nm.

8.3 Electrical Connections

a) The alternator is fitted to the left hand engine mounting bracket where it is located by the horizontal tube running parallel to the engine. Attach the alternator using a 5/16" x 5" bolt and nyloc.

b) The adjusting strap is attached to the hexagonal block already bolted to the engine using a 3/8" bolt and lockwasher, and to the alternator by an M8 x 25mm bolt with both a plain and a lockwasher.

c) Fit the alternator drive belt and tighten by swinging the alternator away from the engine until there is no more than ½" movement in the belt.

d) The live battery connection is effected using the red lead between the positive terminal on the battery and the top stud on the starter solenoid. The battery earth lead connects between the negative terminal on the battery and a bellhousing to engine bolt on the left of the engine.

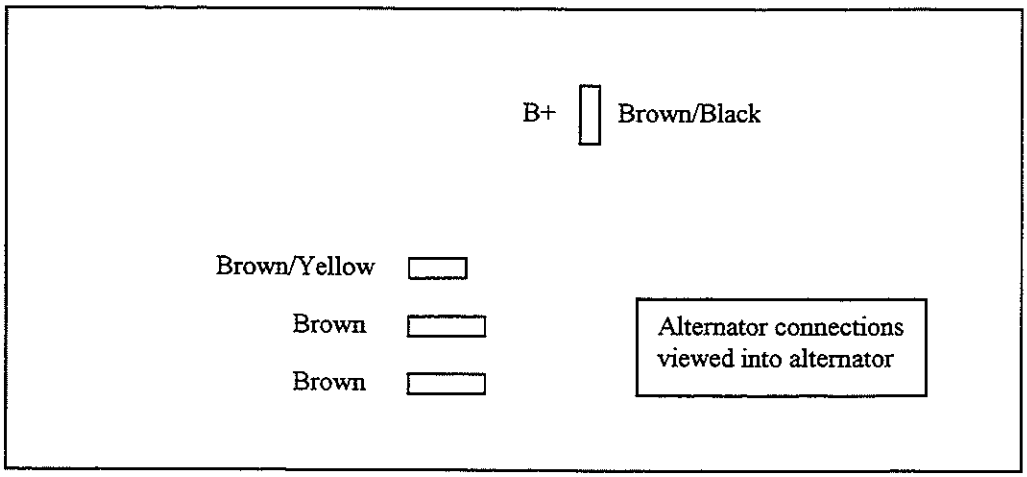
N.B. Do not actually connect this earth lead to the battery until all electrical equipment is installed and connected and the car is ready to run.

e) The engine in turn is earthed to the chassis on the rear engine mounting rubber fixing bolt on the right hand lower chassis tube. The other end of the strap is bolted to an unused threaded hole in the engine block adjacent to the engine mounting bracket.

f) Other electrical connections are as follows:

Alternator	brown/ brown and brown/yellow wires in a plastic connnector. brown/black is redundant (this requires tying back).
Water temperature sender	female lucar connector green / blue
Oil pressure sender	female lucar connector white / brown
Coil	4 pin rectangular connector This connects directly to the amplifier mounted to the coil.

Crankshaft Sensor	3 pin rectangular connector Connects to the thick black cable that runs from the front LHS of the engine (this being the crankshaft sensor).



8.4 Exhaust System

a) Attach the four exhaust manifolds using the gaskets supplied, M8 plain nuts, lockwashers and plain washers.

b) Attach the four into one collector onto the manifold using two ¼" x ¾" bolts, 2 spring washers, 4 plain washers and 2 plain nuts. DO NOT fully tighten at this stage. We recommend the use of Holts firegum or similar to seal the joints and this should be used fairly liberally to prevent 'blowing'.

c) Check that the threaded bush (at the lower left side of the car immediately in front of the rear wheel arch) is clear. Bolt the small angled bracket (see figure 8.1) into this using a 5/16"UNF x 1" bolt. When the bracket is fitted it should point downwards with the longer side outwards. Attach the rubber bobbin on the top of this and tighten using a 5/16" UNF nut and spring washer.

d) Fit an exhaust clamp over the forward silencer pipe and slide the silencer onto the collector.

e) The aluminium exhaust guard can be fitted after sliding the long jubilee clips through the channels provided in its underside. It should be positioned in order to protect the passenger from inadvertently touching the hot silencer, although care should be taken to ensure that the guard does not touch the bodywork. Ensure that the adjusting worms on the jubilee clips are not positioned at the bottom, but at approximately the 4 o'clock position towards the chassis (but NOT touching the chassis). This is to prevent them contacting the road surface and snapping off.

f) Finally tighten all fasteners in the exhaust system.

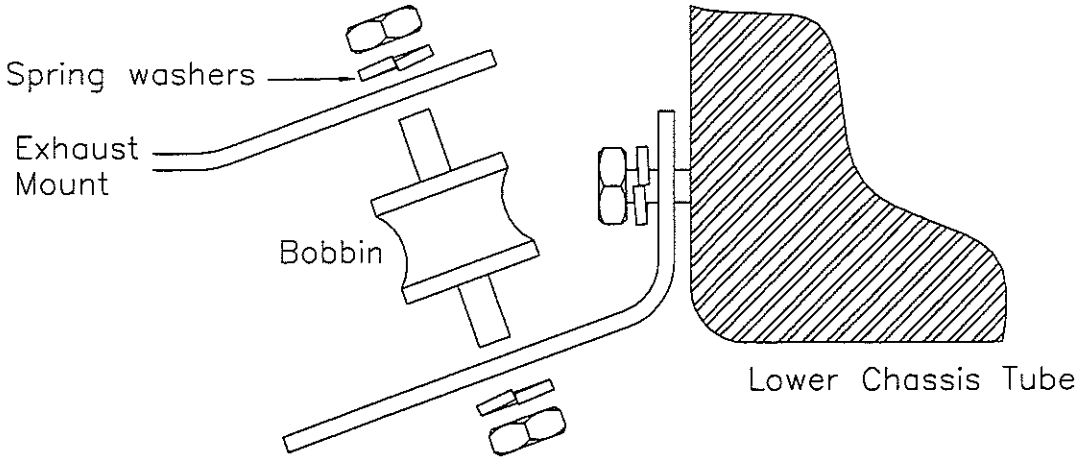


Figure 8.1 Exhaust Mounting

8.5 Cooling System

Refer to figures 8.5.1 (with heater) and 8.5.2 (without heater)

a) Before the radiator can be fitted, the cooling fan needs to be fitted to the top of the radiator. See diagram 8.5.3. The fan should be fitted between the body of the radiator and the brackets on the top of the radiator and fastened using M6 x 16mm bolts. It may be necessary to space these bolts out using 6mm plain washers against the bolt head to prevent the possibility of the bolt touching the radiator.

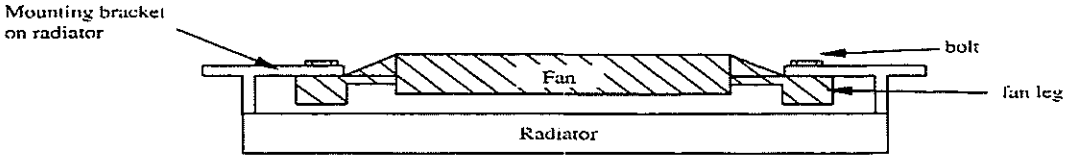


Diagram 8.5.3 – Fan Fitment to Radiator.

Remove the blanking plug on the radiator and fit the thermostatic fan switch in its place. Nip this up to effect a water tight seal. (This faces backwards into the engine bay when the radiator is installed).

Mount the radiator in the lower position on the chassis using the upper holes on the radiator, with the thermostatic switch at the top of the radiator and facing towards the engine.

Connect the black/green and green wires to the switch. There are also radiator drain and bleed plugs.

Before fitting the plastic expansion bottle it must first be modified. (See Figure 8.8.4). The redundant fixing leg must be cut off. Hacksaw this off as close to the main body of the bottle as possible, taking care not to damage/puncture the skin of the bottle, and tidy it up using a file.

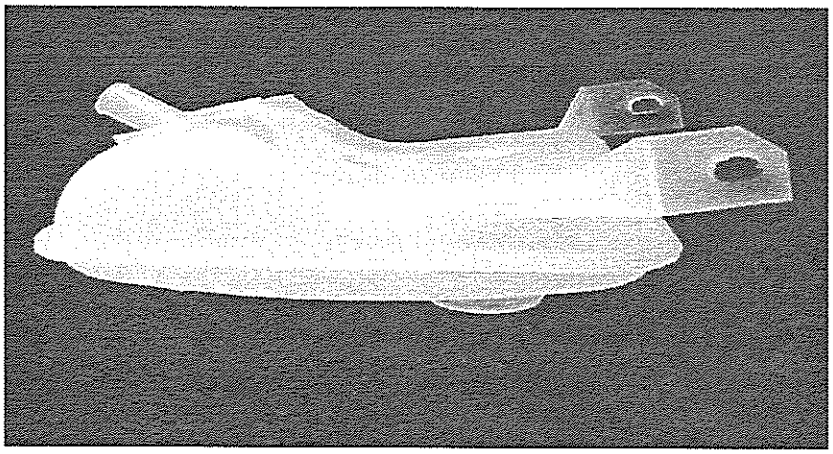


Figure 8.8.4 Expansion Bottle Modification.

The plastic expansion bottle sits on a 5/16" x 3 ½" bolt on top of the cruciform, and immediately behind the radiator. The bolt is screwed into the boss in the chassis to protrude vertically, where it is locked in place with a lock nut. It is held by two brackets on the chassis secured to the expansion bottle by two ¼" x ¾" bolts and nylocs. The position of the expansion bottle should be adjusted until it is level.

The bottom radiator hose is in two sections with a metal 'submarine' pipe (black metal pipe with a smaller diameter pipe (tower outlet) attached in the centre at a right angle to it) connecting the sections.

The 'J' shaped hose is connected from the submarine pipe to the water pump (on the right-hand side of the engine block) and secured with jubilee clips.

An 'S' shaped hose connects from the opposite end of the submarine pipe to the bottom radiator outlet (note that the bottom hose has a front and a back) and offers significantly better clearance to the steering rack when correctly fitted. It is important to ensure that no chafing is possible between the lower forward hose and the steering rack or between the rear lower hose and the water pump casing.

Fitment of the Heater and Cooling Connections

The heater (optional) should now be inserted into the cut out in the scuttle and the base secured using M5 x 16mm screws into the rivnuts already in place. With this positioned locate the position of the rivnuts in the vertical flange of the heater (marking the vertical location with a piece of tape helps) and carefully drill the heater flange and secure in the same way as the base.

The plug from the heater should be attached to a similar plug to be found under the dashboard in the area of the heater.

The tower outlet is connected to the top outlet on the heater, cut 5/8" pipe to suit.

i) A preformed hose connects from the engine directly above the water pump in the upper of the two adjacent outlets to the bottom of the expansion bottle.

j) The remaining outlet, directly above the water pump, connects to the lower heater outlet. Due to a difference in connector sizes on the heater and engine, a short length of 3/4" hose is fixed to the engine. To this hose a 3/4" to 5/8" straight plastic hose reducer must be inserted with a length of 5/8" hose then running to the bottom outlet of the heater, which will require cutting to length.

k) The top radiator hose connects to the engine at the top left above the alternator. Directly above is a small outlet which is connected to the top of the expansion tank.

l) If a heater is not fitted (figure 8.5.2);

i) The tower outlet of the submarine pipe is connected to the lower of the two adjacent outlets directly above the water pump with a preformed hose.

ii) The upper of the two adjacent outlets directly above the water pump should be connected to the bottom of the expansion bottle, as with the heater installation.

m) The cooling system should be filled with a 33% antifreeze solution - **Caterham recommend Comma Oils 'Coldstream'** - to the level marked on the expansion tank. Carefully bleed with the engine running and the bleed valve on the radiator loosened until normal operating temperature is reached and the air is bled out of the radiator. After the car has been road tested the radiator should be bled again to ensure that all the air is bled from the system.

8.6 Oil System / Engine Breather

The outlet on the top of the cam cover exits to a breather bottle. This should be fitted between the forward top cross members of the chassis on the right hand chassis rail above the steering rack. Fix the mounting bracket with rivets. Drill several holes in the black cap to allow breathing.

8.7 Fuel System

The fuel system is complete except for the attachment of the fuel pipe to the connection on the rear carburettor using the short piece of rubber tubing supplied and the two clips. See figure 8.7

8.8 Throttle and Speedometer cables

a) The speedometer cable should be fed through the large grommet above the steering column in the front bulkhead, and connected to the back of the speedometer where it is hand tightened.

At the pedal end, the outer throttle cable sits directly in the front of the pedal box, and the nipple clips into the hole in the top of the pedal lever. The attachment at the carburettor end uses a ball joint which clips together and is secured using a cylindrical clip as is shown in diagram 8.8.1.

Bolt Size	Usage	Torque	Torque
M12 x 40mm	Gearbox to bellhousing	61Nm	45 lbft
M12 x 25mm	Gearbox mount	61Nm	45 lbft
M12 x 40mm	Engine to bellhousing	61Nm	45 lbft
M12 x 60mm	Engine to bellhousing	61Nm	45 lbft
M10 x 40mm	Bellhousing to sump	34Nm	25 lbft
5/16"UNF x 1"	Gearbox mount to chassis	16-20Nm	12-15 lbft
M10 nuts	Exhaust manifold	34Nm	25 lbft
5/16"UNF x 1 3/4"	Engine mounting rubbers	16-20Nm	12-15 lbft
M10	Right Hand Engine Mount	34Nm	25 lbft
M10	Left hand engine mount	34Nm	25 lbft
1/2"UNF x 2 1/2"	Mounting bracket to rubbers	61Nm	45 lbft
5/16"UNF x 3/4"	Exhaust bracket	16-20Nm	12-15 lbft
5/16"UNF x 3 1/2"	Expansion tank support	16-20Nm	12-15 lbft
1/4"UNF x 3/4"	Expansion tank brackets	11Nm	8 lbft

Table 8.1 Vauxhall 1600 – Torques

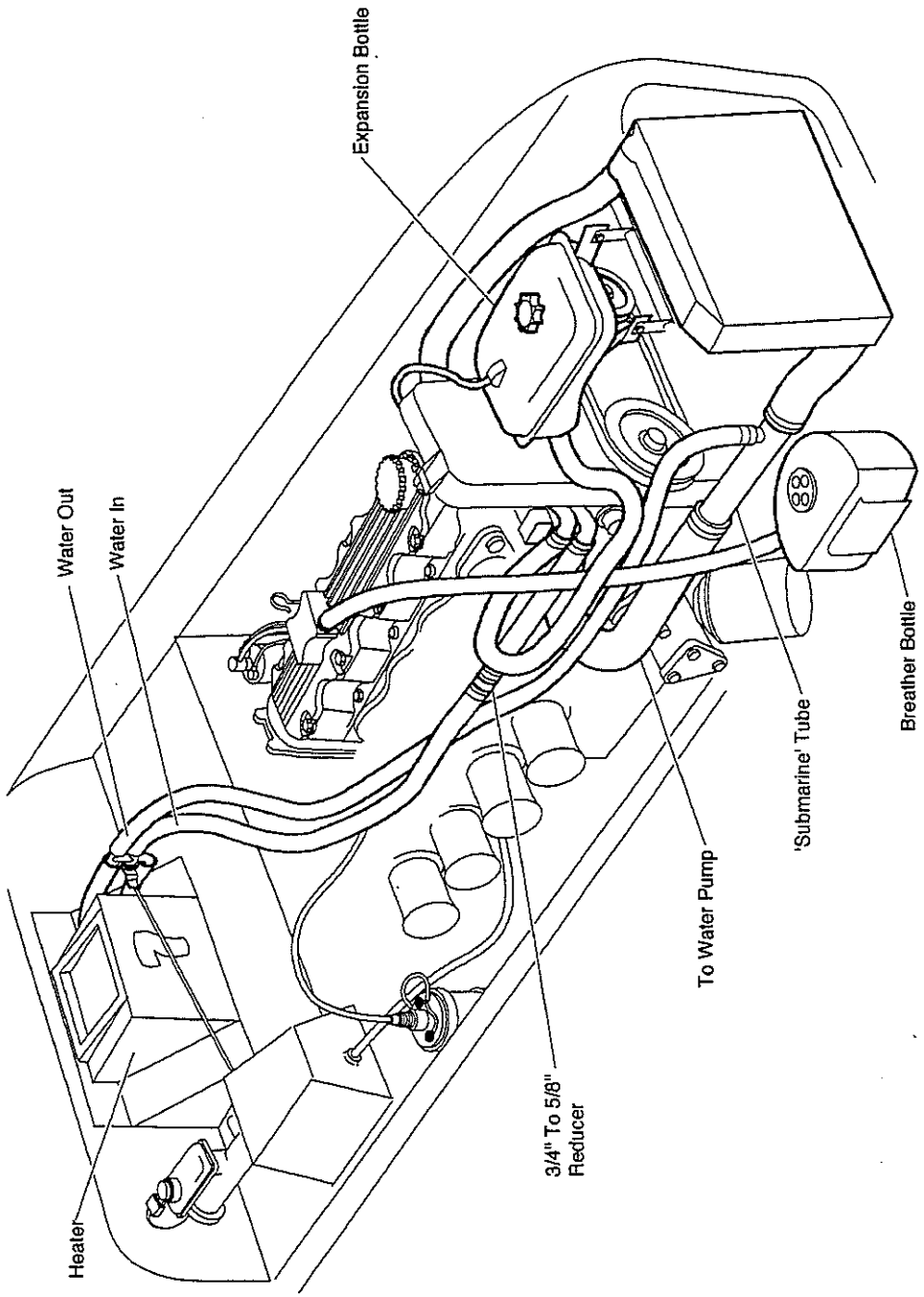


Diagram 8.5.1 – Vauxhall Cooling System with Heater.

