

**PRELIMINARY INFORMATION**

**ASSEMBLY GUIDE**

**DE DION CHASSIS FITTED WITH FORD SIGMA VARIANTS**

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## **PRELIMINARY INFORMATION**

### **LIST OF ABBREVIATIONS**

A/F	Across Flats
CKD	Complete Knock Down
CV	Constant Velocity (joint)
DVLA	Driver and Vehicle Licensing Agency
EC	European Community
ECU	Engine Control Unit
EMU	Engine Management Unit
FIA	Federation Internationale De L'Automobile
Kph	Kilometres Per Hour
lbft	Pounds Feet
LED	Light Emitting Diode
LH	Left-Hand
LSD	Limited Slip Differential
MAC	Ministers Approval Certificate
MAP	Manifold Air Pressure
mm	Millimetre
mph	Miles Per Hour
MSA	Motor Sports Association
Nm	Newton Metre
OAT	Organic Acid Technology
psi	Pounds Per Square Inch
QR	Quick Release
RH	Right-Hand
SVA	Single Vehicle Approval
UNC	Unified Coarse
UNF	Unified Fine
VED	Vehicle Excise Duty
VHPD	Very High Performance Derivative
VRO	Vehicle Registration Office

## PRELIMINARY INFORMATION

### GENERAL WARNINGS AND CAUTIONS

1 The following warnings and cautions indicate general and environmental hazards present during the building process:

#### WARNINGS

- (1) Due consideration should be given to the highly flammable nature of petroleum or alcohol based products and their vapours. Serious burns can result from incorrect use.
- (2) Oils – prolonged and repeated contact may cause serious skin disorders:
  - (a) Avoid contact with the skin as far as possible and wash thoroughly after any contact.
  - (b) Keep out of reach of children.
  - (c) First aid treatment should be obtained for open cuts and wounds.
  - (d) Use appropriate barrier creams.
- (3) Hydraulic fluid (brake fluid) is poisonous. Wash affected areas immediately in case of skin contact and seek medical assistance if swallowed.
- (4) Hydraulic fluid (brake fluid) is hygroscopic. Ensure only clean fresh fluid is used.
- (5) Hydraulic fluid (brake fluid) is corrosive to paintwork, powder coat and plastic components. Care should be taken to avoid spillage at any times.

#### CAUTIONS

- (1) Protect the environment. It is illegal to pollute drains, water course and soil. Authorised waste collection facilities include civic amenity sites and garages which provide facilities for the disposal of oil and used oil filters. If in doubt ask the local authority for advice.

### SPECIFIC WARNINGS AND CAUTIONS

2 The following warnings and cautions indicate specific hazards relating to the Caterham build process:

#### WARNINGS

- (1) Never work underneath a car without supporting it on axle stands or equivalent. Do not rely on a jack alone.
- (2) Use appropriate eye protection whilst carrying out drilling operations.
- (3) Use appropriate eye protection whilst working under the car.
- (4) Cars fitted with electronic ignition systems have increased voltages compared with conventional systems. Ensure system is switched off prior to carrying out any work.
- (5) The electric radiator fan is controlled by a thermostatic switch which operates when the ignition is in the 'on' position. Whilst working on a hot engine ensure that the ignition is switched off.
- (6) Do not remove coolant expansion bottle cap whilst coolant is hot. Take precautions to prevent scalds.
- (7) Correct use of fixings is required in order to ensure full engagement of the nyloc nut.
- (8) Both imperial and metric threads are used on the De Dion brake pipes. The threads on the three way union are imperial whilst those on the brake callipers are metric. To aid recognition a small notch is machined into the hexagon of the metric unions.
- (9) Retighten wheel nuts after 200 miles.
- (10) Ensure adhesive is applied in a well ventilated area. Follow instructions on adhesive packaging. Care must be taken whilst working in a confined area, for instance the footwell.
- (11) Use a suitable face mask to prevent inhalation of dust when drilling fibreglass or carbon fibre.

## **PRELIMINARY INFORMATION**

### **CAUTIONS**

- (1) All brake connections must be kept spotlessly clean and contamination with oil, water and petrol should be avoided.**
- (2) When drilling fibreglass use tape on the surface over the drill holes to prevent damage to the gel coat or painted finish. Slow drill speeds must be used.**
- (3) Do not over-tighten thermostatic fan switch.**
- (4) If less than 43 mm is measured then the differential casing may be holed. If more than 43 mm is measured it is possible that the De Dion tube may hit the differential.**

**SECTION 1 - INTRODUCTION**

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## SECTION 1 - INTRODUCTION

### INTRODUCTION

1 It is recommended that the entire assembly guide is read before commencing building of the car. This will allow planning ahead for the procurement of tools, consumables and equipment required during the build process.

2 Whilst it is possible for many of the build processes to be undertaken simultaneously there are some areas where the correct build sequence is critical. A suggested build sequence is included at the end of this section.

3 The chassis and packages supplied have been engineered to enable a Ford Sigma engine to be installed in conjunction with either a Ford Type 9 close ratio 5-speed or Caterham 6-speed gearbox. A Ford Sierra differential is utilised. There are several different versions of these engines, gearboxes and differentials available. 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.

### CONTACT INFORMATION

4 For aftersales service and all other enquiries, contact Caterham Cars at Dartford on telephone number 01322 625800 (Fax 01322 625810).

5 Ensure that you make a note of your sales order number (top RH side of invoice) and your customer number as these are the references 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.

### PART RECOGNITION/SHORTAGES

6 The kit provided by Caterham Cars (from the factory at Dartford) includes all the items required to build the car. However, due to the sheer number of different components it is possible that some parts are omitted or duplicated. Kits should be checked to ensure all components (including contents of fastener packs) are present prior to starting construction. If there are any shortages contact the Customer Liaison Department at the factory.

### TECHNICAL HELP

7 Caterham Cars will happily provide technical assistance when required. **When in doubt, ask.**

### POST BUILD CHECK

8 When your Caterham Seven is finally completed and ready for the road it is strongly recommended that you make use of our Post Build Check facility. All customers are sent a free voucher covering the first three hours of the Post Build Check (this is ample time to check a completed kit, which can be carried out at the factory in Dartford, at Caterham Midlands or at one of our approved services 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.

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

10 The Post Build Check therefore includes:

- Inspection of all safety related items.
- Inspection of all operating systems (Clutch, Gearbox, Axle etc).
- A written report on any matters causing concern or requiring attention.
- Completion of any agreed warranty work.
- Post Build Inspection Certificate when the car has passed inspection.
- Check to ensure compliance to SVA requirements (if required).

11 The inspection will take approximately three hours and we suggest that you give at least two weeks notice when booking your car in. If additional work is required please notify the Service Manager at the time of booking to ensure that sufficient time can be made available. Any additional work will be charged on an hourly basis.

## **SECTION 1 - INTRODUCTION**

### **SINGLE VEHICLE APPROVAL**

12 The requirements for Single Vehicle Approval (SVA) are detailed in Section 15. For advice or assistance on SVA matters contact the Aftersales Department. SVA is a requirement for UK markets only therefore the additional parts will not be supplied with overseas orders.

### **AFTERSALES**

13 To maximise the enjoyment of your Seven, the safety and integrity of the car must be maintained by careful adherence to the maintenance schedules. Further information on when servicing is required and where best to get it done can be found in the Owners Handbook supplied with your car.

### **DISCLAIMER**

The Caterham Seven is supplied in kit form and is supplied for amateur construction.

The builder must assume that all nuts, bolts and fasteners may be loose and takes 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.

### *NOTE*

*In the UK, the assembled kit cannot legally be driven to the post build inspection (prior to successful completion of an SVA test).*

## SECTION 1 - INTRODUCTION

### SUGGESTED BUILD SEQUENCE

WORK AREA	DETAIL	COMMENT
<b>FRONT</b>		
Steering		Initial fit
	Steering rack	
	SVA sleeves	
	Track rod ends	
Front Suspension		
	Lower wishbones	
	Upper wishbones	
	Headlight brackets	
	Damper units	
	Uprights	
	Wingstays	
	Anti-roll bar	On R400 Back radiator cowling should be fitted before anti roll bar
	Front flexible brake hoses	
	Headlights and front indicators	Can be left until after engine installation
<b>ENGINE &amp; GEARBOX</b>		
	Speedo drive plugs (large and small)	
	Gearbox rubber mounting	
	Gearbox to bell housing	
	Clutch release mechanism	
	Gearbox to engine	
Prep Engine		
	Oil pressure sender	
	Starter motor	
	Wiring loom (starter to alternator)	
	'J' hose	
	Intermediate top hose	
	Gearbox filler plug	Loosen
	Gearbox tail shaft plug	Remove
<b>ENGINE BAY</b>		
	Engine mount blocks	Fit to Chassis
	Earth lead	
	Wiper reservoir	



**SECTION 1 - INTRODUCTION**

WORK AREA	DETAIL	COMMENT
	Oil separation tank mountings	Optional fitment
	Alternate header tank mounting plate	Optional fitment
	Horns	Standard location only
	Install engine/gearbox	
	Engine mounts	Fit to Engine
	Earth lead	
	Engine/chassis loom connections	
	Starter/battery leads	
	ECU	
	MAP unit	
	Reverse light switch	
	Gear stick	
	Fuel pipe	
	Primary exhaust pipes	
	Collector box/cat	
	Lambda probe	
	Oil separation tank	Optional
	Header tank mounting	Optional
	Horns	Alternate location
	Steering column	
	Steering wheel	
	Bottom hose	
	Top hose	
	Radiator bobbins	
	Fan and inner cowl	Cowling is Only on R400
	Anti-roll bar	Front suspension section
	Fan switch	
	Radiator	
	Outer cowl	Cowling is Only on R400
	Heater	May be fitted before engine
	Heater hoses	
	Heater valve	
	Heater control cable	
	Header tank	
	Expansion hoses	