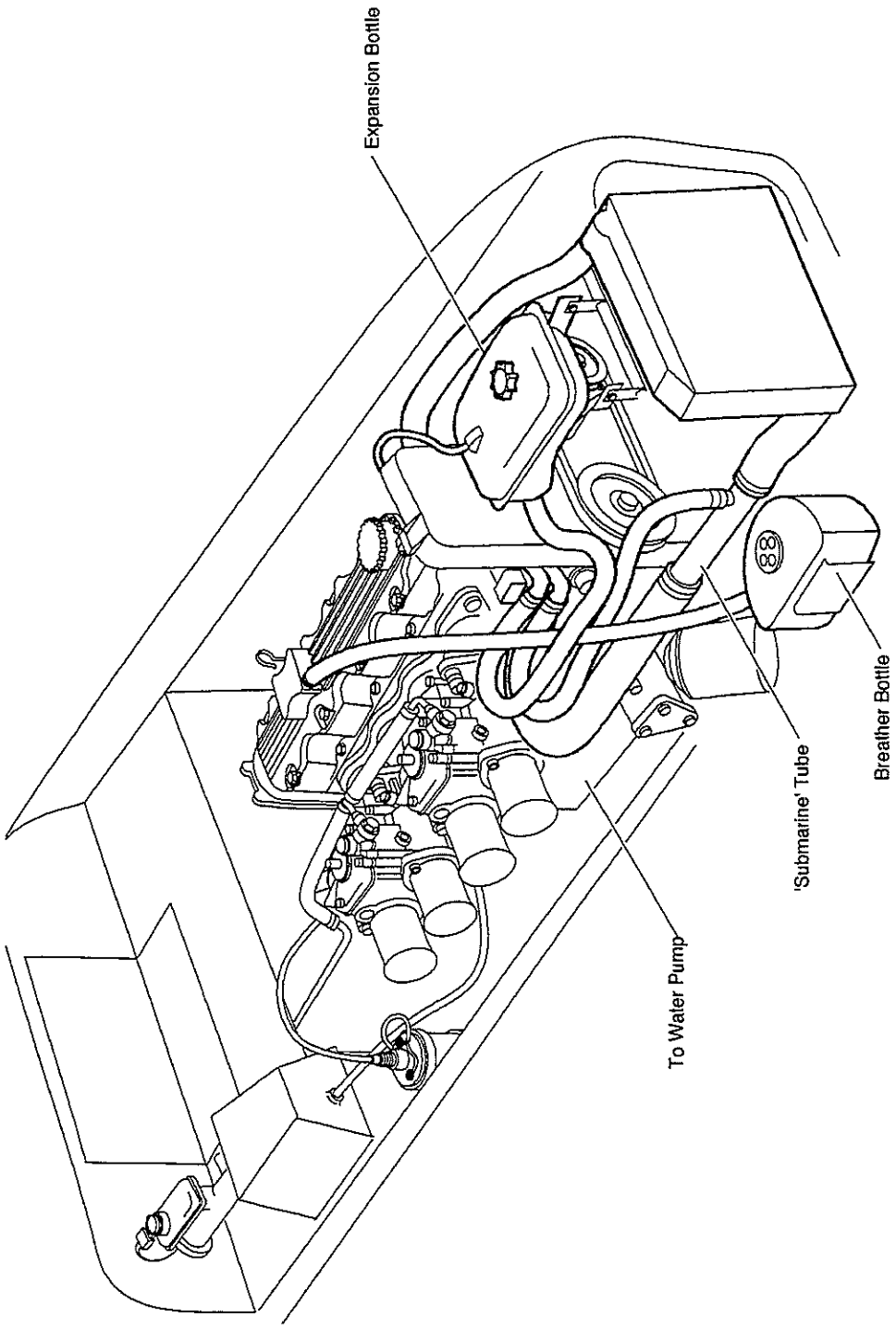


Diagram 8.5.2 – Vauxhall Cooling System without Heater.

SECTION 9

START – UP PROCEDURE

Contents

9.1 Engine Oil

Caterham recommend the use of **Comma Oils 'Eurolite'**. Do not be tempted to buy the highest grade synthetic oil as this is not suitable for the Vauxhall engine supplied. Initially add 4 litres.

9.2 Gearbox Oil

a) As mentioned in Section 8 access to the filler plug is very tight in the tunnel. Remove the filler plug (if not removed earlier) – this will mean using a cut down allen key (10mm) as described in Section 2.

b) Due to the restricted access unless you have access to a pump with a flexible delivery tube it will probably be necessary to make a filling tube using a funnel and hose. Some gear oil bottles may be adequate (if they have a long filler tube) so purchase oil with this in mind.

c) Caterham recommend that the Type 9 five speed gearbox is filled with **Comma Oils EP 80/90**.

d) The Caterham 6 speed gearbox should **only be filled with**

e) Both gearboxes will have a small amount of oil already inside (for assembly purposes). They both need to be filled so that the oil reaches the level of the filler hole – the best gauge of this is when oil dribbles out of the hole. The capacities of both boxes is 2.0 litres but regardless of this fill to the filler hole.

f) Remember to replace the filler plug and tighten.

9.3 Battery Connections

To Positive (on the battery)

Red lead from the starter solenoid (this should have been fitted prior to engine installation and ty-wrapped to the body of the starter motor to prevent it from running close to the exhaust).

Double brown wire (with ring terminal) from the vehicle loom. This consists of two thick wires secured together with black insulating tape.

To Negative (on the battery)

Black earth lead. This should be run from either a bellhousing or starter motor bolt.

9.3.1 Battery Master Switch

If specified at the time of purchase the master switch kit will have already been installed.

a) The remaining parts for you to connect are the two thick red leads that can be found exiting the transmission tunnel. Attach one of the cables to the starter motor solenoid and the other to the positive terminal on the battery. These cables are labelled accordingly to avoid confusion. As a 'double check' the cable to the positive side of the battery is attached to the master switch by itself. The cable to the starter solenoid is attached to the other pole of the master switch along with the double brown wire.

9.4 Water Hoses

Perform a double check on the tightness of all water system hoses.

9.5 Electrical connections

Check that all plugs are making good contact by pushing both halves together.

9.6 Engine/Gearbox Fasteners

Ensure that the engine mounts and brackets are tight.

9.7 Fuel

a) Check the tightness of the main fuel supply line and the carburettor connections.

b) You will need to add at least a gallon of unleaded/super unleaded fuel to the tank for start up and initial running.

9.8 Cranking For Oil Pressure

Before running the engine it is advisable to establish oil pressure.

a) Turn the ignition switch on so that the red ignition warning light is illuminated.

If you have specified an immobiliser, take note of (b), if not then go straight to (c).

b) Activate the immobiliser by placing the red plastic immobiliser key into the socket in the centre of the dashboard. As it is the first activation you may have to repeat this until a 'peeping' noise is heard and the LED is lit. When activated the immobiliser will allow the engine to be turned but will not allow it to fire.

c) Turn the ignition switch so that the engine turns. Watch the oil pressure gauge until the needle moves – it will probably indicate around 4 bar (or more). Do not be alarmed if you are turning the engine for some time (30 – 40 seconds) before oil pressure is achieved. Once oil pressure is established stop turning the engine.

9.9.1 Setting Twin Weber DCOE Carburettors

a) If you have an engine supplied by Caterham Cars the carburettors will have the correct jets installed but will not have been set up as this is not possible without the engine running. Before attempting this procedure which in effect is to set up the carburettors by ear, read the instructions thoroughly and study the diagram 9.1carefully.

b) Identify the four idle mixture screws referred to in the diagram and close them by turning clockwise until the first sign of resistance is felt. DO NOT OVERTIGHTEN AS PERMANENT DAMAGE WILL BE DONE. Open each screw through exactly 2 ½ turns.

c) In the absence of a balancing tool the next task is to set the throttles so that the butterflies in both carburettors open simultaneously. This can be done by eye – observing the movement of the butterflies against the progression holes which are covered by brass plugs. These plugs are positioned directly outboard of each idle mixture screw and it is necessary to remove the right-hand one from the left-hand carburettor and the left-hand one from the right-hand carburettor. When removed, three progression holes are revealed.

d) Looking through the 1 mm hole nearest to the cylinder head on the left-hand carburettor, find the outer edge of the throttle butterfly. You may find it helpful to use a torch and to move the throttle lever by hand to show the movement of the butterfly. Turn the idle speed adjusting screw, located on the right-hand side of the left-hand carburettor, clockwise until the butterfly edge is positioned across the centre of this 1 mm hole.

e) Between the two carburettors there is a horizontal balancing screw which is used to set the throttles relative to each other. Turn this screw until the edge of the butterfly in the right-hand carburettor exactly corresponds with its neighbour. The balance is now set, and this horizontal screw must not be touched again or the procedure will need to be repeated. Replace the brass plugs and turn the idle speed screw on the left-hand carburettor anti-clockwise until the throttle lever ceases to move any further shut, then screw it clockwise 1 ½ turns.

f) Assuming that the ignition is correctly set and the car has petrol, oil and water the engine can be started and warmed up. See section 9.10 – Start Up.

g) Adjust the idle speed screw until the engine will idle at about 1000 rpm. You are now ready to reset the idle mixtures on each carburettor choke in turn.

h) With the engine running and at normal temperature close the number one cylinder (forward) idle mixture screw 2 turns. At this point the engine will slow and run on only 3 cylinders so open one turn and then successive ¼ turns, always allowing at least 5 seconds for the engine to settle on the particular mixture and for you to hear the effect. Normally, with the screw between 2 and 3 turns open, the engine will speed up and run more smoothly.

i) Repeat this process with the other three idle mixture screws after which the engine will probable be idling at around 2000 rpm. Adjust the idle speed screw until it ticks over at about 950 rpm and repeat the whole process again to get a finer tune, setting the idle to 950 rpm again when finished. The important thing is to always allow enough time for the engine to stabilise after each adjustment.

9.10 Start Up

If you have specified an immobiliser, take note of (a), if not then go straight to (b).

a) De-activate the immobiliser by placing the black plastic immobiliser key into the socket in the dashboard – a 'peeping' noise should be heard and the LED light should go out.

b) Check under the car one final time for leaks of any kind.

c) Turn the ignition switch so that the engine turns again until it fires. There may be a period of turning before the engine fires as the fuel is pumped from the tank at the rear to the engine.

d) Leave the engine running until it warms through – keep an eye on the oil pressure gauge initially. When the temperature is rising remove the bleed screw on the top of the radiator. The water inside the radiator should move upwards towards the hole which should be partially covered by the bleed screw. When the water reaches the top of the hole (or just spills over) replace the screw and tighten to seal. This allows any air in the radiator to escape. **The water rises very quickly** so be prepared to put the screw back on almost immediately.

e) Run the engine until the fan cuts in (approximately 92^{O}).

9.11 Oil Level

The engine oil level must be checked with the engine turned off. Ensure that the engine is warm before checking the oil level with the engine cold as this will give an incorrect reading.

SECTION 10

LIGHTING

Contents

The lighting kit includes all the parts needed to make the Seven comply with the lighting requirements of Single Vehicle Approval. If the instructions in this section are followed, all legal requirements will be fulfilled. See diagram 10.1 – Lighting Legal Requirements.

10.1 Headlights and Front Indicators

a) The headlamp brackets should have already been fitted as detailed in the Front Suspension chapter.

b) It is initially easier to assemble the indicators before they are fitted on the car. Remove the amber lens from the indicator. Ensuring that the drainage hole on the indicator seal is at the bottom, line up the three holes in the indicator base with the holes in the indicator cone. Secure with posidrive self tapping screws and nip up firmly. Replace the amber lens.

c) Place the indicator mounting bracket on top of the headlamp bracket with the headlamp bowl assembly large nut and lockwasher underneath. Now fit the headlamp bowl on top of the indicator mounting bracket with its cast base above the bracket.

d) Secure into place underneath the headlamp bracket with the large nut and lockwasher. Initially tighten until the headlamp bowl can just move.

e) Remove the headlamp unit from the bowl by releasing the clamp screw on top of the bowl.

f) Feed the black earth wire from the indicator (ring terminal) up into the headlamp bowl and secure it to the earth screw at the base.

g) Hook the bottom of the rim into the lip on the headlamp bowl and swing the headlamp unit up into position, securing with the top screw.

h) All of the remaining wiring (including the green wire from the indicator) should be fed through the bracket so that it exits into the engine bay next to the pinch bolts for the headlamp bracket/cycle wingstay.

i) You will now have 6 wires in total (all with male econoseal pins). Push the wires into the back of the loose black plug (found with the lighting hardware) so that the correct colour wiring matches up with that into the plug on the main loom. Once all the pins have been located into the plug, the yellow cover can be inserted and the male/female plugs can be pushed together. If the two plugs do not locate properly it is probably due to the pins not being pushed in far enough.

j) Accurate headlight alignment can be carried out using a headlight beam aligning device available at most garages, but a close approximation can be achieved by positioning the car in front of a suitable wall or garage door aligning the beams to face slightly downwards and to the left. Tighten securely when aligned.

k) Finally add a length of the push-on rubber strip to the underside edge of the indicator cone – **this is an SVA requirement**.

10.2 Front Indicator Repeaters - Flared wings

a) Dismantle the repeater assemblies, removing bulb and lens and remove the studs from the unit. These are replaced with 5mm bolts and nyloc nuts. The repeater assemblies are attached to the outer edges of the front wings and are located in order that the forward 5mm mounting bolt passes through the wing and holds the wing onto the wingstay. These should be aligned to suit the wingstay and ensure symmetry on both sides.

b) Drill through the front wings at the appropriate points with a 5mm drill for the outer holes and a 9/16" drill for the centre hole where the bulb-holder locates. The forward hole should be drilled down through the wingstay so that the repeater, wing and wingstay are all in alignment.

c) Bolt the repeaters into place using 5mm x 16mm Posidrive screws and nylocs. The black earth wire is attached to the forward mounting screw and should first be shortened and refinished with a ring terminal.

d) The green wire that comes from the repeaters needs to be directed through the hole in the wingstay and for the moment left hanging from the wingstay where it is clamped to the chassis. Replace the bulb and lens.

e) There will now be six wires protruding out of the wingstay/Headlamp bracket with male econoseal pins on them. These pins have a grey rubber seal backed onto them. Push the wires into the male black plug so that the correct coloured wiring matches up with that on the main loom. Once all the pins have located into the plug the yellow cover can be inserted and the male/female plugs can be pushed together.

NOTE: If the two econoseal plugs do not locate properly it is probably due to the crimps not being pushed in far enough.