**SECTION 1 - INTRODUCTION**

WORK AREA	DETAIL	COMMENT
	Cycle wings and indicator repeaters	
<b>REAR CHASSIS</b>		
Prep and install diff		
	Handbrake and cables	Initial assembly
	Propshaft	
	Differential	
Rear Suspension		
	Brake pipes and flexi hose	
	De Dion tube	
	Rear dampers	Only If standard roll over bar specified
	Radius arms	Or optional Watts linkage
	'A' frame	
	Drive shafts	
	Rear anti-roll bar	Optional
	De Dion ears	
	Hub carriers	
	Speed sensor	Including anti-roll bar spacer if specified
	Hubs/discs	
	Callipers	
	Attach handbrake cables	Adjusted after brakes are bled
<b>COCKPIT &amp; BOOT</b>		
	Transmission tunnel trim	
	Gear knob	
	Scuttle edge trim	
	Sill protectors	Optional
	Knee trim panels and interior panel piping	Depends on roll over protection specified
	Four and six-point harness lap and crutch straps	Optional
	Carpets	
	Seats	
	Roll over bar/cage as specified	
	Head restraint	Roll cage option only
	Rear dampers	If track day roll over bar or roll cage specified

**SECTION 1 - INTRODUCTION**

WORK AREA	DETAIL	COMMENT
	Fuel filler shroud	
<b>BODYWORK AND HOOD</b>		
	Front wings and indicator repeater lights	May be fitted immediately after fitting front anti-roll bar
	Rear wing protectors	
	Rear wings	
	Exhaust pipe bracket	
	Exhaust silencer	
	Heat shields	Silencer and collector/cat
	Hood sticks	
	Hood fasteners	
	Side screens	
	SVA	

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## SECTION 2 - PRE-ASSEMBLY INFORMATION

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## SECTION 2 - PRE-ASSEMBLY INFORMATION

### PACKAGE CONTENTS

1 This section has been included to aid recognition of parts and to give a basic idea as to where they might be found. Due to the complexity of the range of options available and subsequent variations on packages it is impossible to list every permutation; however Table 1 (below) and Annex A (at the end of this section) show the normal location of parts in a standard CKD kit.

2 Kits supplied from Caterham Cars arrive as shown in Fig 1. Due to packaging constraints some items may be located in different packages.

**TABLE 1 PACKAGE CONTENTS**

BOX	Package	Contents
BOX 1	Steering, Exhaust, Gearbox assembly, Drive shafts	Steering rack, rack clamps, upper and lower steering columns, column bush, column clamp, track rod ends. Grub screws, silencer assembly (standard system). Primary pipes (4), collector or catalyst collector, silencer (competition system), exhaust guard, mounting brackets and bobbins, wheel nuts, centre caps, badges, bell-housing, clutch release mechanism, speed sensor and threaded adapter, reverse light switch, mounting rubber, gearknob, anti-roll bar and fixings, cycle wingstays, 'A' frame, differential driveshafts and nuts, De Dion Tube, brake pipes, propshaft
BOX 2	Axle (De Dion)	Disc pads and callipers, drive flanges, De Dion ears, hub, bearings
BOX 3	Differential	Differential assembly
BOX 4	Front Suspension, Rear Suspension	Spring damper units, upper and lower wishbones, spring damper units, radius arms/Watts linkage, anti-roll bar and fixings
BOX 5	Cooling	Coolant hoses, water rail, cooling fan, heater (option on Superlight), bobbins, expansion bottle and cap, radiator cowling
BOX 6	Lighting	Headlamp units, headlamp brackets (cycle wing only), indicator pods, indicators, number plate light, reversing light, fog light, side repeaters
BOX 7	Miscellaneous Pack	Handbrake lever, interior mirror, battery cables, wheel brace, gear lever, tool bag, nosecone badge, engine mounting rubbers, scissor jack, windscreen washer kit, stainless steel brake hoses, horns, windscreen wipers
BOX 8	Interior Trim	Covered tunnel top, tunnel side carpets, footwell carpets, seat back carpets, seats, hood, sidescreens, hood sticks, boot cover, pulley and cables, throttle cable, clutch cable, rear wing protectors, steering wheel, spare wheel wishbone, seat belts and fixings, tonneau cover, seat runners, seat spacers, assembly guide, arm restraint, hardware packs, SVA packs, SVA mirrors, air box and fixings
BOX 9	Weather equipment	Hood straps, exterior mirrors, fuel filler cover, hinges (sidescreen), sill protectors, wiper arms, wiper blades, hardware pack
OWN BOX	Upright	Front upright assemblies including brakes
PALLET	Engine	Complete engine and clutch, engine loom, engine mounting brackets
OWN BOX	Gear box	
OWN BOX	Radiator	
LOOSE	Side exit catalyst	
LOOSE	Wheels and Tyres	Alloy wheel and tyre assemblies
OWN BOX	Roll over bar	
ON CHASSIS	Chassis/ Body Unit	Chassis, battery, body panels, pedals, master cylinder, instruments, switches, wiring loom, fuel tank, fuel pump, fuel lines, ignition module/ECU. Rear wings, front wings, nosecone, battery, battery clamp/tray, knee trim panels, scuttle trim, econoseal plugs, steering column plate, grilles (Mesh 7), int panel trim, keys (ignition, fuel cap, battery master switch), aluminium tonneau cover, paint touch bottles

**SECTION 2 - PRE-ASSEMBLY INFORMATION**

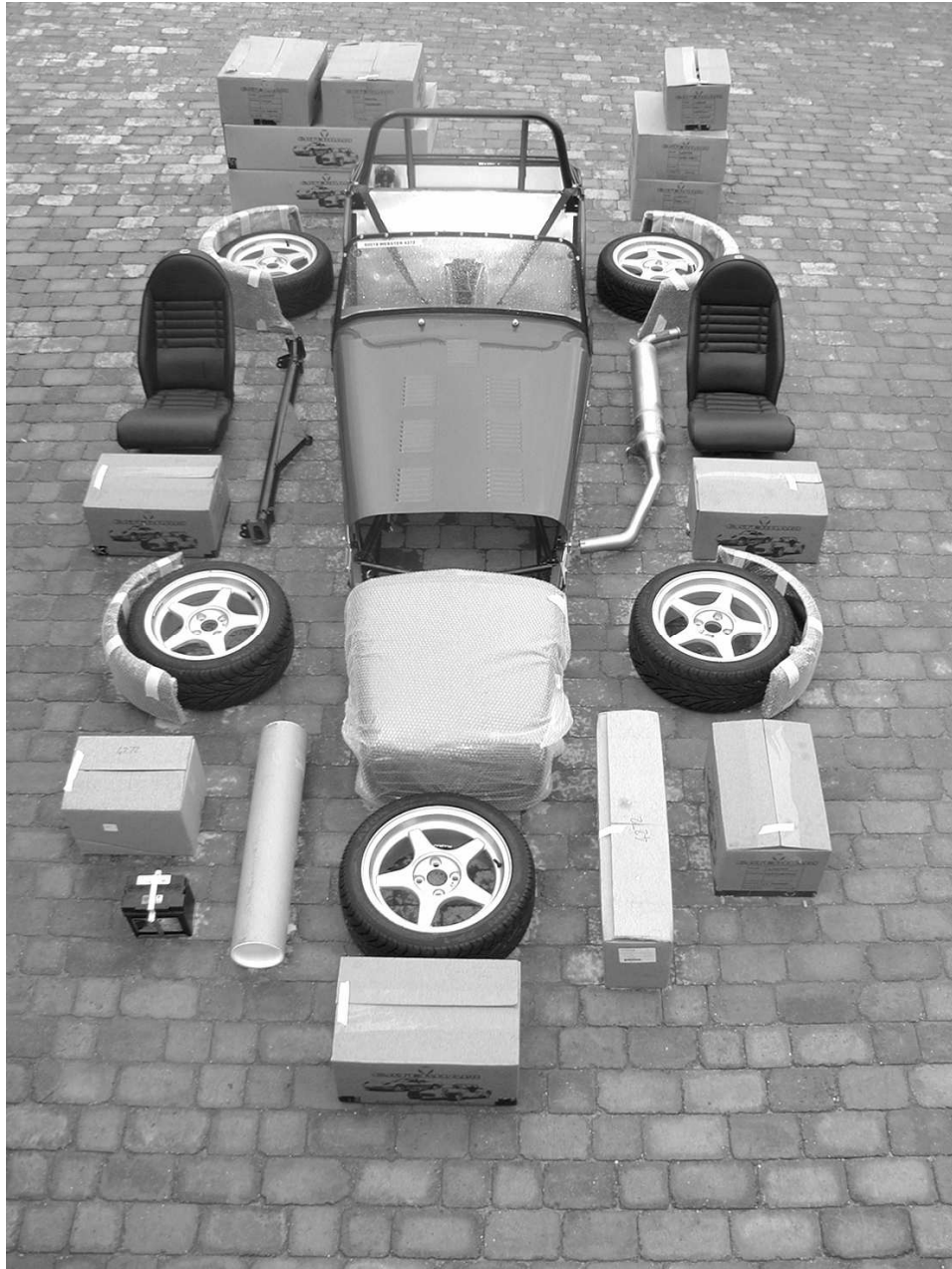


Fig 1 Complete kit (less engine)

## SECTION 2 - PRE-ASSEMBLY INFORMATION

### BASIC DEFINITIONS

3 The text in the assembly guide refers to the Right Hand (RH) side or Left Hand (LH) side of the car. For all purposes the RH side of the car is taken to be the driver's side of a RH drive car.

4 Also mentioned in the assembly guide are the terms inboard (pointing towards the centre line of the car) and outboard (pointing away from the centre line of the car).

### TOOLS AND EQUIPMENT

5 All kits supplied by Caterham Cars are specifically designed for the amateur car builder with basic facilities. Table 2 details the general purpose tools that will be required during the build process.

**TABLE 2 TOOLS REQUIRED**

Item	Remarks
Socket set	Metric and imperial
Spanner set	Metric and imperial
Screwdriver	Flat point (various)
Screwdriver	Phillips/posidrive (various)
Soft faced hammer	Rubber/plastic/copper/hide
Circlip pliers	
Torque wrench	0 to 80 Nm
Allen keys	Metric
Measuring tape	
Hacksaw	
Rivet gun	
Goggles	Eye protection
Twist drill bits	Metric and imperial
Crimp pliers	
Drill	Preferably rechargeable
Axle stand	Qty 4
Jug/small funnel	

6 The tools detailed in Table 3 are not generally to hand in the amateur workshop. These will be required during the build process.