10.3 Front Indicator Repeaters - Cycle Wings

It is recommended to fit the repeaters with the wings off the car and this method has been covered in Section 7 -Miscellaneous. However, the instructions are the same if you have chosen to leave fitment until now.

10.4 Rear Lights

a) The kit includes two identical rear light assemblies which comprise rear, brake and indicator lights. They are mounted on rubber blocks which ensure that the lights are vertical when fitted and secured with four self tapping screws. Turn one unit around on the blocks to enable the amber indicator lights to be on the outside.

b) The rear wings are marked for two holes that give the position for the rear lights. Drill the lower innermost hole to 4mm; this is for the lower inner fixing of the lamp assembly. Drill the outer to 30mm; this takes the wiring and the econoseal plug.

c) Remove the lenses and the bulbs from the rear lamps noting that the indicators use a single filament bulb and the rear/brake lights a double filament bulb. Drill through the rubber of the four corner holes with a 4mm drill ensuring this is at 90^{o} to the base plate.

d) Each rear light unit is attached using four self tapping screws, the upper ones being longer. Locate the rubber grommet into the 30 mm hole and feed the wiring and the plug through. Attach the rear light (with one of the shorter screws) at its bottom inside corner. Ensuring that the light is level drill through into the wing using the 4mm drill for the remaining three holes. It is advisable to remove the unit and clear away the swarf before finally fixing in place. Replace the bulbs and lenses.

e) The wiring is simply connected to the main loom using the econoseal plug that will be protruding from a grommet mounted just inside the rear wing. Simply push together the male and female plugs making sure that they have located properly and hide the plug inside the rear side panel. The grommet should be fitted in the aluminium panel.

For reference the applications of the wiring is listed below:

Function	Loom Wires	Light Unit Wires
Rear light	red/white	Red
Brake	green/mauve	green/mauve
Left Indicator	green/red	Green
Right Indicator	green/white	Green
Earth	Black	Black

f) For neatness, neatly clip the wiring out of the way with ty-wraps inside the body.

10.5 Reversing Light and Fog light

a) The reversing light and fog light are fixed to the rear panel. The connections have already been made.

10.6 Rear Number Plate Light

a) Dismantle the light unit and note that there are two round and two square holes provided in its metal base. The upper square holes are used to secure the unit to the spare wheel carrier and one of the round holes will align with a similar one on the carrier to take the feed wire.

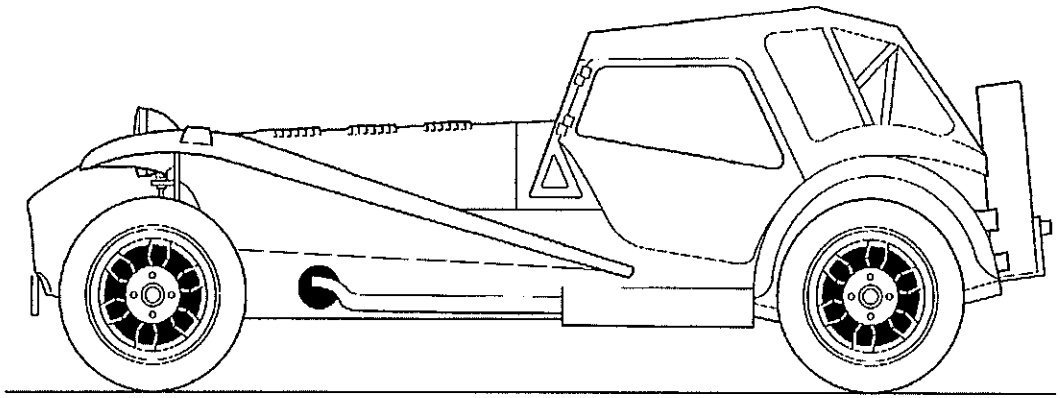
b) Pierce the rubber backing before fixing using two 5mm x 16mm posidrive screws and nylocs.

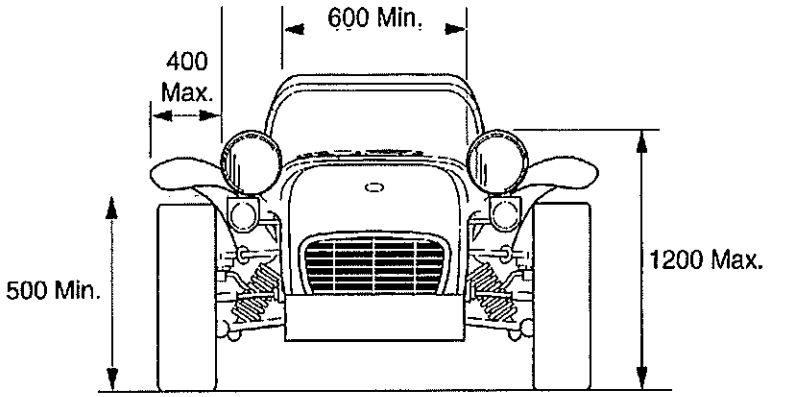
c) Feed the red wire through from the loom into the back of the unit. Strip back just sufficient insulation and attach to the screw connection provided in the centre of the light unit. The number plate light is earthed through its base so no other connection is needed.

10.7 Final Testing

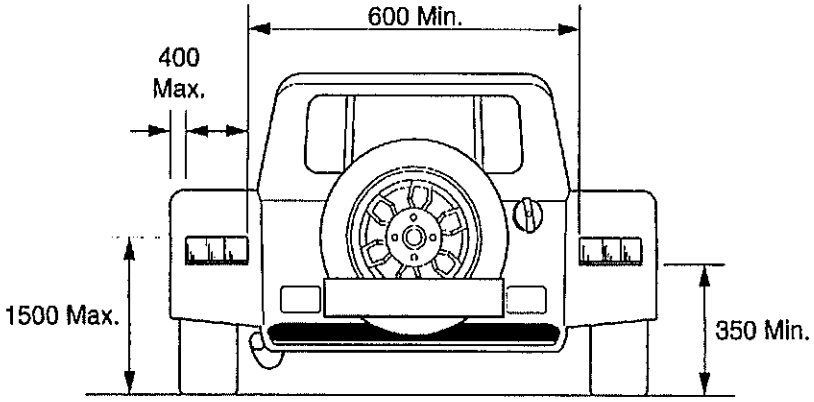
When all connections are made to the engine and the battery is installed, all the electrical functions can be checked. If there are any problems, recheck your connections and ensure that the bulbs have not been damaged in transit. In addition check **EVERY** earth point on the chassis, both for the wiring loom and the battery earth leads. In the unlikely event that a problem persists contact Caterham Cars Technical department on 01322 625802. In Appendix A there is a wiring diagram provided which may be of assistance.

Diagram 10.1 – Lighting Legal Requirements.





Position of Headlamps



Position of Rear Lamps

Dimensions in millimetres unless otherwise stated

	Min. height	*Max. height*
Fog Lamps	250	1000
Direction Indicators	430	2290

SECTION 11

INTERIOR TRIM

Contents

Before fitting the carpeting you must ensure that all operations that require access under carpets are completed. Eg. handbrake fitted but not tightened.

11.1 Seat Back Carpet

a) The seat back carpet has a leatherette strip along its upper edge. Lay the carpet in place - the carpeted section should be laid up to the edge of the aluminium with the leather strip wrapped around the tube. **Only glue the leatherette strip at this stage.** Make sure that you follow the instructions when applying the glue. To prevent movement during drying use tape to secure the strip in place. Ideally leave to dry for one hour.

b) You can now glue the carpet to the seat back. Only apply glue down as far as the transmission tunnel – the remainder is behind the seats.

c) Tighten the top seat belt bolt to 45 lbft (62 Nm). The lower seat belt can now be tightened to the outer anchorage – again torque to 45 lbft (62 Nm).

11.2 Transmission Tunnel Carpet

a) Trial fit the transmission tunnel carpet before gluing. You may be required to make certain cuts in order to ensure a correct fit along the tunnel into the cockpit. Ensure that the centre ridge on the carpet sits perfectly down the top of the tunnel. Pay particular attention to getting good adhesive coverage onto the forward section of the carpet so that the bond is good in order to prevent the carpet from becoming detached.

b) Once these carpets have been fitted the seat belt buckle should be fitted with the curved side of the plastic head sitting next to the transmission tunnel. The bolt can now be tightened to 45 lbft (62 Nm).

11.3 Tunnel Top

a) The tunnel top incorporates the gearlever gaiter. Ensure that the knob on the gearlever has been removed (if fitted).

b) There are four pre-drilled holes in the sides of the tunnel top; one either side towards the front and one either side towards the rear. Locate these and drill through with an M5 bit.

c) Place the tunnel top over the gearlever and push firmly into place over the sides of the transmission tunnel (and carpets). Line up the holes in the tunnel top with the holes in the chassis and secure with M5 x 16mm self tapping screws, plain washers and nylocs.

d) Screw the gearknob into position.

11.4 Footwell Carpets

a) The handed (left and right) footwell carpets are secured using three poppers at the rear of the footwell. Secure popper bases into the three pre-drilled holes with pop rivets.

b) Stick masking tape onto the underside of the carpet approximately where the popper bases are and lay in place, pressing firmly so that the bases make an impression on the tape. Use the riveting tool and punch to make appropriate holes in the carpet and to rivet together the popper and its retaining cap.

c) The carpets can now simply popper into place.

11.5 Boot Carpet

a) The boot carpet is laid in place (not glued) but will need to be cut to fit around the fuel filler pipe. The edges should be tucked down the sides of wooden (aluminium if Academy car) bootboard at the rear and sides. In order for the carpet to sit flat it may help to make small inward cuts to allow the tabs of the carpet to 'hinge down' around the corners. Do not make these cuts too big.

b) The filler cover plate can now be fitted and is held in place with four small self-tappers into the bootboard (these holes need to be drilled through the filler cover when the cover is in position). Re-position fuel filler hose clips if necessary to fit the cover.

11.6 Knee Trim Panels

The knee trim panels are pre-bent lamiplate panels and are handed. Fasteners are to be found in the chassis components bag.

a) The panels fit into place under the scuttle and behind the aluminium side panel and the rubber trimming. The last rivets that hold the interior panel to the chassis (also securing the stainless steel sill protector on a painted car) have been left off to make it easier to insert the knee trim panel behind the interior side panel. The knee trim panels are secured in place using black self tapper screws. An additional self tapper can be fitted to the front face if the panel does not lie completely flush with the dashboard. The remaining holes can now be drilled in the sill protector (using those already in the interior side panel as guides) and riveted using black rivets.

11.7 Fitment of Seats

Check that all three bolts holding the seat belts have been fully tightened. This is obviously safety critical and must be done at this point as access is severely limited after fitment of the seats.

a) The adjustable seats (whether of leather or cloth) are bolted in place using M8 x 25mm setscrews front and rear, plain washers and nyloc nuts.

b) First, remove the seat cushion from the seats – this allows for easier access to the runners. Lay the seats in place (they are already attached to their runners).

c) Firstly, bolt down the front of the seats through the runners using a plain washer above the nyloc nut.

d) Now push the seat fully forward on its runners. Access to the rear bolts will still be limited and therefore two people will make this an easier task. A tip to prevent the bolt heads on the inside from turning is to use a screwdriver rather than a spanner or socket.

e) Ensure the seat fasteners are nipped up tightly – there is no torque figure to be applied due to the limited access to the rear bolts.

SECTION 12

WEATHER EQUIPMENT

Contents

If you have purchased a Starter Kit then you will need to fit your weather equipment using the following instructions. However if you have purchased a kit in CKD form you will find that the hood and sidescreens have already been fitted and you should pick up these instructions from the mirrors onwards.

12.1 Fitting Hoodsticks and Hoodstraps

a) To prevent the drill from wandering off course we suggest that the hole centres are indented using a centre punch. (Failing this, a Phillips screwdriver may suffice).

b) The rear of the vehicle is marked with the locations of the fourteen popper bases necessary to secure the rear of the hood. These should be drilled with a 5/32" drill and the popper bases secured with 5/32" **countersunk** pop rivets.

c) Remove the inner hoodstick from the hoodstick assembly and feed the hoodstraps over the inner and outer hoodsticks. Adjust so that they take up the positions as shown in the diagram. Since the exact positioning will depend upon the hood itself when fitted, temporarily secure the inner hoodstick to the rear of the car with tape to maintain the 16" spacing as shown in diagram 12.1.

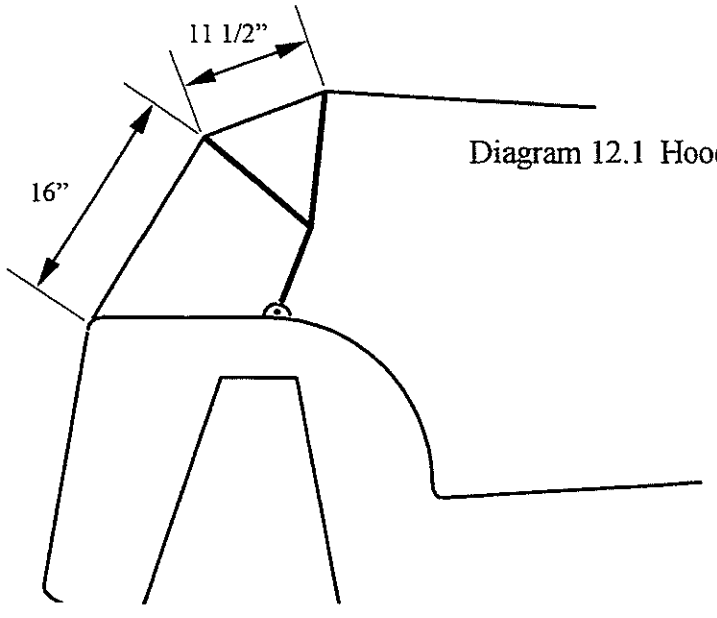


Diagram 12.1 Hoodstick Spacing

d) Reassemble and bolt the assembly in place using the washers and nylocs supplied.

12.2 Hood Fitting

a) With the hoodsticks in the up position and the hoodstraps loose, drape the hood approximately in position. Attach the hood at the front and rear with the pre-fitted poppers. Please note that there will be no poppers fitted around the side of the hood.

b) Noting the dimensions in figure 12.1 fix the hoodsticks into position. The hoodsticks should align with the 'darts' in the hood. Drill the inner edge of the top rear tube with two 1/8" holes, 6 ½" outboard of the vertical braces as shown in figure 12.2.

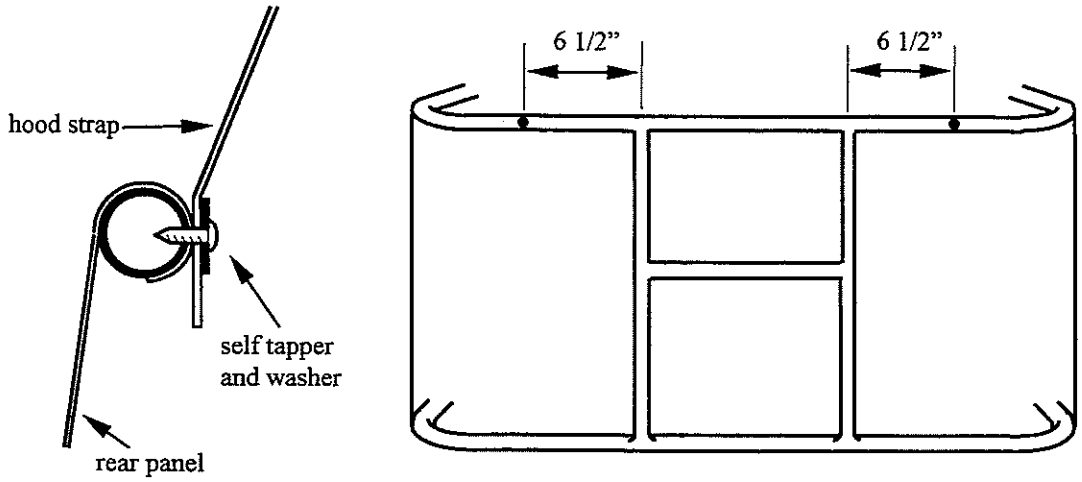


Diagram 12.2 Hoodstrap Fixing

c) Make corresponding holes in the hoodstraps to achieve the correct dimensions and attach them to the top rear tube using self tapping screws and plain washers.

d) Now that the hood is correctly tensioned, the poppers around the side of the hood can be fitted to match the bases fitted in Section 12.1a. To do this, pull the side of the hood down so it is tight, but not creased, and mark the position of the popper on the hood. Punch a hole in the hood and the popper fixed in position.

e) When fitting these poppers the rearmost popper on each side should be fitted first, followed by the second from the front, making sure the hood is tight at all times. The poppers in between should be done next. Leave the front popper until the side screens have been fitted.

12.3 Side Screens

a) Attach the side screen hinges to the outside of the windscreen with 5mm x 16mm bolts and nylocs.

b) With the hood erected and tensioned offer up the side screens into position. The top of the side screen should align with the hood guttering and the front tucks in behind the windscreen support to provide protection from the elements.

c) Position the other halves of the hinges above those fitted to the screen and temporarily insert the brass hinge pins. Mark the locations of the hinge mounting holes on the outside of the side screens and drill 5mm holes through the metal frame within the screen. For ease of marking, stick masking tape onto areas where the hinges are expected to locate and before drilling make sure that all the holes form one line. See diagram 12.3.

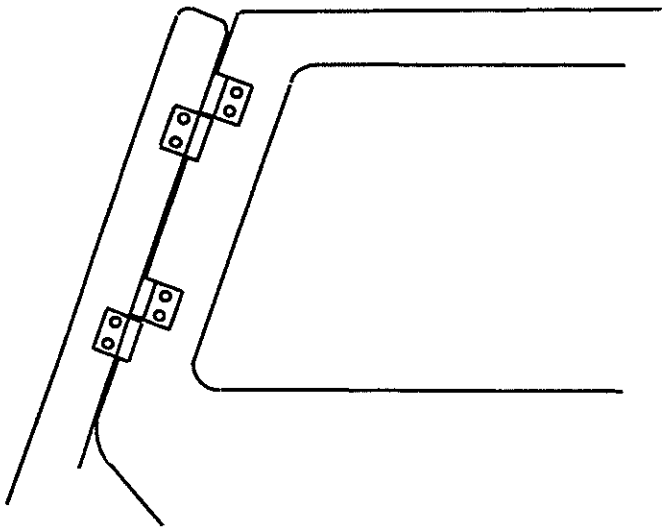


Diagram 12.3 Side Screen Fixings

d) Bolt the hinges onto the outside of the side screens using 5mm x 16mm Posidrive screws and nylocs and mount them in place on the windscreen. On the driver's side the upper hinge should be secured using the length of studding supplied and a nyloc nut at each end. A small plastic cap will need to be applied to each of the nuts – use a small amount of silicone sealant to secure. The 'more permanently attached' sidescreen on the drivers side is an SVA requirement and must be presented at the inspection in this format. **Please note that if fitting an FIA rollbar the passenger sidescreen must also be secured using the same method (ie. Length of studding with nyloc nut at each end). This is an SVA requirement.** The fourth pin is supplied should you wish to revert to the original fixing method at some time in the future. In order to locate properly, the screens must be bent slightly around the scuttle. The exact position will be clear when hung.

e) The side screens are held closed by straps located both at the rear and midway along the bottom edge.

f) The straps to the rear on the side screens are secured using poppers, the bases for which should be fixed to the top rail of the chassis frame inside the cockpit using pop rivets.

g) The strap attached to the hinged panel on the side screen clips this panel shut onto a popper which needs to be fitted to the top tube just inside the car.

h) The position of both sets of poppers and their bases on the car will be apparent with the side screen in position. It is important when fitting the corresponding part of each popper to the straps to ensure that they are positioned so as to keep the side screens firmly shut if draughts and water ingress are to be avoided.

i) Fit the front popper base for the hood sides to the chassis such that the aperture in the hood lines up with the rear of the side screen.

j) Increased visibility hoods and side screens have the addition of a sleeve fastened with Velcro to hold the hood to the top hoodstick.

12.4 Sidescreen SVA Caps

Plastic caps (M5 size) need to be fitted to the interior sidescreen hinge bolts (the eight each side that are on the sidescreen itself, not the windscreen stanchion). If necessary they can be secured in place with a small amount of silicone sealant. **The fitment of these caps is an SVA requirement and they must be present at the time of the inspection.**

12.5 Exterior Mirrors - Fitment to Sidescreens

a) Exterior mirrors are fitted to the sidescreens towards the front just below the clear window panel. They are attached to the hidden metal frame of the sidescreen with countersunk bolts. Holes in the metal frame will already be present; these can be located through the material. When found, drill through with a 5mm drill.

b) Bolt the mirror in place with the 5mm x 16mm countersunk posidrive bolts and nyloc nuts.

c) Plastic M5 caps should be fitted to the nuts securing the mirror to the sidescreen (on the inside of the screen). **As with the sidescreen itself they can be secured in place with silicone sealant and must be on the vehicle at the time of the SVA inspection.**

12.6 Hood Erection

If the correct procedure is not followed the hood can prove somewhat tricky to erect so we recommend that the following steps are taken:

a) Remove the spare wheel from its carrier unless the optional spacer has been supplied.

b) Erect the hoodsticks.

c) Slacken the hoodstraps by easing them around the sides of the rearmost hoodstick reducing the normal hood height.

d) Unfold the hood and clip it onto the windscreen.

e) Stretch the rear of the hood over the back of the car and clip it over the poppers situated on the back panel starting at the outside and working into the centre.

f) Attach to the remaining poppers on the sides of the vehicle.

g) From the inside of the car ease the hoodstraps round to the top of the rear hoodstick to tension the hood, using the adjusting buckle to align the hoodsticks with the darts in the hood (diagram 12.5).

h) The hood has the facility to capture the front hoodstick in a "pocket" secured by Velcro strips. This should be done up last and prevents the hood from "ballooning" at speed.

i) Finally replace the spare wheel in its carrier.

12.7 **Folding**

In order to preserve your hood and its windows we suggest that it is always carefully folded as in diagram 12.6.

12.8 **Boot Cover**

When correctly fitted the boot cover should look like the example shown in diagram 12.7.

a) The boot cover is designed to attach semi-permanently to the top of the bulkhead behind the seats and to clip onto the same fasteners as those provided for the hood at the rear of the vehicle. Please note that it is designed to fit over the hoodsticks therefore it is essential that these have been fitted prior to the boot cover. When not in use, ie when the hood is erected, it folds away into the boot area.

b) The cover is designed to fit around the optional rollover bar, but since these vary according to chassis type, be sure to order the correct cover.

c) If the poppers have not already been fitted, measure carefully the centre point of the car across the rear bulkhead and mark the positions for six 1/8" holes to be drilled in the middle of the tube at 1¼", 7¾" and 14¼" each side of the centre line.

d) The forward edge of the boot cover is secured with six popper bases with small self tapping screws; the front edge of the boot cover aligns with the front edge of the seat bulkhead. The forward edge of the boot cover has a metal insert with pre-drilled holes to locate the popper base positions.

If harness type seat belts are being fitted the metal insert is removed and the belts are secured into the four threaded bosses on the top of the seat bulkhead, through the boot cover. Additional fastening is made with four popper bases in the following locations: one popper base 1¼" each side of the centre line; one popper base in the midpoint between each pair of harness bolts. If a tonneau cover is fitted popper position should be adjusted accordingly.

e) Stretch the boot cover over the luggage area and establish locations for the poppers. It is suggested that you fit the outermost poppers on the flat rear panel first since these will hold the cover evenly in position while the others are marked up. You are advised that masking tape be used to assist with marking and that poppers are fitted in the same way as in the weather equipment section.

f) Fit the remaining poppers across the rear and sides of the boot area except for the forward two poppers on each side.

g) If a tonneau cover is also to be fitted the normal popper outer or male part will have to be substituted by a further popper base. The kit includes special bases with small 1/8" centre hole to enable them to be riveted together with the normal popper inner. The rivet should pass from the inside outwards.

12.9 **Tonneau Cover**

When correctly fitted the tonneau cover should look like the example shown in diagram 12.8.

a) Before the tonneau can be fitted both the boot cover and seat belts must be installed, and the steering wheel and head restraints must be removed (if specified).

b) Carefully align the tonneau along the centre line of the car and stretch it across so that there should be approximately 1" of tonneau ahead of the popper centres. Mark and fit two poppers at the front to correspond with the bases just fitted.

c) Carefully measure the positioning of the rear edge of the tonneau, relative to the popper bases securing the front of the boot cover, ensuring that its rear edge is exactly parallel to the seat bulkhead and that it is properly centred. Mark the positions of the popper bases and fit the six poppers across the back. If harness type seat belts have been fitted the popper positions across the seat bulkhead will need to be adjusted. It is very important to locate these poppers correctly as these set the correct tension for the whole cover. It should not be so tight that it puts too much stress on the fittings, bearing in mind that it will not stretch as well in cold weather, nor so loose that water can collect on it.

d) Working one side at a time, starting with the passenger side, mark and drill a hole and fit a further popper base on the scuttle approximately 1¾" inward from the lower inner edge of the windscreen support where it joins its triangular base (see diagram 12.9). Stretch the tonneau carefully into position taking care to pull the tonneau far enough forward to achieve a little clearance in front of the rear wing and fit another fastener.

e) Mark, drill and fit a popper base ¾" below the rear lower edge of the scuttle, l" rearward of the centreline of the large securing rivet. Again stretch and fit the tonneau with a fastener.

f) Carefully pull the rear edge of the tonneau over the side of the car and mark and fit a fastener to secure it to the boot cover side.

g) Mark, drill and fit a popper base at a point 2" down from the top rear of the doorway and 1¾" forward of the rear wheelarches. Pull down the tonneau to achieve an even fit to the wheelarch and fit the final fastener.

h) Un-zip the tonneau and refit the steering wheel when fitting the first fastener leaving the rear fasteners in place along the seat bulkhead. Repeat the fitting procedure taking care to stretch the tonneau away from the vehicle centreline towards the windscreen stanchion just sufficient to prevent bagginess in front of the steering wheel.

i) Fastening the zip will correctly tension the tonneau.

12.10 **Wind Deflectors**

The wind deflectors available from Caterham Cars locate onto the mountings fitted to the sides of the windscreen used for the sidescreens.

These are manufactured from ICI cast acrylic sheet of high quality and are 10 times more impact resistant than glass.

It is extremely important however that they are not cleaned with any solvents as it is likely that the surface will be damaged. Use soap and water and rinse off, or use 'Mr Sheen' or a similar polish. The occasional use of 'T Cut' will remove any polish build up, and any small scratches, but do not use a power tool buffer.

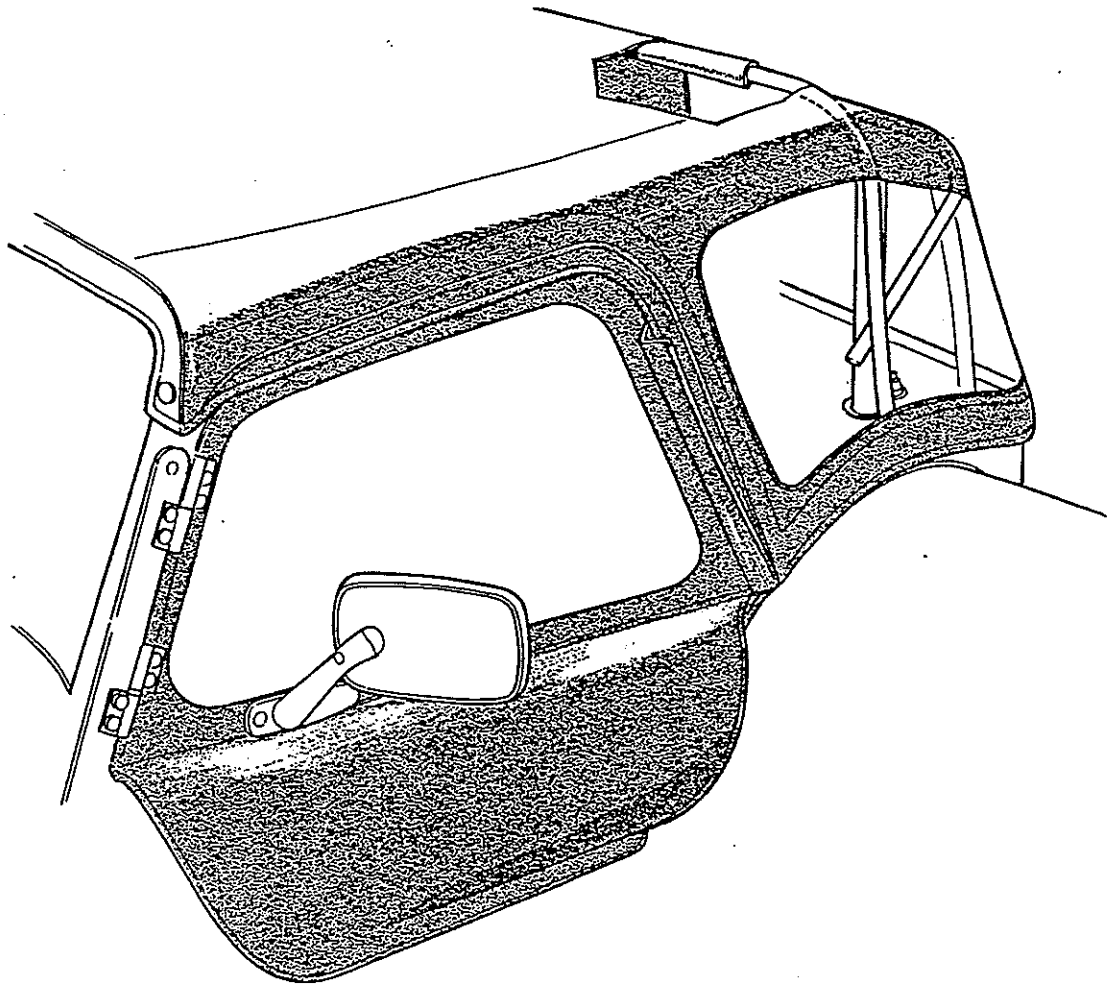


Diagram 12.4 – Increased Visibility Hood and Sidescreens.

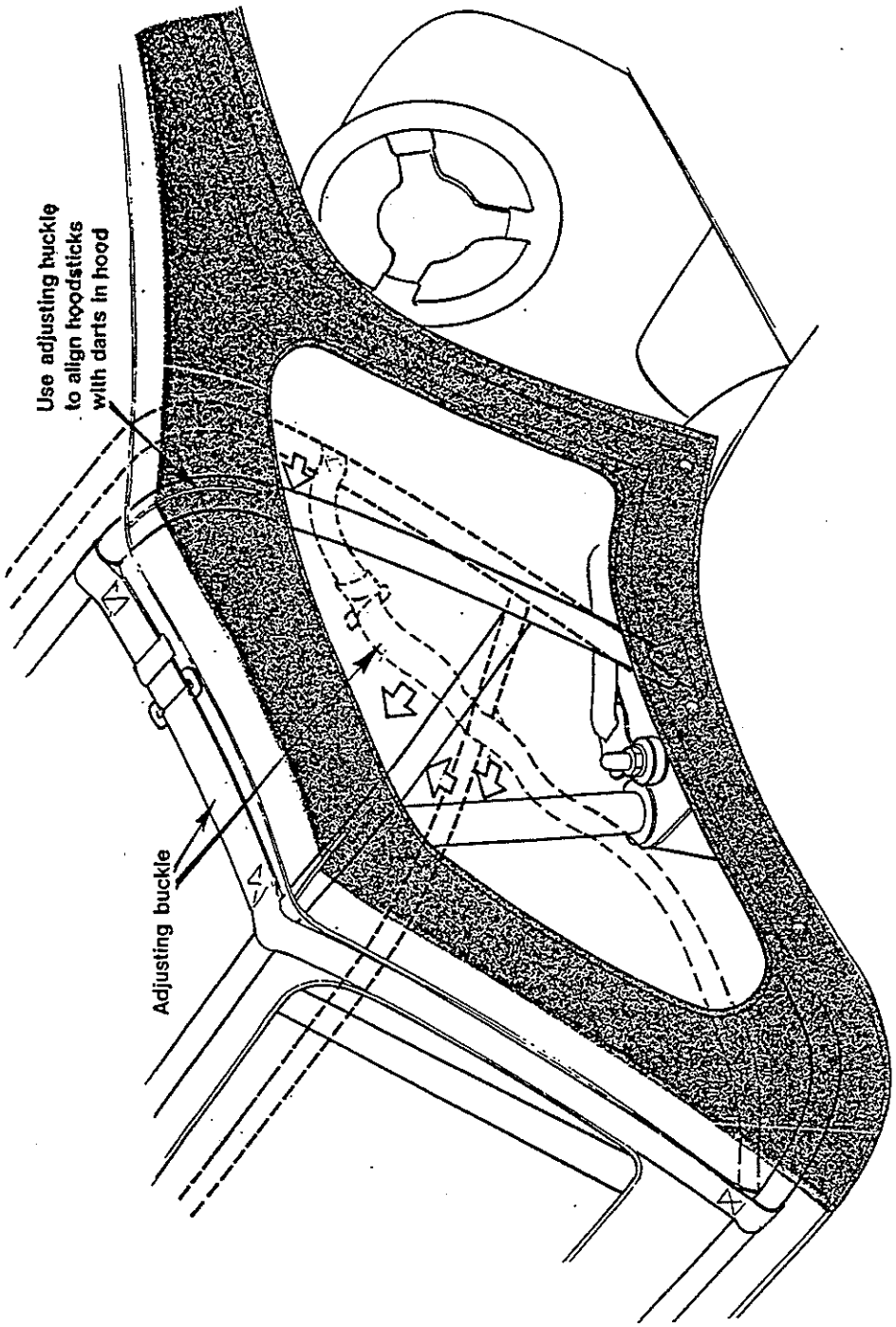


Diagram 12.5 – Tensioning of Hood.