**TABLE 3 ADDITIONAL TOOLS AND EQUIPMENT**

Item	Remarks
Engine hoist	SWL of 150 kg
Socket 41 mm	
Torque wrench	Up to 275 Nm
Cut down 3/8" Allen key	Gearbox oil filler plug
Durable Dot fastening tool	76068 – supplied with chassis kit

7 The engine hoist should only be required for a short time and can usually be sourced from a tool hire company. The 41 mm socket and torque wrench will be required to tighten the rear hubs to the drive shafts and the cut down Allen key is required to tighten the gearbox oil filler plug, due to the restricted access in the transmission tunnel. The key can be modified as shown in Fig 2.



Fig 2 Cut down Allen key



## SECTION 2 - PRE-ASSEMBLY INFORMATION

8 The consumables detailed in Table 4 and recommended lubricants detailed in Table 5 are required during the build process.

**TABLE 4 CONSUMABLES**

Item	Type	Remarks
Rubber lubricant	Holts RL2R	To ease assembly and operation of rubber bushes and grommets
Copper grease	Comma Copper Ease	Anti seize compound where lubrication is not required to ensure ease of future disassembly
Threadlock	Loctite Threadlock 242 or 243	Used where the application prevents the use of nyloc nuts or spring washers
Silicone sealant	Clear	To achieve a watertight seal. It should be applied sparingly
Masking tape	Duct tape	Protection of body
Adhesive	Contact	Carpet/trim

**TABLE 5 RECOMMENDED LUBRICANTS**

Item	Type	Remarks
Engine oil	Comma Syner-Z synthetic OW-40	Road usage
	Caterham Motorsport oil 5W-50	Performance/ Track driving
Gearbox oil (5 and 6 speed)	Caterham gearbox oil GL4 grade	Under no circumstances use GL5 grade oil
Differential (All)	Caterham differential oil	EP90
LSD - additive		Use in LSD's only
Brake fluid	Comma DOT4	
Engine coolant	Comma Xstream Red	OAT

**NOTE**

*It is recommended that non-synthetic standard multi-grade oil is used for the first 500 miles to aid the running in process.*

9 It is recommended that a sturdy workbench and a good vice are made available for holding items stable.

10 The application of undue force should not be necessary if assembly is carried out in the correct sequence.

### NUTS, BOLTS AND WASHERS

11 As a general rule the fasteners used are RH thread and of Metric dimensions. Some Imperial fasteners are still used, particularly within the brakes and suspension.

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

13 All safety critical fastenings supplied by Caterham Cars are high tensile conforming to British Standards 1768 (Imperial) and 3692 (Metric). Customers supplying their own fasteners should only use fasteners with heads marked 10.9 and 12.9 particularly when attaching suspension, steering, upright and axle kits. Any unmarked bolt should not be used.

14 Ensure that the correct tightening torque is applied. Where torque figures are not specified use the figures detailed in Table 6. Particular care must be taken when using the torque wrench to tighten fastenings into aluminium.

**TABLE 6 GENERAL TORQUE FIGURES**

Thread	Socket size	Torque (Nm)
1/4" UNF/UNC	7/16" A/F	7
5/16" UNF/UNC	1/2" A/F	20
3/8" UNF/UNC	9/16" A/F	34
7/16" UNF	5/8" or 11/16" A/F	47
1/2" UNF	3/4" A/F	61
5 mm	10 mm	6
6 mm	11 mm	7
8 mm	13 mm	20
10 mm	17 mm	47
12 mm	19 mm	61

15 It is good practice to mark the bolt head or nut with a spot of paint once it has been finally tightened. This provides a good visual means of checking that all fixings have been set to the correct torque.

16 Over tightening can often cause more problems than under tightening, such as sheared bolts and studs and incorrect stresses.

## SECTION 2 - PRE-ASSEMBLY INFORMATION

17 The majority of fastenings have washers inserted between the nut and or bolt head and the item being secured. Spring washers or lock washers are usually placed next to the bolt head or nut then the plain washer. As a general rule the following washers are used as detailed:

### Plain washer

- To protect the surface and spread a load when attaching to a soft material such as glass fibre or aluminium.
- To adjust the spacing of one component to another use plain washers of appropriate thickness and external diameter.
- To present a uniform surface on which to tighten a fastening onto a rough or irregular surface.

### Spring washer

- To lock a thread where there is a possibility of the nut or bolt working loose. Not used with a nyloc nut.

### Large diameter, thin plain washer

- To spread a load onto very thin material.

### Large diameter plain washer

- To prevent migration (sideways movement) of rubber bushes.
- The large plain chamfered washers are often used in conjunction with the metallistic suspension bushes. Where this is the case the chamfered edge must be fitted towards the bush to prevent contact with the outer metal part of the bush.

18 Particular care should be taken to ensure that the correct fastening is being used, since it is possible to use an overlong bolt only to find that it is apparently missing when the only remaining bolts are too short.

19 The majority of fasteners supplied by Caterham are in polythene bags with an A4 sheet on a card insert, refer to Fig 3. The A4 sheet can be used to confirm that the contents are correct. Each pack has a unique number, located at the top RH corner and each item within the pack can be identified by a number at the bottom LH corner of the part number box. Where fasteners are specified in the text, the unique pack number will be stated the first time it is required along with the description and the Item Identification number in brackets. The next time an item from that pack is required it will be identified by description and the Item Identification number only, for example:

- Bolt (fastener pack 30P017A Item 2) identifies the Bolt M8 x 50 mm from the fastener pack illustrated at Fig 3.
- At a later point in the same section of text 'nut (4)' identifies the M8 nut from the same fastener pack.

### *NOTE*

*Imperial and metric fasteners are supplied together in some packs. Ensure that the correct threadform is identified before use.*

**SECTION 2 - PRE-ASSEMBLY INFORMATION**


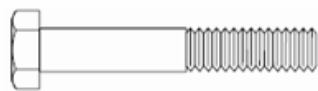
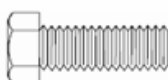




<b>SERIAL NUMBER</b>			<b>PACK NUMBER</b>	
51			30P017A	
<b>FASTENER PACK - ROLL CAGE (SERIES 3 METRIC)</b>				
Please note : This pack may include extra fasteners to cover different options				
NO	DESCRIPTION	PART NUMBER	QTY	DRAWING
1	Bolt M8 X 50 Grade 8.8 Bolt with plain section & Metric threaded section	BM8X50	2	
2	Set Screw M10 X 16 Grade 8.8 Hexagonal Head & Metric Full Threaded section	SM10X16	4	
3	Caphead Bolt M10 X 20 With Metric threaded section	BMCH10X20	2	
4	Nut M8 With Metric thread & Nyloc locking mechanism	NMYF 8	2	
5	Washer M10 Plain Washer Heavy-Duty	WPHM10	4	
6	Washer M8 Plain Washer Heavy-Duty	WPHM8	4	
* please note : Drawings are not to the scale <span style="float: right;">Page 1 of 1</span>				

Fig 3 Fastener pack

## SECTION 2 - PRE-ASSEMBLY INFORMATION

### GENERAL BUILD INFORMATION

20 Caterham Seven builders should take care to observe basic safety precautions whilst assembling the kit since tools, parts and materials handled incorrectly may result in injury.

21 Due to circumstances beyond the control of Caterham Cars, occasionally it is necessary to change suppliers and/or to make minor changes to the car or kit specification.

22 If it is intended to build the car over a short period (up to 4 weeks) it is recommended that an application for the SVA inspection is submitted now. There is usually a wait of 2-3 weeks, minimum. In addition it will take up to a week for the Vehicle Inspectorate to process the application. Full details about applying for the SVA inspection can be found in Section 15.

### WARNING

**Never work underneath a car without supporting it on axle stands or equivalent. Do not rely on a jack alone.**

23 It is recommended that the chassis is supported on 4 axle stands which will give stability for both safe working and ready access. Placing of the axle stands is made easier if assistance is available. Lift the front of the car and place the axle stands at the outer ends of the second chassis cross tube adjacent to the rear mounting of the lower front wishbone mounting, refer to Fig 4. If the car is raised using a jack, ensure that it is positioned under the front cruciform and that the powder coat finish is protected.



Fig 4 Front axle stands

24 The rear axle stands should be positioned at either end of the chassis tube that supports the front of the fuel tank, refer to Fig 5. If the car is raised using a jack, ensure that it is positioned centrally and the powder coat finish on the chassis tube is protected.



Fig 5 Rear axle stands

### USEFUL WEB SITES

25 Useful web sites where you can find information on Caterham services and recommended consumables and lubricants:

[www.caterham.co.uk](http://www.caterham.co.uk)  
[www.commaoil.com](http://www.commaoil.com)  
[www.loctite.us](http://www.loctite.us)  
[www.holtsauto.com](http://www.holtsauto.com)

## SECTION 2 ANNEX A - KIT CONTENTS

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## SECTION 2 ANNEX A - KIT CONTENTS

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### INTRODUCTION

1 The following pages include pictures and tables to assist with part recognition and location. Due to the multiple permutations that can be produced it is impossible to show the exact locations of every part. However the pictures have been laid out in such a way that each picture represents what you should expect to find in a particular box.

### PACKAGES

2 The complete kit is supplied as follows:

- Chassis/Body unit (CBU).
- Composite panels (nosecone, rear wings and front wings).
- Engine assembly.
- Gearbox assembly.
- Boxes of parts (approximately 10).
- Wheel/tyre assemblies.
- Seats.
- Exhaust silencer.
- Heater (in own box).

### IMPORTANT NOTE

The following pages are provided as a guide to aid recognition of parts. The packages shown will not be an exact representation of what you should expect to find in the packages supplied with your kit and should therefore not be used as a parts check list.