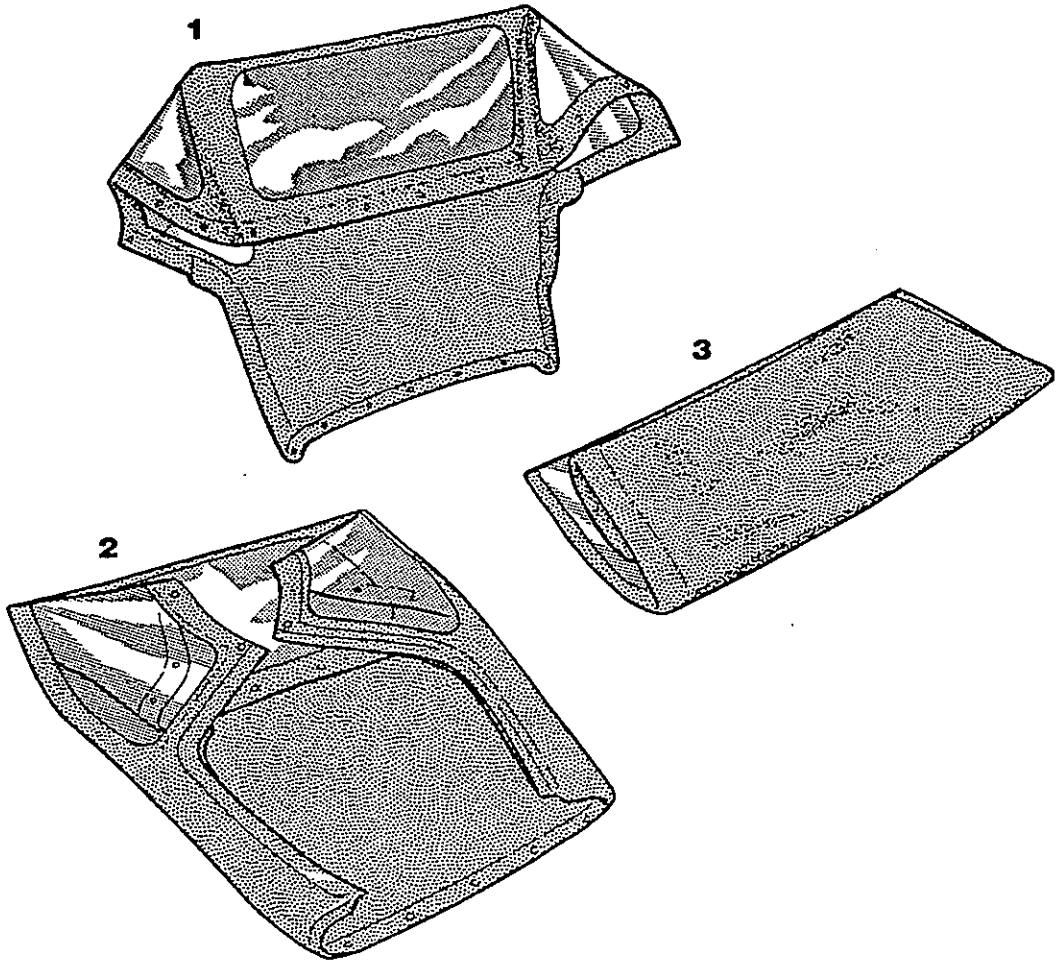


Diagram 12.6 – Folding of Hood.

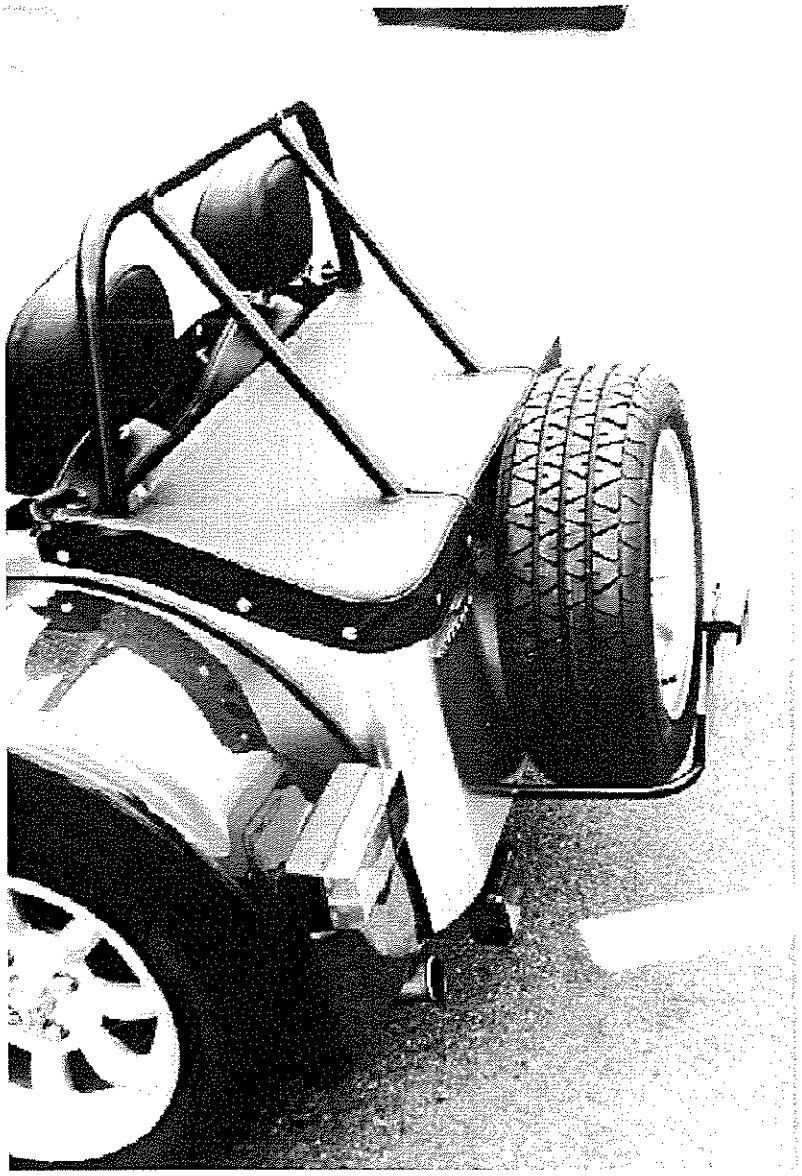


Diagram 12.7 – Boot cover

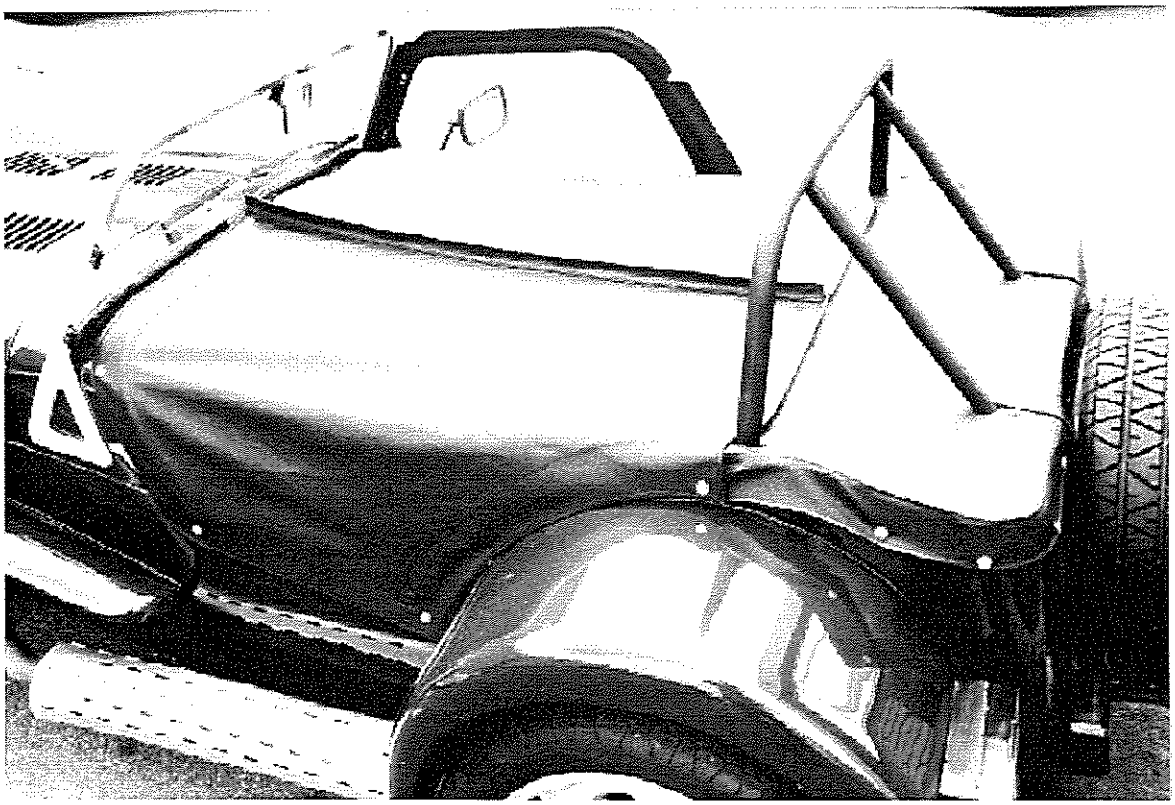


Diagram 12.8 - Tonneau cover

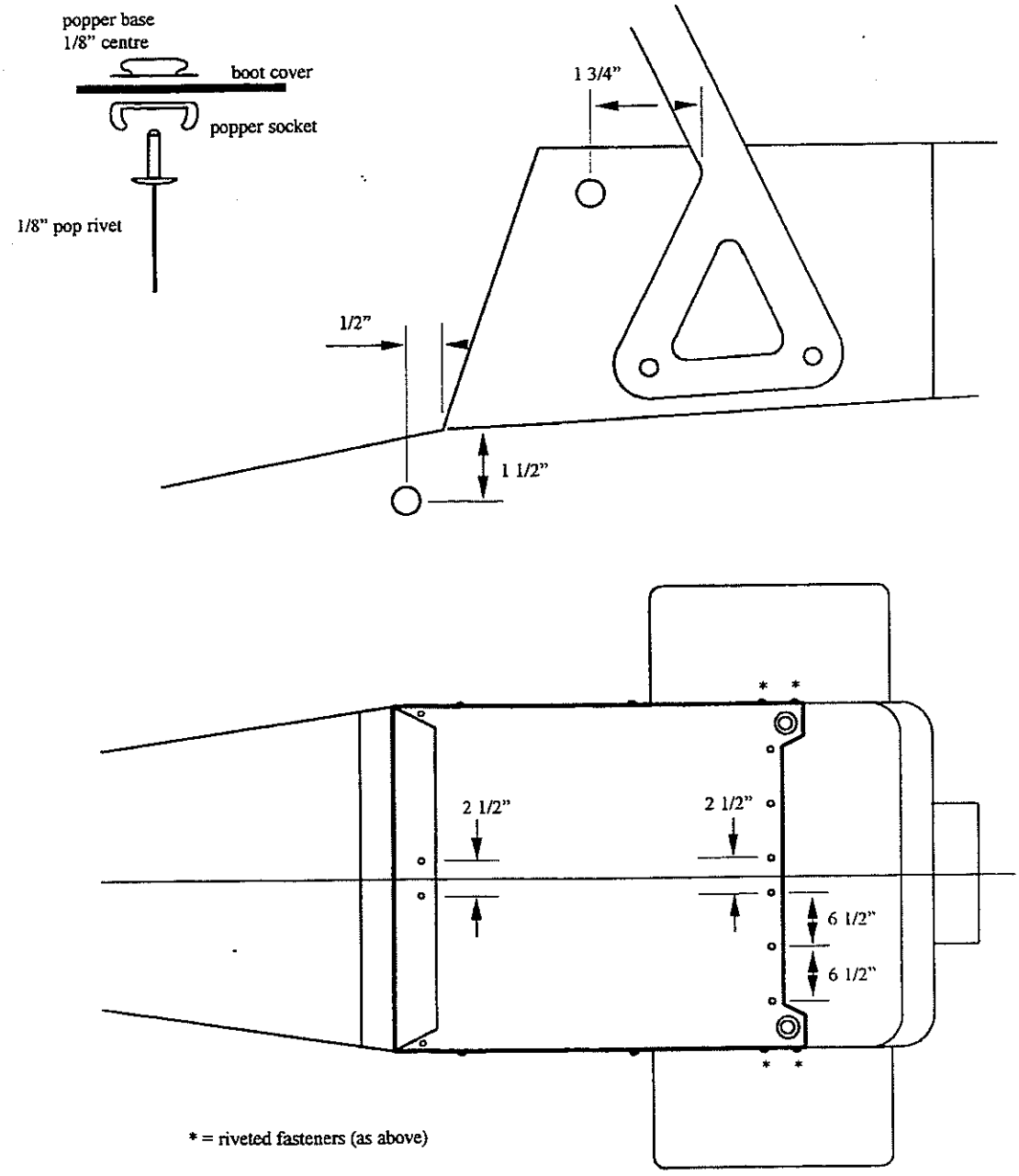


Diagram 12.9 – Tonneau Cover Positioning.

SECTION 13

COMPETITION AND TRACKDAY OPTIONAL EXTRAS

Contents

13.1 Battery Master Switch

If specified at the time of purchase the master switch kit will have already been installed.

a) The remaining parts for you to connect are the two thick red leads that can be found exiting the transmission tunnel. Attach one of the cables to the starter motor solenoid and the other to the positive terminal on the battery. These cables are labelled accordingly to avoid confusion. As a 'double check' the cable to the positive side of the battery is attached to the master switch by itself. The cable to the starter solenoid is attached to the other pole of the master switch along with the double brown wire.

13.2 FIA Roll Bar

a) The rear diagonals are secured to the brackets provided at the rear of the boot compartment using 5/16" x 2" bolts and nylocs with a plain washer under both the boltheads and nylocs.

b) The main mounting plates are attached using 5/16" x 1" bolts, plain washers and lockwashers at the rear outside edge, and by the 7/16" x 1" bolts holding the full harness seatbelts at the inner edge. The rear damper fixings locate through the hole in the rear of the mounting plate with one set of rubber bushes above the plate and one underneath. When all the bolts are located they can be fully tightened.

c) The diagonal brace is fitted between the top of the rollover bar and the inside edge of the cockpit on the passenger side (RHD cars).

d) The forward and lower mounting is to a bush located within the chassis and normally hidden behind the trim panel. It can be found approximately one inch below the point at which the dashboard tube is welded to the top of the chassis rail.

e) Drill out six 3/16" rivets, holding the top edge of the trim panel in place around this point, and ease the panel away from the chassis until the exact location of the bush is identified. Drill a small pilot hole through the trim panel and enlarge so that a 7/16" bolt can

be fitted through, taking care when doing so that the thread in the bush is undamaged. ,When this can be done replace the trim using new dome headed rivets.

f) The top half of the brace is secured to the top of the rollover bar with a 7/16" x 2 3/4" bolt and nyloc, with plain washers under both the bolt head and nyloc. The bottom section is secured to the bush in the side panel using another 7/16" x 2 3/4" bolt, plain washer and lock washer.

g) The two halves are held together by another 7/16" bolt, nyloc and washers after first drilling through both sections to suit.

h) We strongly recommend that all parts of the rollover bar likely to be contacted by either the driver's or passenger's heads are protected. We suggest that you obtain some foam lagging of appropriate size (available from Safety Devices or Demon Tweeks etc) and tape it to the bar using tank tape or ty-wraps.

13.3 Race Seat Installation

a) There is a degree of flexibility in the fixing of the race seat in order for it to be tailored to suit the individual driver. The fore-aft position of the backrest should be decided first, and the narrower fixing bracket should be drilled to suit the rear upper set mounts. The bracket may need to be cut down for taller drivers. With the seat and bracket assembled, rest the seat in the car and mark the position of the bracket on the cockpit back panel. Remove the bracket from the seat and hold it in position against the back panel. Drill through both the seat bracket and the back panel with a 5/16" drill near to either end of the bracket, avoiding any chassis tubes. Bolt in place using large diameter washers either side to spread the load.

b) Fit the front (wider) mounting bracket to the chassis crosstube with the ears facing rearwards and refit the seat at the rear. Calculate the height that you would like the front of the seat to be set at, then mark the bracket with the correct position for the seat to bracket bolts. Remove the bracket and drill these holes. Loosely refit the bracket to the seat with a large diameter washer under the bolt head.

c) Before refitting the seat, the crotch straps for the six point harnesses need to be fitted to the chassis as the mounting points are inaccessible with the seat in position. Feed the two tails through the holes in either side of the seat, leaving the tang for the buckle sitting on the seat. Bolt the two tails to the unused seat mounting points at the rear of the floorpan. It is also a good idea at this stage to fit the lap straps to the mounting bosses on either side of the cockpit. The seat can now be fitted in position and tightened up.

13.4 Head Restraints

It is essential that a head restraint is fitted on the car to help prevent whiplash. A head restraint kit with two fixing brackets is supplied with the Scholarship/Academy cars' roll over bar kit along with fitting instructions. On other cars this is an option.

13.5 Timing Strut

For Scholarship/Academy cars a timing strut for hillclimb and sprint events is supplied with the kit, which should be fitted to the grille such that its lower edge is approximately 200mm above ground level.

13.6 SPA Mirrors for Cars without Sidescreens

The mirror is fixed to the windscreen support through the lower of the four holes usually used for the sidescreen hinge and a second hole that requires drilling. Drill a 5mm diameter hole 37mm higher up on the support than the lower hinge hole (See Diagram 13.1). The mirror should be attached with two countersunk screws, washers and nylocs (as supplied). The above positioning of the mirror is only a recommendation and if desired they can be placed in an alternative location.

If an aeroscreen is fitted, the mirrors will have to be fitted to the scuttle, preferably on the right hand side and on car centreline.

SECTION 14

SINGLE VEHICLE APPROVAL AND REGISTRATION PROCEDURE

Contents

14.1 Background

All mass-produced cars sold in Europe are Type Approved to a set of regulations accepted throughout Europe - this is called European Whole Vehicle Type Approval. Historically, vehicles produced in much smaller numbers - such as kit cars - had no particular regulations to conform to. The kit car industry is particularly indigenous to the UK and the Department of Transport have now introduced a set of regulations directly aimed at kit and amateur built cars (also non franchised imported vehicles) in order that they can be legally Type Approved to a set standard. This set of regulations is called 'Single Vehicle Approval' and as its name implies each vehicle is inspected and then approved. The emphasis is very much on issues regarding the environment and safety. The scheme became MANDATORY ON IST JULY 1998.

ALL CATERHAMS WILL HAVE TO BE INSPECTED UNDER THE SVA REGULATIONS IN ORDER TO BE REGISTERED.

14.2 Requirements

The following items are tested under the SVA inspection:

Radio Interference Suppression
Protective Steering
Exhaust Emissions
Lamps, Reflectors and Devices
Rear View Mirrors
Anti-Theft Devices
Seat Belts
Seat Belt Anchorages
Installation of Seat Belts
Brakes
Noise
Glass and Glazing
Seats and their Anchorages
Tyres
Interior Fittings
External Projections

Speedometers
Wiper and Washer System
Defrosting and Demisting System
Fuel Input
Design Weights
General Vehicle Construction

The examiner will conduct an engineering assessment or a simple physical test as opposed to the more thorough test that the full European type approval entails. A full whole vehicle type approval test may take weeks rather than hours so the assessment will often take the form of a visual inspection. In some cases though (brakes, noise, emissions etc) there will be a physical test either on a rolling road or within the grounds of the test centre eg speedometer calibration. The inspection will not require any parts of the car to be dismantled. The test will be carried out at Vehicle Inspectorate test stations. Unfortunately the countrywide coverage of stations that are able to perform the inspection is currently poor (see Section 14.7). The SVA inspection may take up to 4 hours and will cost £165. It will be possible to book an out of hours inspection (out of hours means before 8.00 am or after 5.00 pm on a Monday to Thursday; before 8.00 am or after 4.30 pm on a Friday; any time on a Saturday, Sunday or Bank Holiday). An additional fee of £75 will be applicable if this service is required.

14.3 How To Apply For The Inspection

You cannot just turn up at the test station. The inspection must be formally booked in advance.

(i) Obtain an application form from your local Vehicle Registration Office (VRO) or Vehicle Inspectorate Office (HGV Test Station).

(ii) Complete the form and return it along with test fee to:

Vehicle Inspectorate
91/92 The Strand
Swansea
SA1 2DH

(iii) You will then receive confirmation of the test that will give details of the time and location. Where possible the test will be carried out at the Vehicle Inspectorate test station you have selected.

(iv) You will be asked to provide certain information upon submitting your application form. This will consist of vehicle design weights and maximum speed. The relevant information appears at the end of this supplement and states the figures you must quote for your model when applying.

In order to attend the inspection you will be allowed to travel to and from the test station without the vehicle being registered (obviously) or fitted with trade plates. Should any items require rectifying you will be permitted to drive to and from a place where rectification can be carried out. **You will however be required to provide insurance cover for all such journeys**. (You will be able to secure cover by quoting your chassis number to your chosen insurer).

The test station may refuse to inspect your car for the following reasons:

1. You arrive at the test station later than your appointment time.
2. You have not paid your fee.
3. There is insufficient fuel or oil for the test.
4. The car is presented in a dangerous or such a dirty condition that the test is not feasible.
5. A device designed to be readily opened is actually unopenable (eg bonnet padlocked).
6. The presenter of the vehicle does not remain with the car to operate controls, etc as requested.

14.4 Design Weights

You will be asked to specify the maximum gross weight and maximum permitted axle weights during your application for a test date. This will be checked by weighing the car without passengers and luggage (kerb weight) and then using a formula to calculate the theoretical gross weights. It is not recommended that the Seven is used for towing therefore when asked the answer is 'not applicable'. The following weights should be quoted for all models:

Maximum Gross Weight - 900 kgs.

Maximum Permitted Front Axle Weight - 360 kgs.

Maximum Permitted Rear Axle Weight - 540 kgs.

Maximum Design Speeds

Caterham Seven (all engines except VHPD) - 130 mph.

Maximum Power Engine Speed

1600 Vauxhall 8 valve	5500 rpm
1800 Vauxhall Supersprint	6250 rpm

NB Speedometer is compatible with vehicle.

14.5 Checking The Car Prior To Inspection.

This is essentially a checklist to ensure that no SVA critical areas are omitted.

Radio Interference Suppression

Caterham supplied ignition leads are suppressive. If you choose not to use Caterham supplied parts please ensure that they are clearly marked as suppressive.

Protective Steering

In the event of an accident there is a requirement for the driver to be protected from the steering column/wheel assembly moving back into the habitable space. A certain amount of column intrusion is allowed. In order to allow the column to 'absorb' the impact there is a telescopic section that allows the lower column to slide into the upper column. This allows a Caterham to pass a full EEC Protective Steering test. An additional requirement is that the steering wheel itself should offer protection. A collapsible boss is ideal for this requirement though this would place the steering wheel back into the cockpit. The other alternative is a padded steering wheels and this is the option that Caterham have taken. All standard Caterham wheel types have a removable pad fitted and this must be in place at the time of inspection.

Emissions

All cars will be supplied with catalytic convertors that bring gaseous emissions within the limits of the test parameters.

Lights

If you have built your car using the components and information supplied there should be no problems. Please ensure that you have fitted repeater flashers to cycle and flared wings.

Rear View Mirrors

These should be set up for maximum rearward visibility. If you have specified an FIA roll bar it is recommended that this is fitted after the SVA as this impedes rearward visibility. Rear visibility can also be enhanced by fitting the head restraints after the inspection. Relevant to this section but also a general note is that of taking the hood off as you arrive (or arriving without it altogether). This improves both visibility and access.

Brakes

The braking system will be subjected to a thorough test (on brake rollers) so it is imperative that you take the time to bleed the brakes and achieve a good pedal. The performance of the brakes often improves dramatically after a small amount of use. To bed in the entire system apply the brakes frequently on the way to the inspection. Ensure that the handbrake is correctly adjusted and does actually lock the rear wheels.

Noise

Tailpipe noise will be tested. Although the silencer is brand new, the efficiency is increased when the internal packing has expanded against the inner wall. It is therefore recommended that you allow the car to idle as much as possible prior to taking the car to the test - this also allows a layer of soot to settle which helps deaden the 'ring' of a new silencer.

Tyres

Ensure that the recommended pressures have been applied - the tyres will have been delivered at a high storage pressure.

Wiper and Washer System

Carry out a full system check prior to the inspection.

External Projections

The Lotus Seven was designed in 1957 and since Caterham have been manufacturing the Seven we have strived to preserve its shape and dimensions. SVA presents the greatest threat to the shape of the Seven (exposed suspension, etc). Piping similar to that which you should have fitted to the scuttle should be added to the edges of the cycle wing. You may choose to remove this once the car has successfully completed the inspection. A rubber sleeve should be placed over the steering arm locknut, secured with ty wraps. Plastic caps will be provided to cover exposed bolt heads that are contactable. A small piece of trim will need to be pushed onto the edge that faces forwards above the top damper bolt.

Interior Projections

Plastic dome headed nuts or plastic caps for exposed bolt heads will be supplied.

General Construction

This should of course be checked at the post build check stage, but if you are not using that service ensure that chafing of brake pipes and wiring loom is not possible. Following the procedures and tightness settings in the Assembly Guide should allow you to have no problems with this section of the inspection.

It is recommended that the car is presented in a clean condition as this will greatly improve the inspectors' demeanor!

The inspectors have all been trained to the same standard but obviously may interpret certain regulations differently. Each test station will have received a detailed explanation of what a Caterham is and which European regulations it complies with, so they should have a reasonable amount of product knowledge – especially since more Caterhams have been tested.

It would be advisable to take an 'emergency kit' with you to the test. This should consist of ty-wraps, push on trim and a length of rubber hose – these should have been supplied in your kit. In the event of a non compliance for any reason these items may lend themselves to a quick 'fix' that may save you re-presenting your car. It is also advisable to take a basic tool kit should you need to tighten or re-align any components – this may save you taking the car away and re-presenting it.

Finally you should remember that any modifications made to the car subsequent to passing the SVA inspection may prevent it from passing an MOT at a later date. ie If a competition exhaust system is fitted, the original catalyst equipped system must be retained in order to meet MOT emissions standards. The MOT is an inspection of the vehicle's condition and will be carried out in the same way as it is for normal production cars. Items such as internal/external projections, noise, fields of visibility, seat belt anchorages etc will not be inspected at an MOT.

If your vehicle fails the SVA inspection for any reason you will be allowed to take the car away to rectify it. You will then have to re-apply to have the specific items inspected. There will no charge levied for retest if the car fails any of the points mentioned below **and** if the car is resubmitted within 5 days.

Lamps and reflectors
Anti-theft device
Interior fittings (up to three items)
Exterior fittings (up to three items)
Wiper and washer system
Defrost and demisting system
Fuel input

14.6 Registration procedure after SVA inspection

Upon successfully passing the SVA inspection you will be issued with a certificate to confirm that the car has passed to the standard required. This certificate is officially called a 'Ministers Approval Certificate' (MAC) and must be retained. In order to register your car you must submit the MAC, a completed application for registration form (currently V55/5), along with your VED (Vehicle Excise Duty) fee for either 6 months or a full year to your local Vehicle Registration Office (VRO). An additional £25 registration fee will be levied by the DVLA to cover administration costs throughout the life of the vehicle (sending out tax disc reminders, etc).

The car will need to be MOT'd three years after it was first registered.

14.7 Location Of Test Stations Where SVA Inspections Can Be Carried Out

Vehicle Inspectorate,
Cloverhill,
Bridge of Don Industrial Estate,
ABERDEEN.
AB23 8EE.

Vehicle Inspectorate,
Grange Road,
Houston Industrial Estate,
LIVINGSTON,
West Lothian.
EH54 5DD.

Vehicle Inspectorate,
Sandy Lane,
GOSFORTH,
Newcastle Upon Tyne.
NE3 5HB.

Vehicle Inspectorate,
Brunthill Road,
Kingstown Industrial Estate,
CARLISLE,
Cumbria.
CA3 0EH.

Vehicle Inspectorate,
Ex RAF Site,
Middleton Road,
HEYWOOD,
Lancashire.
OL10 2LT.

Vehicle Inspectorate,
Oldbeck Road,
Off Grovehill Road,
BEVERLEY.
North Humberside.
HU17 0JG.

Vehicle Inspectorate,
Ennerdale Road,
Harlescott,
SHREWSBURY.
SY1 3LF.

Vehicle Inspectorate,
Raynesway,
Alavaston,
DERBY,
DE21 7AY.

Vehicle Inspectorate,
40 Cannock Street,
Barkby,
Thorpe Road,
LEICESTER.
LE4 7HT.

Vehicle Inspectorate,
Jupiter Road,
Hellesden,
NORWICH.
NR6 6SS.

Vehicle Inspectorate,
Stanbridge Road,
LEIGHTON BUZZARD.
Bedfordshire.
LU7 8QG.

Vehicle Inspectorate,
Willow Tree Lane,
Yeading,
HAYES.
Middlesex.
UB4 9BS.

Vehicle Inspectorate,
Ambley Road,
GILLINGHAM,
Kent,
ME8 0SJ.

Vehicle Inspectorate,
School Road,
Miskin,
PONTCLUN.
Mid Glamorgan.
CF72 8YR.

Vehicle Inspectorate,
Ashton Vale Road,
Ashton Gate,
BRISTOL.
BS3 2JE.

Vehicle Inspectorate,
Grace Road,
Marsh Barton Trading Estate,
EXETER.
Devon.
EX2 8PH.

Vehicle Inspectorate,
Hillson Road,
Bottings Trading Estate,
Botley,
SOUTHAMPTON.
SO3 2DY.

SECTION 15

FINAL CHECKS AND SERVICE INFORMATION

Contents

15.1 Final Checks before taking to the Road

a) Before the car is used check again to ensure that all bolts securing suspension, steering and brakes are properly tightened and that no wires or brake hoses are positioned in such a way as to foul anything that moves or gets hot in use. Particular care should be taken with wires close to the exhaust manifold.

b) New Caterham supplied alloy wheels are fitted with steel inserts enabling secure tightening of the wheel nuts. However, these inserts settle into the wheels over the first few hundred miles causing the wheel nuts to lose torque. **IT IS VERY IMPORTANT THEREFORE TO RE-TIGHTEN YOUR WHEEL NUTS AFTER THE FIRST 200 MILES IF USING ALLOY WHEELS.** Wheel nuts should not be over tightened and we suggest that they are torqued with the car on the ground to 55 lbft (75Nm).