## SECTION 2 ANNEX A - KIT CONTENTS

### Exhaust, steering, large suspension items, bell-housing and front wingstays

3 The exhaust, steering, large suspension items, bell-housing and front wingstay items are shown in Fig 1 and Fig 2. The contents of the polythene bags are shown in Table 1.



- |   |                         |   |                       |
|---|-------------------------|---|-----------------------|
| 1 | Exhaust guard           | 5 | Cat/collector         |
| 2 | Fastener pack 'exhaust' | 6 | Exhaust primary pipes |
| 3 | Polythene bag 'exhaust' | 7 | Exhaust silencer      |
| 4 | Cat guard               |   |                       |

Fig 1 Exhaust

#### NOTE

*Items may differ from those illustrated.*

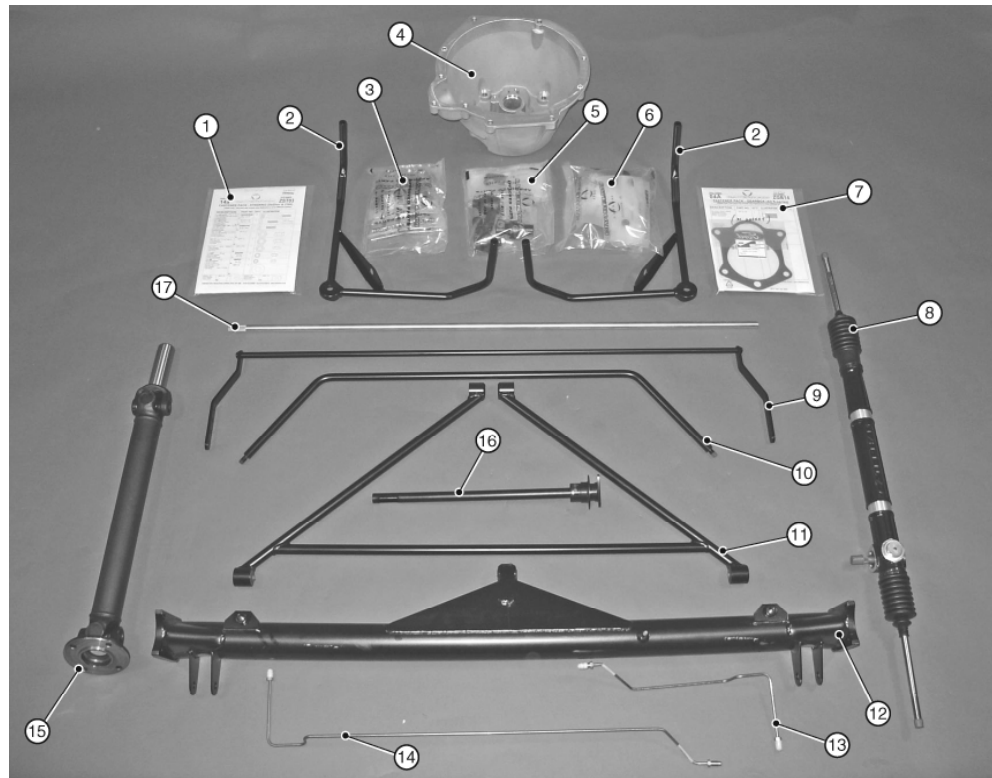
**SECTION 2 ANNEX A - KIT CONTENTS**

**TABLE 1 POLYTHENE BAG CONTENTS - EXHAUST, STEERING, SUSPENSION ITEMS, BELL-HOUSING AND FRONT WINGSTAYS**

Identifier	Description	Qty
Gearbox	Gearbox mounting rubber	1
	Gear knob	1
	Speedo drive cover	1
	Reverse light switch	1
	Grommet	2
	Speedo blanking plug	1
Steering	Track rod ends	2
	Universal joint	1
	Aluminium steering rack clamps	2 pairs
	Steering column bush	1
	Grommets	2
	Grub screw	1
	Steering column clamp	1
	Steering column clamp plate	1
	Steering column cheese wedge	1
Rivets	3	
Exhaust	Jubilee clips	5
	Exhaust clamp	1
	Exhaust mounting bracket	1
	Mounting bobbins	2
	Exhaust springs	2
	Lambda sensor	1
Wheels	Wheel nuts	16 or 18
	Wheel nut washers	16 or 18
	Centre caps	4 or 5
	Centre cap badges	4 or 5



**SECTION 2 ANNEX A - KIT CONTENTS**



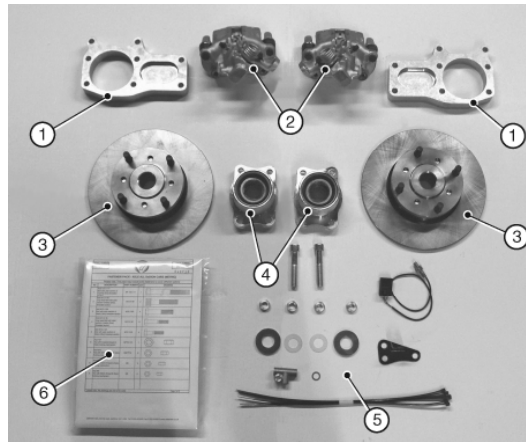
- |   |                          |    |  |
|---|--------------------------|----|--|
| 1 | Fastener pack 'steering' | 10 | Front anti-roll bar                          |
| 2 | Front wingstay           | 11 | 'A' Frame                                    |
| 3 | Polythene bag 'gearbox'  | 12 | De Dion tube                                 |
| 4 | Bell-housing             | 13 | Brake pipe (short)                           |
| 5 | Polythene bag 'steering' | 14 | Brake pipe (long)                            |
| 6 | Polythene bag 'wheels'   | 15 | Propshaft                                    |
| 7 | Fastener pack 'gearbox'  | 16 | Upper steering column and QR boss (optional) |
| 8 | Steering rack            | 17 | Lower steering column                        |
| 9 | Rear anti-roll bar       |    |  |

Fig 2 Steering, large suspension items, bell-housing and front wingstays

## SECTION 2 ANNEX A - KIT CONTENTS

### Rear axle

4 The rear axle items are shown in Fig 3. The contents of the polythene bag are detailed in Table 2.



- |   |                               |   |                           |
|---|-------------------------------|---|---------------------------|
| 1 | De Dion ears                  | 4 | Hub/bearing assembly (2)  |
| 2 | Brake calliper (2, LH and RH) | 5 | Polythene bag 'rear axle' |
| 3 | Brake disc (2)                | 6 | Fastener pack 30R011A     |

Fig 3 Rear axle items

**TABLE 2 POLYTHENE BAG CONTENTS - REAR AXLE**

Identifier	Description	Qty
Rear axle	Cable ties	-
	Aluminium brake calliper spacers	4
	Drive shaft washer	2
	3-way brake union	1
	Race washers	2
	Copper washer	1
	Rear wheel speed sensor	1
	Rear wheel speed sensor bracket	1
	Rear brake pads	4

## SECTION 2 ANNEX A - KIT CONTENTS

### Differential

5 The differential is shown in Fig 4.

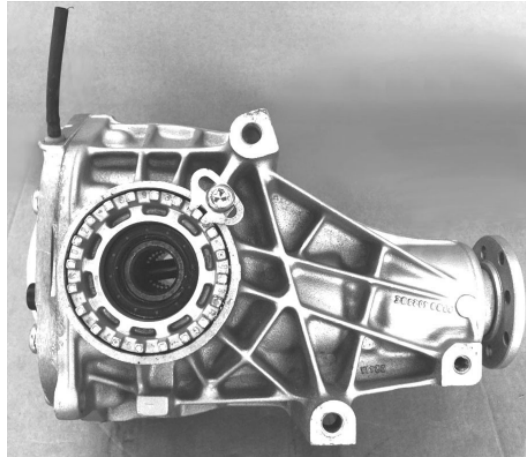
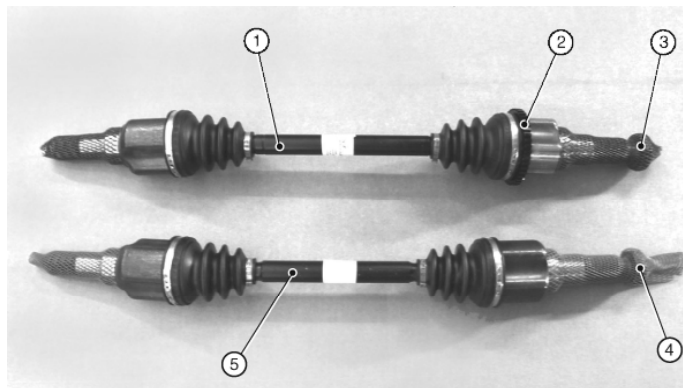


Fig 4 Differential

### Driveshafts

6 The driveshafts are shown in Fig 5.



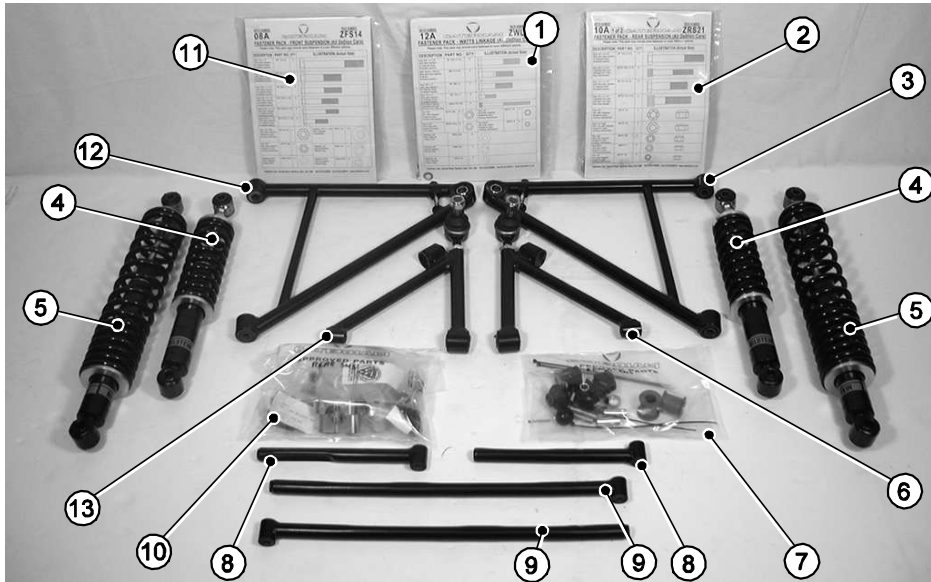
- |   |                          |   |                          |
|---|--------------------------|---|--------------------------|
| 1 | RH driveshaft            | 4 | Nyloc nut (white insert) |
| 2 | Speed sensor ring        | 5 | LH driveshaft assembly   |
| 3 | Nyloc nut (green insert) |   |                          |

Fig 5 Driveshafts

**SECTION 2 ANNEX A - KIT CONTENTS**

**Suspension**

7 The suspension items are shown in Fig 6. The contents of the polythene bags are detailed in Table 3.



- |   |                                  |    |                                 |
|---|----------------------------------|----|---------------------------------|
| 1 | Fastener pack 30R012A            | 8  | Watts link (rear) radius arm    |
| 2 | Fastener pack 30R011A            | 9  | Watts link (front) radius arm   |
| 3 | Lower wishbone (RH)              | 10 | Polythene bag 'rear suspension' |
| 4 | Spring damper unit (front)       | 11 | Fastener pack 30F015A           |
| 5 | Spring damper unit (rear)        | 12 | Lower wishbone (LH)             |
| 6 | Upper wishbone (RH)              | 13 | Upper wishbone (LH)             |
| 7 | Polythene bag 'front suspension' |    |                                 |

Fig 6 Suspension items

**SECTION 2 ANNEX A - KIT CONTENTS**

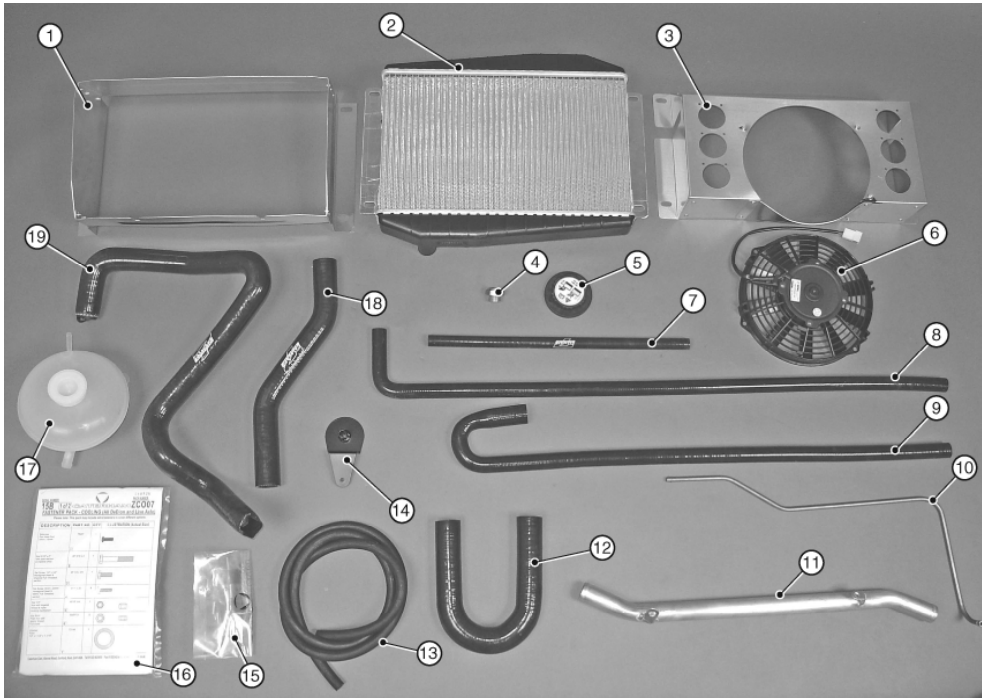
**TABLE 3 POLYTHENE BAG CONTENTS - SUSPENSION**

Identifier	Description	Qty
Front suspension	Rubber cotton reel bushes	2
	Damper sleeves	4
	Anti-roll bar rubber cover	2
	Anti-roll bar ball ends	2
	Cables ties	-
	Anti-roll bars mounting clamps	2
	Wishbone sleeves	2
	Special stepped nyloc nut (widetrack/SV)	2
Rear suspension (including Rear anti-roll bar option)	Rubber cotton reel bushes	2
	Aluminium mounting blocks	2 pairs
	Rear damper spacers	4
	Bellcrank (Watts link)	2
	Bellcrank spacer	2
	Rod end (Watts link)	4
	ARB mounting boss	2
	Anti-roll bar extension	2
	Thrust washer	2

## SECTION 2 ANNEX A - KIT CONTENTS

### Cooling

8 The cooling items are shown in Fig 7.



- |    |                           |    |                          |
|----|---------------------------|----|--------------------------|
| 1  | Outer radiator cowl       | 11 | Water rail               |
| 2  | Radiator                  | 12 | Engine/water rail hose   |
| 3  | Inner radiator cowl       | 13 | Hose                     |
| 4  | Blanking plug             | 14 | Expansion bottle bracket |
| 5  | Expansion bottle cap      | 15 | Polythene bag 'cooling'  |
| 6  | Cooling fan               | 16 | Fastener pack 'cooling'  |
| 7  | Engine breather hose      | 17 | Expansion bottle         |
| 8  | Expansion bottle hose     | 18 | Top radiator hose        |
| 9  | Engine/heater outlet hose | 19 | Bottom radiator hose     |
| 10 | Water bleed pipe          |    |                          |

Fig 7 Cooling items

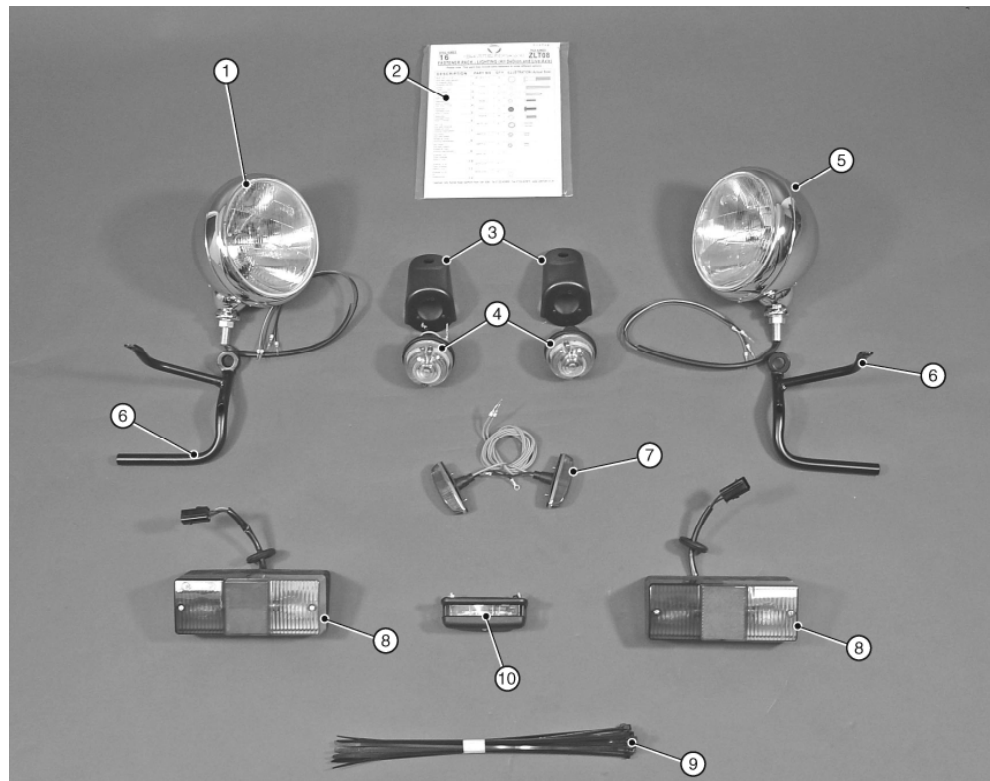
### NOTES

- (1) A thermostatic fan switch may be supplied in lieu of a blanking plug (if supplied, the switch **must not** be connected to the vehicle wiring harness).
- (2) If supplied, the water bleed pipe may be fitted to the engine.
- (3) Items may differ from those illustrated, dependant on kit specification.

## SECTION 2 ANNEX A - KIT CONTENTS

### Lighting

9 The lighting items are shown in Fig 8.



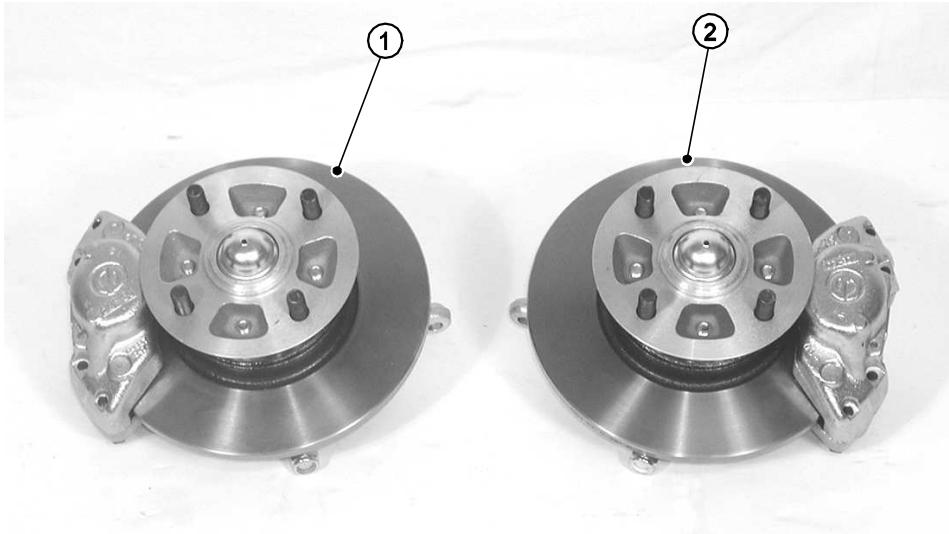
- |   |                       |    |                      |
|---|-----------------------|----|----------------------|
| 1 | Headlight             | 6  | Headlight bracket    |
| 2 | Fastener pack 30L002A | 7  | Indicator (repeater) |
| 3 | Indicator cones       | 8  | Rear light cluster   |
| 4 | Indicator (front)     | 9  | Cable tie            |
| 5 | Headlight             | 10 | Number plate light   |

Fig 8 Lighting items

## SECTION 2 ANNEX A - KIT CONTENTS

### Uprights

10 The uprights are shown in Fig 9.



- 1 Upright assembly (RH)
- 2 Upright assembly (LH)

Fig 9 Uprights



## SECTION 2 ANNEX A - KIT CONTENTS

### Interior trim, cables and options

11 The interior trim, cables and options items are shown in Fig 10, 11, 12, 13 and 14. The contents of the polythene bags are detailed in Table 4.