Tyre pressures in psi are as follows:

13" Wheels	20 psi	1.40 bar

Please note that wheel/tyre combinations supplied by Caterham, and included in CKD kits, are pre-inflated to around 40 psi (2.8 bar) to ensure that the tyre is correctly seated on the wheel. **Do not forget to let them down.**

15.2 Pedal Adjustment

a) All cars are fitted with a pedal box assembly that incorporates sufficient movement to cater for most sizes and shapes of drivers. This is not intended to give instant adjustment but provides an opportunity for the owner to tailor an optimum driving position.

b) The range of movement is limited and adjustment towards the extremes of travel will lead to the pedals lifting to a somewhat high position, but in combination with the adjustable seat the majority of drivers should find a suitable setting.

c) When a kit leaves the factory the pedals are set in the middle of three positions, unless specified otherwise, and can thus be moved backwards and forwards as required. It is

important not to move the pedals too far forwards however as this will restrict pedal travel, interfering with the correct operation of the master cylinder. This in turn may prevent the dual circuit fail safe facility from operating thus rendering your vehicle both illegal and potentially dangerous.

d) In order to move the pedals the procedure set out below should be followed, starting with the removal of the pedal box lid that is held in place by 8 screws.

e) Adjust the clutch cable at the bellhousing end in order to bring it level with the brake pedal and the throttle cable.

f) Position the driver's seat to suit your reach to the steering wheel and gearlever, and assess how far (if at all) the pedals need to be moved.

g) First adjust the brake pedal; this can be achieved in two ways.

(i) By increasing the effective length of the master cylinder pushrod which has an adjustable shackle.

(ii) By moving the fulcrum position from the middle hole to either the rear hole or the front hole where appropriate, which also moves the clutch pedal. Note that if the movement required is more than 2" then the adjustment available on the pushrod will not be sufficient.

h) The clutch pedal can now be levelled up to the brake pedal by adjustment at the bellhousing.

i) Finally the throttle pedal pivots around its mounting bolt. This bolt is screwed into the front mounting bush of the two provided in the chassis.

j) In order to level the throttle with the brake and clutch it may be necessary to move the bolt to an alternative mounting point. The threaded portion of the throttle cable can then be adjusted to take up any lost movement in the pedal.

k) It is possible to adjust the pedals laterally although this requires the use of a lever as the pedals need to be bent. If any lateral adjustment is required than you should start by moving the clutch pedal towards the centre of the car – then the brake pedal in the same direction away from the throttle pedal. Take care not to restrict the pedal movement by causing the pedal to contact the side of the footbox.

l) The pedal box lid can now be replaced and the eight fixing screws properly tightened.

15.3 **Post Build Check**

When your Seven is finally completed and ready for the road we strongly recommend that you make use of our Post Build Check facility. Customers are sent a voucher for a free Post Build Check which can be carried out either at our premises at Dartford (please contact Len

Unwin on 01322 625804) or by one of our Approved Service Agents. The Seven, even in its lowest state of tune, possesses acceleration and cornering abilities far in excess of most road going cars and it is therefore extremely important that it is assembled and set up correctly.

We are also keen to ensure that our customers do not suffer disappointment as a result of premature component failure due to incorrect assembly or sub standard performance.

The Post Build Check therefore includes:

a) Inspection of all safety related items.

b) Inspection of all operating systems (ie clutch, gearbox, axle, etc).

c) Discussion of the build and any queries you may have.

d) Completion of any agreed warranty work.

e) Post-Build Inspection Certificate when the car has passed inspection.

f) Check to ensure compliance to SVA (if required).

The inspection will take approximately 3 hours and we suggest that you allow at least two weeks notice when booking your car in. If you require any additional work done please notify us at the time of booking so that sufficient time can be made available.

15.4 Running In Period

If your car has been built using a Caterham supplied engine and gearbox we advise the following running-in procedure:

Vauxhall 8 valve 50HC engines run on either unleaded or super-unleaded fuel; there is no need to use 4 star at any time. **All exhaust systems feature a catalytic convertor so leaded fuel must not be used.**

0-500 miles 4000 Max revs with no labouring.

At 500 miles (800 kilometres) the initial service should be carried out.

15.5 Service and Maintenance

To ensure safety and component longevity and to maximise the enjoyment of your Seven it is very important that the recommended servicing procedures are carried out correctly.

It is, of course, possible to return your car to Caterham Cars or to any of our Approved Service Agents for servicing, but for those who wish to carry out their own maintenance a detailed Owner's Manual including all normal service information is available.

All Caterham Sevens should have an initial service at 500 miles (800 km) when the engine oil should be changed, followed by regular services at 6000 mile (9600 km) intervals, or 3000 mile (4800 km) intervals if the car is used on the track (see Appendix C for more details). Major services are required at the 6000 and 12000 mile intervals.

The Seven is best maintained with little but often maintenance. See diagram 15.2 – Service Locations. Sevens are generally used infrequently therefore it is best to carry out a basic check procedure on a regular basis. Check: Oil level, water level, brake fluid level, tyre pressures, security of wheels and lights.

It is vital that oil level is checked every 1000 miles (or sooner) if you use high revs for long periods of time.

15.6 Electrical Problems

In Appendix A you will find a wiring diagram with an appropriate key and diagrams showing the layout of the fuse box. In our experience 90% of electrical problems are caused by poor earth connections and therefore if you suffer a problem you are advised to check the vehicle earthing points which are as follows:

a) Battery to bellhousing bolt.
b) Engine (block) to engine mount.
c) Instrumentation to chassis (at wiper motor securing bolt under dashboard).
d) Rear lights to chassis (to rear wing securing bolts).
e) Three way brake union bolt in engine bay.

See diagram 15.3 for the electrical system layout.

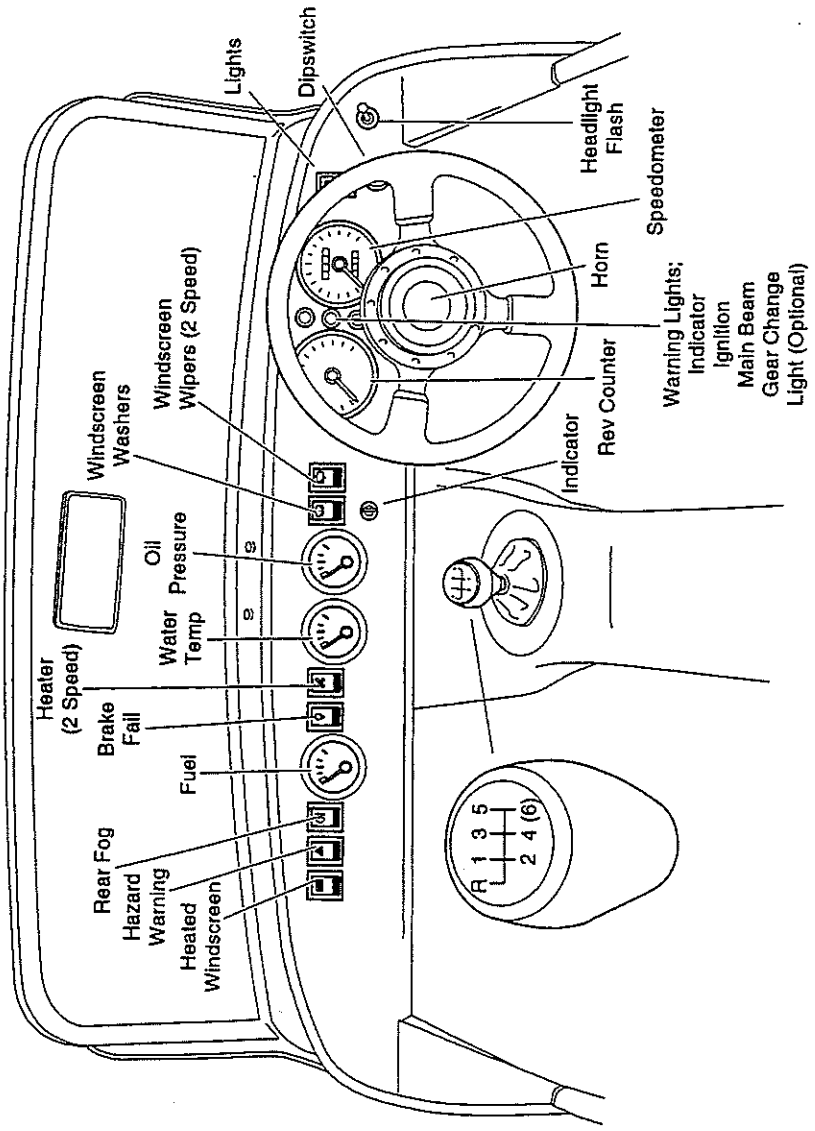


Diagram 15.1 – Dashboard Layout.

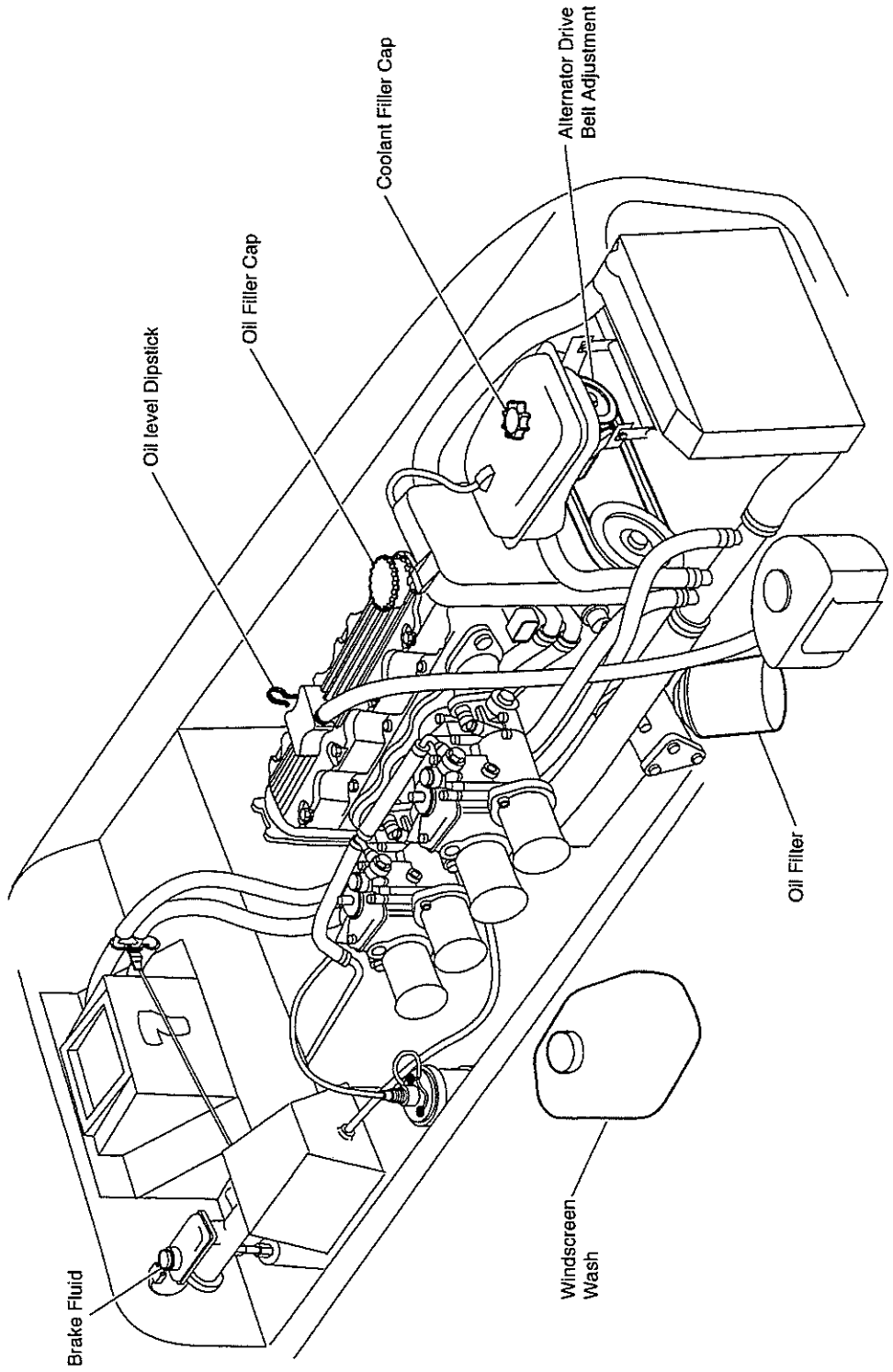


Diagram 15.2 – Service Locations.