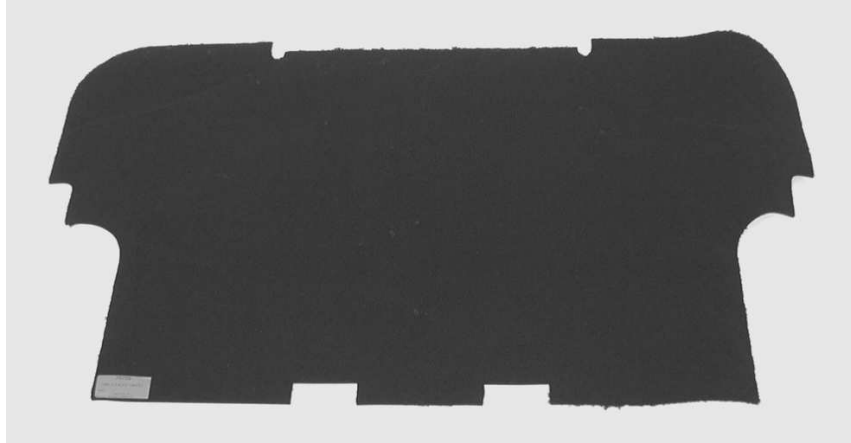


Fig 10 Boot carpet



Fig 11 Bulkhead carpet

**SECTION 2 ANNEX A - KIT CONTENTS**

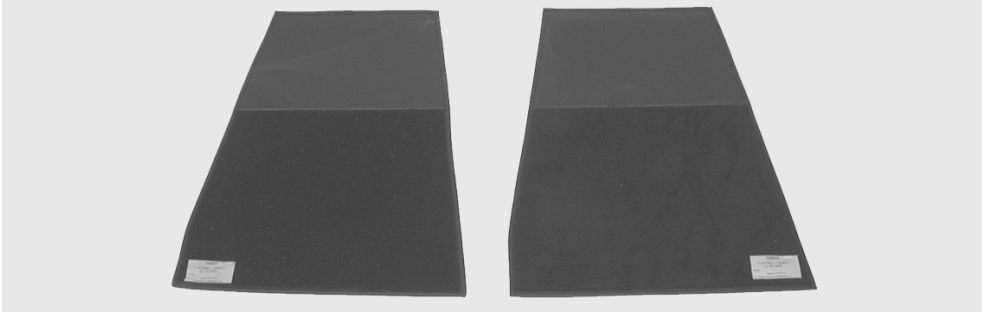


Fig 12 Footwell carpet



Fig 13 Rubber mats



Fig 14 Transmission tunnel top

**SECTION 2 ANNEX A - KIT CONTENTS**

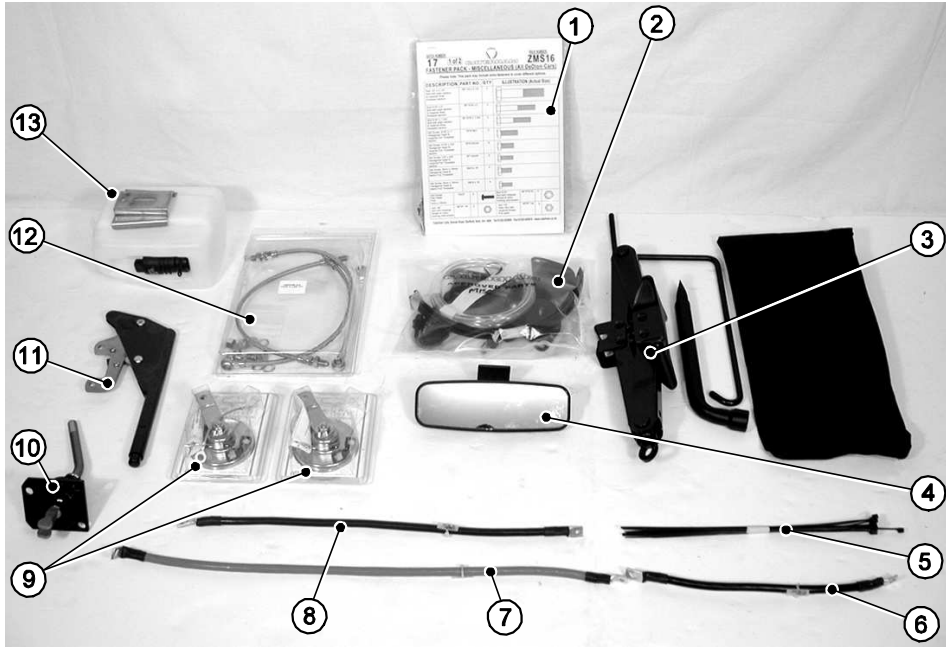
**TABLE 4 POLYTHENE BAG CONTENTS - INTERIOR TRIM, CABLES AND OPTIONS**

Identifier	Description	Qty
SVA	Cable ties	-
	Track rod end sleeves	2
	Track rod end bottom cap	2
	Wing mirror pack	1
	Sticky back foam (roll)	1
	Edge trim (roll)	1
	Large flat bolt head covers	6
	Small domed caps	12
	Long bonnet catch rubbers	2
	Short bonnet catch rubbers	2
	Large domed caps	2
	Medium domed caps	4
Spare wheel	Wheel nuts	2
	Spare wheel bolt	1
	Spacer	1
	Mounting wishbone	1
Oil/air tank	Temperature sender	1
	Filler plug	1
	Lower mounting platform	1
	Upper mounting brackets	2
	Cradle cable tie mount	10
	Foam insert	1
	Hose clips	2
	Cable ties	10
	Dowty seal	1
	Adhesive strip	1

**SECTION 2 ANNEX A - KIT CONTENTS**

**Miscellaneous**

12 The miscellaneous items are shown in Fig 15. The contents of the polythene bag are detailed in Table 5.



- |   |                               |    |                       |
|---|-------------------------------|----|-----------------------|
| 1 | Fastener pack 30P012A         | 8  | Battery negative lead |
| 2 | Polythene bag 'miscellaneous' | 9  | Horns                 |
| 3 | Tool kit including bag        | 10 | Gear lever            |
| 4 | Rear view mirror              | 11 | Handbrake             |
| 5 | Cable tie                     | 12 | Brake hoses           |
| 6 | Earth lead engine/chassis     | 13 | Washer bottle         |
| 7 | Battery positive lead         |    |                       |

Fig 15 Miscellaneous items

**SECTION 2 ANNEX A - KIT CONTENTS**

**TABLE 5 POLYTHENE BAG CONTENTS - MISCELLANEOUS**

Identifier	Description	Qty
Miscellaneous	Propshaft bolts	4
	Handbrake clevis	1
	Tunnel blanking grommet	2
	R-clip	2
	Clevis pin 1/4"	1
	Clevis pin 5/16"	1
	Pulley	1
	Clutch pedal stop	1
	Throttle pedal stop	1
	Brake calliper banjo bolts	2
	Shake proof washers	2
	Nyloc 1/4"	2
	Washers 1/4"	2
	Washer jet	1
	Seat spacers	4

## SECTION 2 ANNEX A - KIT CONTENTS

### Gearbox

13 The standard 5-speed gearbox is shown in Fig 16, the optional 6-speed gearbox is shown in Fig 17.

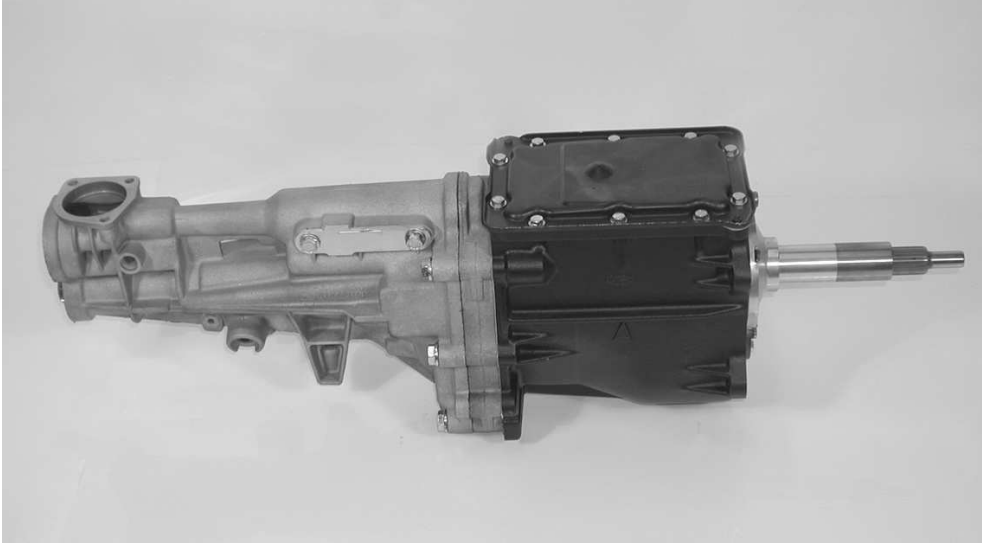


Fig 16 5-speed gearbox

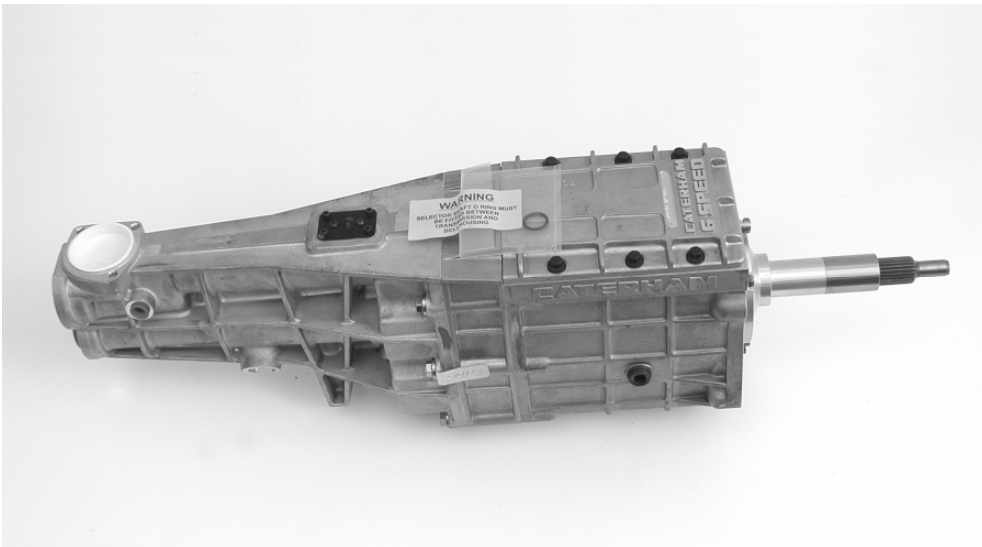
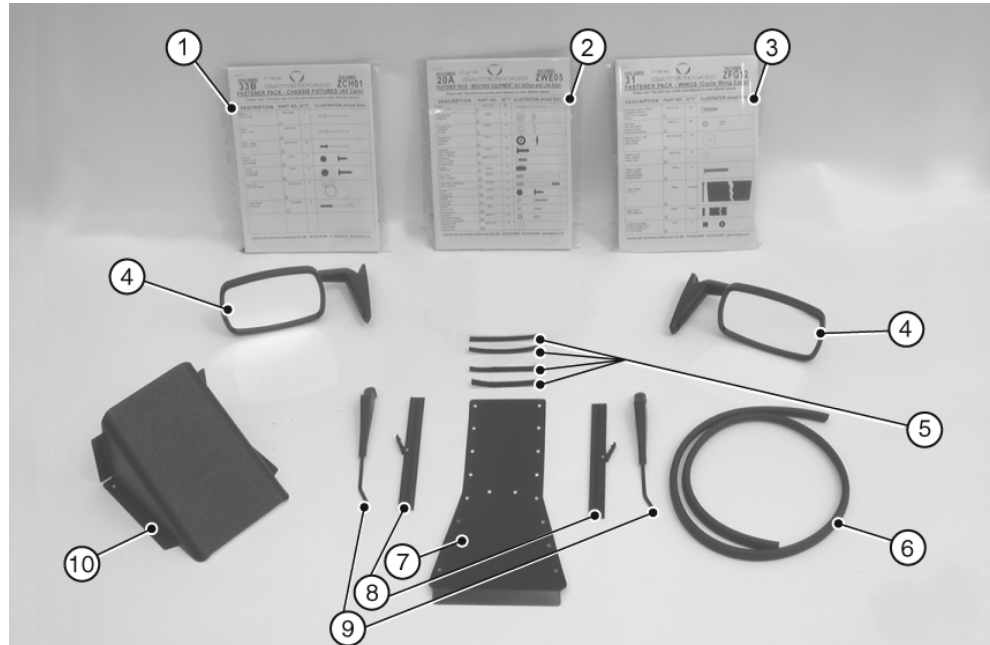


Fig 17 6-speed gearbox (optional)

## SECTION 2 ANNEX A - KIT CONTENTS

### Chassis/body unit

14 The chassis body unit comprises; chassis, body panels, pedals, master cylinder, instruments, switches, wiring loom, windscreen, wipers, fuel tank, fuel pump, fuel lines, ignition module and breather. Additional items placed loose in the chassis are shown in Fig 18.



- |   |                       |    |                           |
|---|-----------------------|----|---------------------------|
| 1 | Fastener pack ZCH     | 6  | SVA trim                  |
| 2 | Fastener pack ZWE     | 7  | Transmission tunnel cover |
| 3 | Fastener pack 30P016A | 8  | Wiper blades              |
| 4 | Side screen mirrors   | 9  | Wiper arms                |
| 5 | Velcro strips         | 10 | Fuel filler cover         |

Fig 18 Items loose in chassis

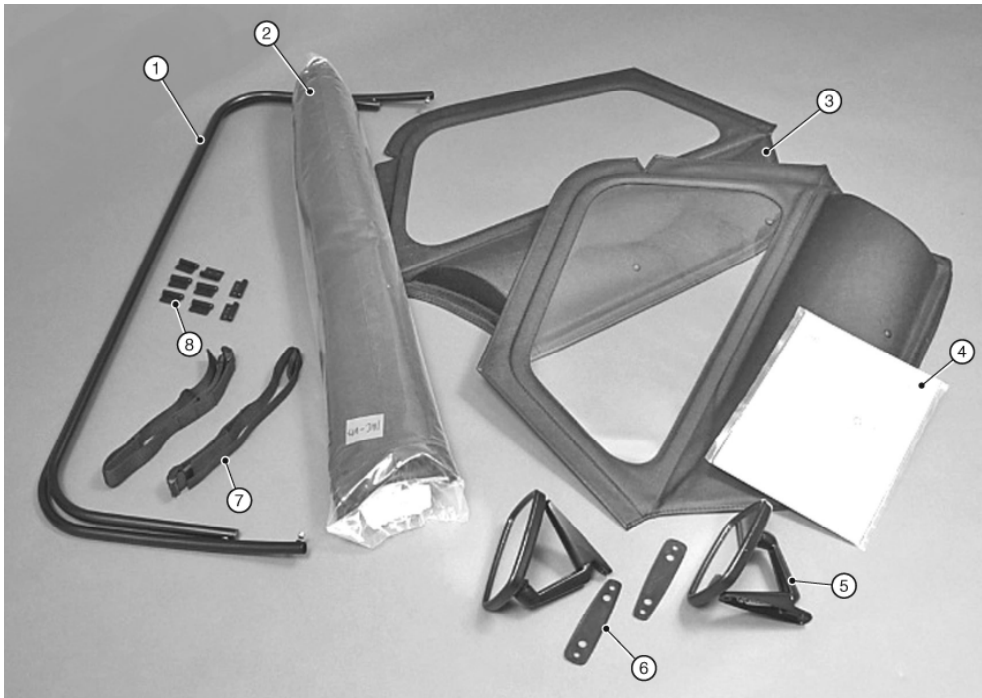
### NOTE

If the optional weather gear has been specified, the side screen mirrors will be supplied in the weather gear pack.

## SECTION 2 ANNEX A - KIT CONTENTS

### Weather gear (optional)

15 The optional weather gear items are shown in Fig 19.



- |   |                         |   |                             |
|---|-------------------------|---|-----------------------------|
| 1 | Hoodsticks              | 5 | Mirrors                     |
| 2 | Hood                    | 6 | Mirror plate (not required) |
| 3 | Side screens            | 7 | Hood straps                 |
| 4 | Fastener pack 'weather' | 8 | Hinges                      |

Fig 19 Weather gear (optional)



## SECTION 2 ANNEX A - KIT CONTENTS

### Engine

16 The engine, Fig 20, is supplied on a frame complete with engine mountings and lifting eyes. The frame must be removed from the engine prior to fitting and returned to Caterham Cars. Once the engine is fitted the lifting eyes must be removed. The engine is supplied complete with wiring loom. The starter motor is not fitted as it is secured to the bell-housing.



Fig 20 1.6 engine 3/4 left

### Heater assembly

17 The heater assembly, Fig 21, is packed into an unmarked cardboard box.



Fig 21 Heater assembly

### Wheels

18 The alloy wheels are supplied with tyres already fitted. It should be noted that the tyres may be handed, that is, have a direction of rotation arrow showing the direction of travel. Wheels must be fitted with the directional arrow in the correct direction.

### Seat

19 The seats are supplied in protective covers. It is recommended that the covers are not removed until the seats are required for fitment.

## **SECTION 2 ANNEX A - KIT CONTENTS**

### **Wings**

20 The front and rear wings are supplied protected with bubble wrap. The two largest wings are for fitment to the rear of the car.

### **Nosecone**

21 The nosecone is supplied in protective bubble wrap. It is recommended that it is left protected until required for fitment.

### **Roll over bar**

22 The roll over bar is protected by bubble wrap and is supplied in its own box.

## SECTION 3 - STEERING

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6	Steering column .....	2
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19	Motolita.....	4
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## SECTION 3 - STEERING

### STEERING RACK (STANDARD AND WIDE TRACK)

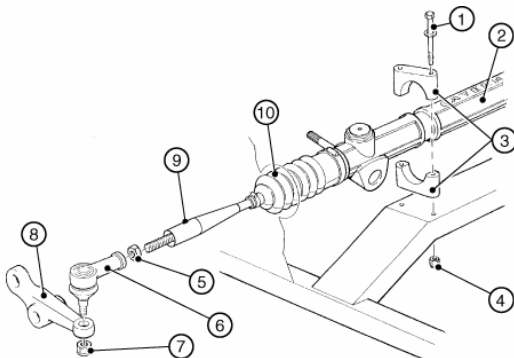
1 The steering rack should be fitted before the front suspension. Before fitting the steering rack it is advisable to protect the outside of the aluminium side panels around the circular cutouts through which the rack protrudes. Masking tape is sufficient for this purpose.