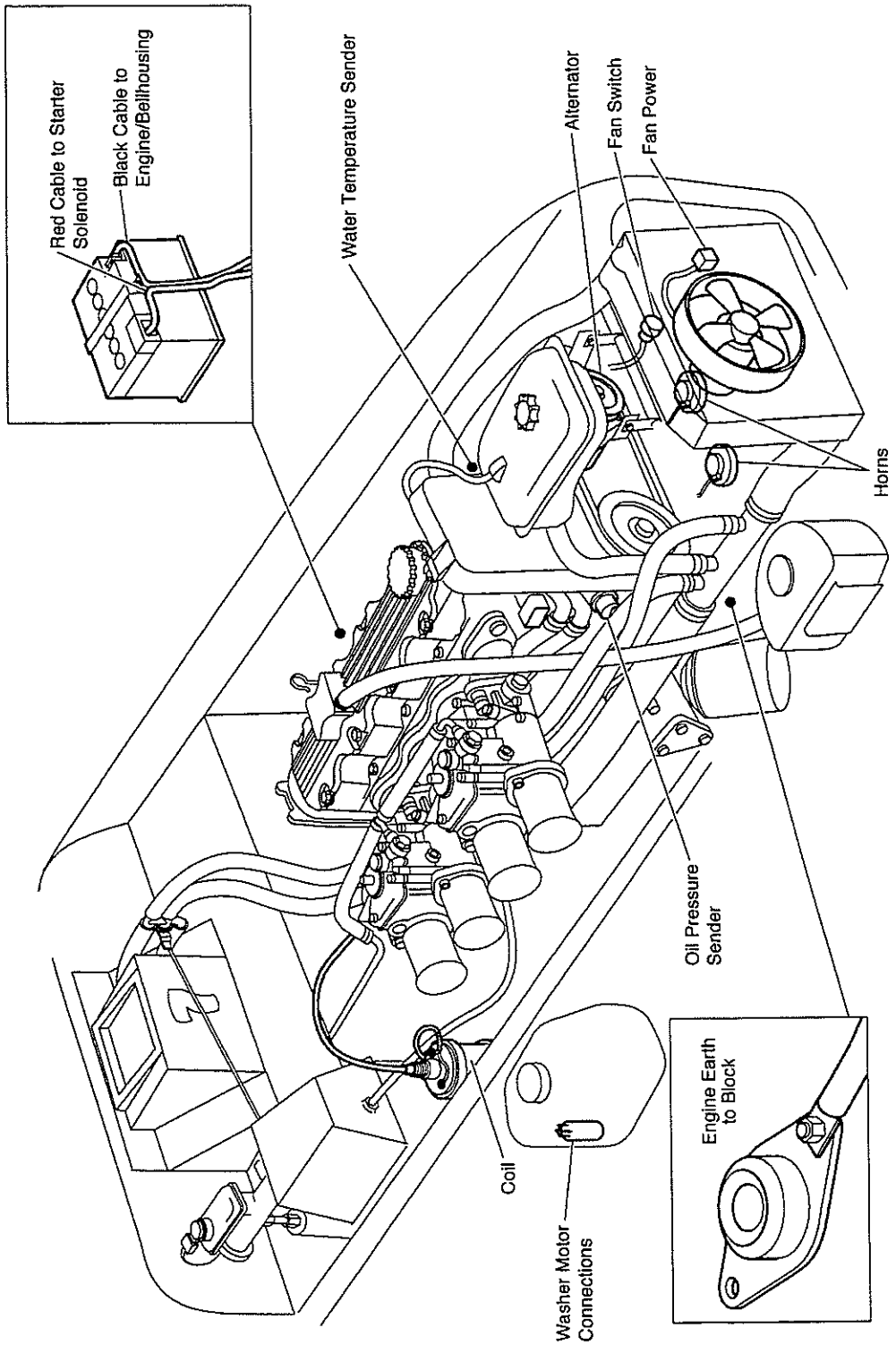
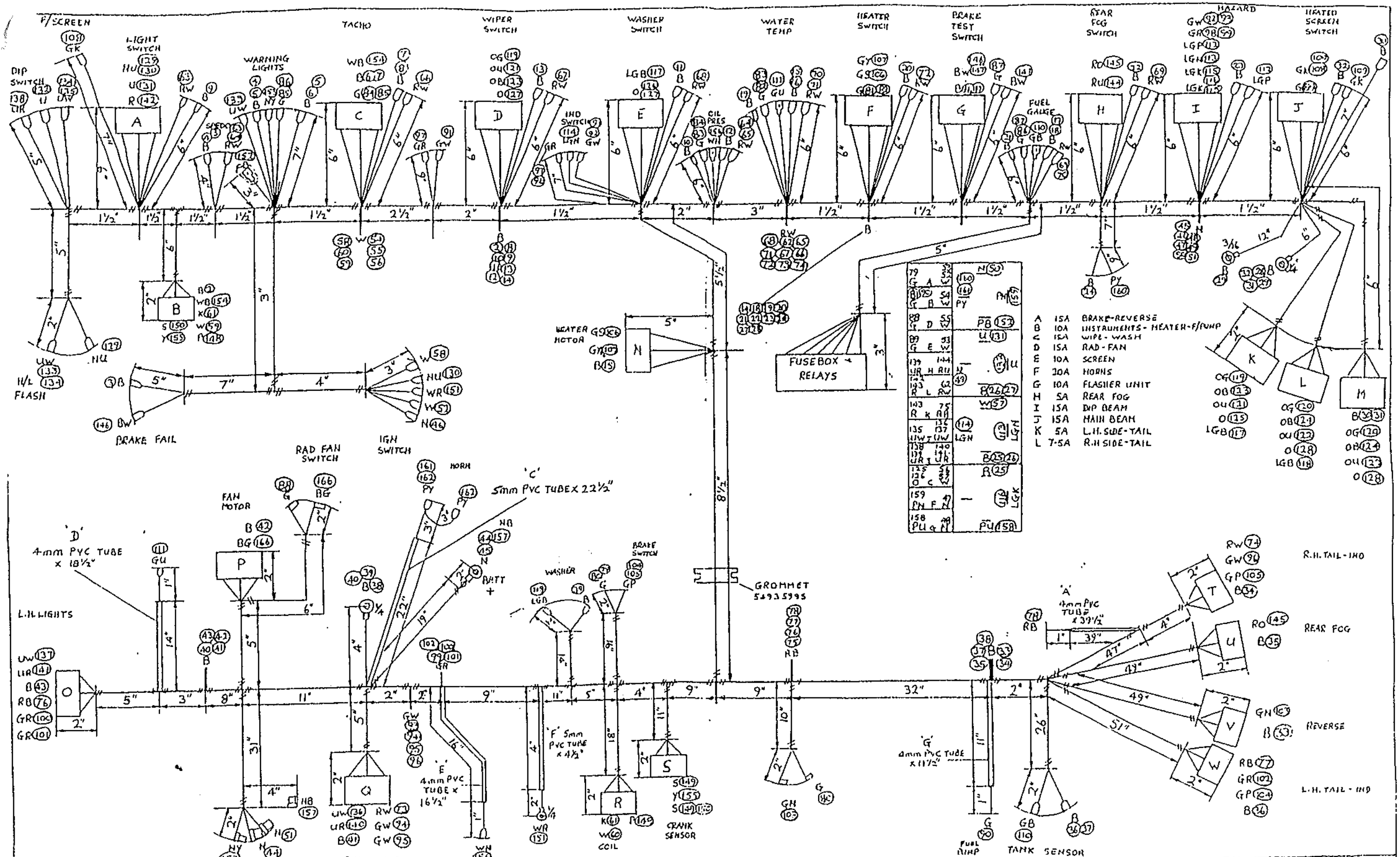


Diagram 15.3 – Electrical System.

WIRING DIAGRAM



ALL MOULDINGS AND FUSE BOX VIEWED CABLE ENTRY

71177-2P

CATERHAM CARS LTD MODEL 7 VAUXHALL CARBS 1.6 8 VALVE

OCT 1997

DRAWN	DATE	CHECKED	DATE	APPROV	DATE	SCALE
RHN	9-2-96					

M.E.S. UNIT 10+12 LADBROKE PARK WARWICK CV34 5AE

DRAWING NUMBER 0900024A

A	WASHER MOVED, REVERSE SWITCH CHANGED	15-3-95	
		DATE OF REVISION	DATE APPROVED

APPENDIX B

PREPARATION FOR TRACKDAYS AND RACING

The Caterham Seven is an excellent dual purpose road track car and is ideal for enjoying trackdays with minimal modification. The Seven is designed with track use in mind and as a result it is easy to humble more expensive 'Supercars' – and stay out lapping long after they have returned to the pits with boiling brake fluid!

Caterham Racing

There are currently four Caterham supported championships, each one involving a completely different vehicle specification, adhering to a separate set of regulations.

Caterham Academy

This was created in 1995 as the Sport Scholarship as a means of introducing total novices to the world of motorsport. The championship offers a complete package with fully sponsored cars and from the year 2000 will be available to 50 competitors per year.

Caterham Academy is designed to introduce drivers to a range of motorsport disciplines and to encourage drivers to continue with motorsport for many years to come. As such, this championship attracts competitors from all walks of life, male and female and of all ages with a particular emphasis on developing a strong social bond between competitors.

The car is a Classic (with live axle rear suspension) powered by the 1.6 litre Vauxhall 8 valve engine. The format of the championship is multi-discipline with the competitors (having been led ARDS tuition for their National 'B' Licence) taking part in a kart race, test day, three hillclimbs, three sprints and two circuit races. This championship is only open to novices (people who have never held a race licence before).

Caterham Cars provides a technical backup service available to competitors at each organised event.

Caterham Graduate Series

This series provides a natural progression for ex-Scholarship competitors but is also open to drivers who have not previously competed in the Scholarship. The specification of the car must not deviate from the original Scholarship specification. Typically the season consists of two hillclimbs and nine circuit races.

Caterham 1600 Roadsport Championship

The Rover K-Series engine was introduced into Caterham racing back in 1992 and the specification of both the car and engine has been evolving ever since. 1998 saw an all new Championship introduced utilising the latest specification 1.6 litre, 133 ps engine complete with Caterhams' own close ratio 6-speed gearbox. The chassis is the latest specification De-Dion with race tuned suspension and semi-slick racing tyres. These are all roadgoing cars and so remain true to the original concept of racing your road car. To ensure close racing the major technical components are

sealed and the technical regulations are strictly enforced throughout the season. The overall winner of the 1999 Championship secures use of a Caterham Superlight R for the following season.

Caterham Superlight R Challenge

This is the ultimate in terms of one make Seven racing. The drivetrain specification makes these cars particularly exciting as they use the 193 ps 1.8 Rover K-Series VHPD engine and close ratio 6-speed gearbox. These are not roadgoing cars so weight is kept to a minimum with the exclusion of unnecessary road going equipment such as lights and dashboard instrumentation. Further weight is saved by replacing the windscreen and wipers with a small wind deflector. Increased levels of grip are provided by Avon slicks. Like the Roadsports the Superlight R engines are sealed and the series is carefully scrutinised to guarantee fast and spectacular racing.

For further information contact Caterham Sales on 07000 000077.

Caterham Motorsport Centre

Hyperion Motorsport are the Official Motorsport Centre for Caterham. They provide an expert preparation service for both trackdays and racing.

Approved Race Teams

Caterham Cars recommend the services of the following race teams:

Arrowstar Racing
Aryliam Motorsport
Promotasport
Ratrace Motorsport
Sebah Motorsport
Taylors Foundry Motorsport
Team Parker Racing

Caterham Motorsport Club CMC

The CMC provides owners of Caterhams (and any type of car) the opportunity to drive their car on a race track. These track days take place at all the major circuits around the UK and allow participants to explore the limits of their skill in their own car. Qualified instructors and celebrity drivers are available to offer tips, advice and fast lap rides in Caterhams' own cars – if you drive a 1.6 engined car and wondered how quick a Superlight R really is then somebody will be on hand to show you!

Trackday Preparation

It should be noted that trackdays are **not** races. The whole idea is to provide the regular owner with an opportunity to drive on a race circuit. There is no minimum speed on the circuit – you lap at whatever speed you feel comfortable with – as with all Seven driving the emphasis is on fun!

To get the most out of your trackday it is essential that your car is properly prepared.

Noise Levels

There are technical rules to adhere to, the most critical of which is noise. Certain circuits enforce different noise limits on different days – some will even vary the limit on the day depending on which way the wind is blowing! Venues that require reduced noise levels are typically Castle Combe, Goodwood, Oulton Park and Thruxton whereas Brands Hatch and Silverstone usually run days where the noise limits are less onerous. CMC are available to advise you on which days are noise sensitive.

Engine Oil

It goes without saying that you should use a high quality engine oil if you are contemplating track use. Cornering speeds are much higher on track (increasing the likelihood of oil surge) and this in conjunction with sustained high revs means that the engine oil is made to work very hard. We recommend that you check the level of your engine oil when the engine is warm – you should ensure that it is up to the maximum mark on the dipstick.

Tyres

We have found that increasing the pressure of standard road tyres for track use vastly improves their performance. For a wet track 30 psi all round works well and for dry usage pressures should be increased (we have used up to 40 psi in the past) to take into account the higher side loadings. This helps stop the tyre wall distorting under cornering (race circuits are much smoother than public roads so there is little need for a soft ride which enhances sidewall). In general, higher pressures will be required for racing than for sprints and hillclimbs due to the increased heat build up in the tyre. The Academy car runs on 13" diameter wheels with Avon CR322 tyres.

As a last word on tyres please ensure that your tyres are road legal at the end of a trackday (if you intend to drive home on tyres you have used on the track).

Engine Mount Restraints

These are fitted as standard on the Academy car.

Otherwise it is recommended that you fit engine mount restraints if you intend to use your car on the track. These prevent the engine mounts distorting under heavy cornering.

Safety

The following are all fitted as standard on the Academy car. They are not mandatory items, however if you are considering taking your classic car onto the track on a regular basis we recommend that you fit them all.

Battery master switch – allows every electrical circuit on the car to turned off using just one switch.

FIA rollover bar – increased diameter and thicker grade tube provides greater protection in the event of a roll – it is, however, very difficult to roll a Seven!

Fire extinguisher – a sensible idea for piece of mind.

Personal Equipment

A crash helmet must be worn on the circuit at all times. Whilst it may be possible to borrow a helmet from the organisers (check beforehand) it is usually more convenient to buy your own. Always buy the best you can afford - motorcycle shops have a wide choice of well priced helmets. Motorsport retailers such as Demon Tweeks stock a good range right up to Formula 1 specification! A pair of Nomex driving gloves are a good idea. A fireproof race suit is recommended, but is not a mandatory requirement on trackdays – however **bare arms must be covered.**

General

Remember to take a foot pump and a tyre pressure gauge to allow you to alter your tyre pressures.

Fuel can sometimes be bought at the circuits or at a station nearby. You will average approximately 15 miles per gallon during a trackday so be sure to arrive with a full tank (8 gallons).

Remember to bring some engine oil for topping up if necessary.

For advice on any of these items you can speak to Caterham (Technical) on 01322 625802.

We recommend you start with the advice included within this appendix and gain some experience of driving the car in this form before deviating from this. We also recommend that you take advice and careful consideration before making any changes as it is very easy to 'spoil' the handling of the car. If you have any queries please contact the Technical department on 01322 625802.

It is also essential that the rest of the car is in good general condition. The best preparation is to check the security of all critical fasteners (drivetrain, suspension and steering) against the values given in each section. All other fasteners should be checked (hoses etc). Other preparation is merely common sense – **DO NOT** venture out onto the circuit with a known fault (an oil leak for instance) without rectifying it first. Take some tools with you on the day itself and during the day take 15 minutes just to check the main fasteners again. Caterham can carry out pre-trackday preparation for you – contact Service on 01322 625804.

APPENDIX C

UPGRADES

There are a large variety of upgrades available for the Caterham Seven. The majority of these improve the performance of the car in some way – handling, braking, engine power or change the emphasis of the usage the car gets – frequent track day use for example.

These parts are designed to be retro-fitted so that you can upgrade your car at any time.

All of these upgrades are available direct from the Caterham Parts Counter (call 01322 625801) and can be fitted by our Service department (call 01322 625804).

Typical Upgrades

Uprated front brakes
Lightweight wheels
Alloy radiator
Carbon panels (exterior and dashboard)
FIA roll bar
Battery master switch
Limited slip differential
4 point harnesses
Fire extinguisher
Weather equipment
Windscreen
Heater
Immobiliser

APPENDIX D

ASSEMBLY GUIDE QUESTIONNAIRE

1. How would you describe your level of mechanical skill prior to building your Seven? Please tick as appropriate.

Minimal		Low		Moderate		High	

2. How useful did you find this Assembly Guide when building your car?

Essential		Helpful		Reference Only		Inadequate	

3. Were there any areas that were particularly useful?

4. Were there any areas that were not clearly explained?

5. Did you encounter any particular difficulties in building your car and, if so, how did you overcome them?

6. Are there any areas in the Assembly Guide that you feel could be expanded – or any areas not covered that you think should be?

7. Have you enjoyed building your car?

Name: Model: Chassis Number: Date:

APPENDIX E

ENGINE SPECIFICATIONS

VAUXHALL 1600

Engine capacity	1598cc
Number of cylinders	4 in-line
Firing order	1-3-4-2
Bore	80 mm
Stroke	79.5 mm
Compression ratio	10.4:1
Cylinder head	aluminium, polished, ported and skimmed
Valve gear	SOHC 8 valve. Hydraulic tappets
Camshaft	1, in cylinder head
Fuel system	2 twin choke, Sidedraft Weber 40 DCOE on bespoke Caterham alloy manifold
Fuel	Unleaded 95 or 98 RON
Max Power	101 ps @ 5500 rpm
Max Torque	107 lbft @ 3600 rpm

VAUXHALL 1800 SUPERSPRINT

Engine capacity	1784cc
Number of cylinders	4 in-line
Firing Order	1-3-4-2
Bore	84.5 mm
Stroke	79.5 mm
Compression ratio	10.5:1
Cylinder head	aluminium, polished, ported and skimmed
Valve gear	SOHC 8 valve. Hydraulic tappets
Camshaft	1, in cylinder head
Fuel system	2 twin choke, Sidedraft Weber 40 DCOE on bespoke Caterham alloy manifold
Fuel	Unleaded 95 or 98 RON
Max Power	122 ps @ 6250 rpm
Max Torque	120 lbft @ 4750 rpm

APPENDIX F

KEY SERVICE INFORMATION

Engine Oil

Type: Comma Oils 'Eurolite'

Volume: 4 litres (approx.)

Oil level to be at maximum on dipstick with the engine turned off (having just been run to normal operating temperature).

Gearbox Oil

Ford 5 speed (Type 9)

Type: Comma Oils EP80/90 gear oil

Volume: Approximately 2 litres (depending on amount used during assembly).

Caterham 6 speed

Type:

Volume: Approximately 2 litres (depending on amount used during assembly).

Axle Oil

Marina/Ital (No LSD) Comma Oils GL5 SX 75w-90 with Extralube LZ6178

Volume: Approximately 1 litre GL5 and 100ml Extralube

Brake Fluid

Type: Comma Oils DOT 4

Volume: As required.

Coolant

Type: Comma Oils 'Coldstream'

Water/antifreeze ratio: 2:1

Volume:	With heater	5.5 litres
	Without heater	5.0 litres

Fuel

Type: Unleaded 95 octane or Super Unleaded 98 octane.

Capacity: 8 gallons (36.3 litres).

Tyre Pressures

13" Michelin - 20 psi
13" Yokohama - 20 psi
13" Avon CR322 - 20 psi

Steering Alignment

Front: 0°20' +/- 0°10' **TOE IN**