#### WARNING

**Never work underneath a car without supporting it on axle stands or equivalent. Do not rely on a jack alone.**

2 Carefully pass the steering rack through the circular cutouts in the side panels until the machined areas of the rack line up with the holes in the rack platform. Ensure that the rack pinion exits the rack on the driver's side of the vehicle.

3 The steering rack is held in place by two piece aluminium rack clamps (polythene bag marked 'steering'). The rack clamps are matched pairs and clamp the steering rack into position as they are bolted into place, refer to Fig 1.



- |   |                          |    |                           |
|---|--------------------------|----|---------------------------|
| 1 | Securing bolt and washer | 6  | Track rod end             |
| 2 | Steering rack            | 7  | Securing nut              |
| 3 | Rack clamps              | 8  | Steering arm (on upright) |
| 4 | Nyloc nut                | 9  | SVA cover                 |
| 5 | Locknut                  | 10 | Steering rack gaiter      |

Fig 1 Steering rack assembly

4 Clamp the rack loosely into place using bolt (fastener pack 30S003A Item 1), nyloc nuts (8) and washers (10). Ensure a washer is placed between the rack clamp and the bolt head. The rack will be tightened later when the steering column is correctly positioned.

5 Fit the SVA cover (polythene bag marked 'SVA' (refer to Section 15) to the end of the steering rack arm, ensure that the larger diameter is outboard. Screw the locknut (Fig 1 item 5) onto the steering rack arm then fit the track rod end. This should be screwed on 11 full turns (S3) or 13 (SV) to give an approximate track setting. Do not tighten the locknuts.

#### NOTES

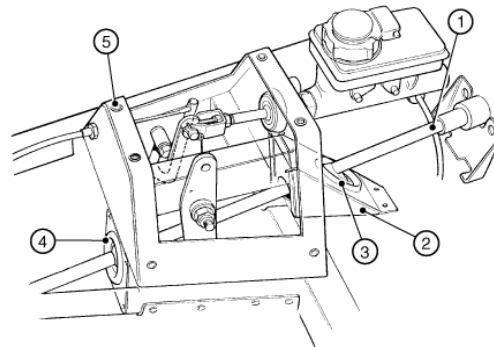
(1) The SVA covers are secured using cable ties. However this should not be done at this stage as final adjustment to the tracking will be required.

(2) Tracking is adjusted during final checks, refer to Section 14.

### STEERING COLUMN

6 The steering column should not be fitted until after the engine and gearbox have been installed.

7 Remove the lid of the pedal box, refer to Fig 2.



- |   |                       |   |                     |
|---|-----------------------|---|---------------------|
| 1 | Lower steering column | 3 | Grommet             |
| 2 | Cheese wedge          | 4 | Grommet sealing box |
|   |                       | 5 | Pedal box           |

Fig 2 Pedal box

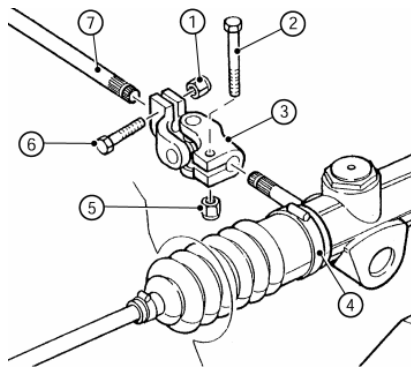
(Clutch master cylinder and brake pipes omitted for clarity)

8 The front of the pedal box is sealed using a grommet inserted into the hole through which the steering column passes, refer to Fig 2. The inside of the rubber grommet should be smeared with rubber lubricant to prevent wear.

### SECTION 3 - STEERING

9 Position the 'cheese wedge' (refer to Fig 2) on the pedal box, aligned with the hole for the steering column (it may be necessary to trim the top edge of the cheese wedge to avoid fouling the clutch master cylinder). Mark the three hole positions using the holes in the cheese wedge as a guide. Drill the holes using 1/8" drill bit (it may be necessary to remove the clutch master cylinder for access). Apply silicone sealant to the seating edges of the cheese wedge and secure the cheese wedge with rivets. Seal the edges with sealant. Fit the grommet to the large hole at the rear of the cheese wedge. Coat the grommet with rubber lubricant.

10 The lower steering column is inserted, splined end first, through the dashboard under the brake master cylinder, through the rubber grommet in the 'cheese wedge', through the pedal box and finally through the rubber grommet in the pedal box sealing plate.



- |                   |                         |
|-------------------|-------------------------|
| 1 Nyloc nut       | 5 Nyloc nut             |
| 2 Bolt            | 6 Bolt                  |
| 3 Universal joint | 7 Lower steering column |
| 4 Steering rack   |                         |

Fig 3 Steering rack to steering column

11 Position the front wheels (or uprights) in an approximate 'straight ahead' position and attach the universal joint (polythene bag marked 'steering') using bolt (3) and nyloc nut (7) noting how the bolt locates into the machined groove in the splined end of the lower steering column.

**NOTE**

*If insertion is difficult the universal joint can be opened up by inserting a flat blade screwdriver into the split and twisting. To ensure linearity of response it is recommended that the yoke of the universal joint is positioned with the cross*

*vertical/horizontal when the steering wheel is in the straight ahead position.*

12 Fit the lower end of the universal joint onto the rack, again clamping with the bolt and nyloc nut and tighten both bolts to 20 Nm. The universal joint should be run as straight as possible, continuing along the same angle as the column, the steering rack can be turned in its blocks to achieve this.

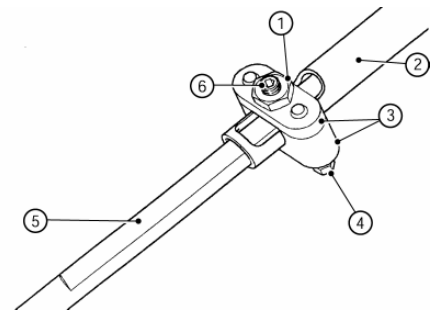
13 The upper steering column can now be fitted.

**NOTE**

*When fitting an optional, quick release, column the upper steering column bush can be fitted prior to inserting the upper steering column into the steering column lock tube, refer to Para 15.*

14 The lower column bush will have been fitted by Caterham, but care must be taken when sliding the upper steering column down through the dashboard. Ensure that the lowest portion of upper steering column is liberally coated with grease and minimum force is exerted. Telescope the upper steering column over the lower steering column.

15 Slide the upper steering bush onto the column and into the dash tube. Note how the raised rubber locators on the bush fit in the holes in the dash tube. To ease fitment lightly coat the upper steering bush with rubber lubricant.



- |                         |                         |
|-------------------------|-------------------------|
| 1 Locknut               | 4 Securing bolts        |
| 2 Upper steering column | 5 Lower steering column |
| 3 Clamp                 | 6 Grub screw            |

Fig 4 Upper steering column clamp

## SECTION 3 - STEERING

16 The two parts of the steering column are clamped together using the locking clamp, refer to Fig 4. Insert the grub screw loosely into the clamp. Secure the two halves of the clamp using two bolts (2), plain washers (10) and spring washers (11). Torque to 14 Nm. Tighten the grub screw with an Allen key to eliminate any free play in the steering. Lock the grub screw into place using locknut (6).

### NOTE

*Before tightening the clamp:*

*Fit the steering wheel boss onto its spline to ensure that the steering wheel boss does not foul the dashboard. Slide the steering column/steering wheel boss away from the dashboard to achieve clearance.*

*Check that the lower steering column does not foul the drive belt tension mechanism on the engine. If necessary rotate the steering rack in its clamps to provide clearance.*

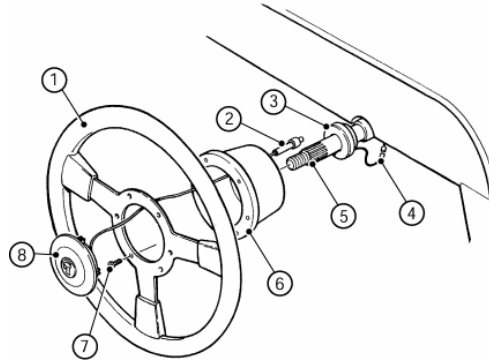
17 Tighten the steering rack clamps to 11 Nm. Ensure that the two bolts securing the steering column lock tube to the scuttle face are tight.

### STEERING WHEEL FITMENT

18 Two makes of steering wheel are available. The Motolita wheel has a central pushbutton which activates the horn whilst the Momo wheel has a horn button mounted on the dashboard. Each steering wheel has a different type of mounting boss. It is recommended that the fitting of the steering wheel is left until the entire interior trim, including seats, has been completed.

#### Motolita

19 Before fitting the steering wheel it will be necessary to fit the horn contact ring, refer to Fig 5, 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, using a soft hide hammer, over the steering column bush. The electrical wire from this ring must be connected to the black/purple wire in the wiring loom adjacent to the steering column.



- |   |                       |   |                 |
|---|-----------------------|---|-----------------|
| 1 | Steering wheel        | 5 | Steering column |
| 2 | Pencil contact        | 6 | Mounting boss   |
| 3 | Horn contact ring     | 7 | Fixing screw    |
| 4 | Purple and black wire | 8 | Horn push       |

Fig 5 Horn pushbutton - Motolita

(SVA pad omitted for clarity)

20 Attach the steering wheel to the mounting boss using the fixing screws and nuts provided taking care not to damage the screw heads or scratch the surface finish on the steering wheel. Slide the pencil contact into the hole in the mounting boss.

21 Release steering lock and centre the road wheels to establish the straight ahead position. Fit the steering wheel over the steering column splines. Fit the washer (9) and secure the steering wheel to the steering column using nyloc nut (4) and tighten.

22 Feed the electrical connection from the pencil contact through the SVA pad and connect to the spring loaded steering wheel horn push. Push the SVA pad into the mounting boss and then insert the horn push into the steering wheel.

#### Momo

23 Loosely fit the mounting boss to the steering wheel using the 6 mm x 16 mm countersunk Allen bolts. Centre the road wheels to establish the straight ahead position of the steering wheel. Place the steering wheel and boss over the splines in the straight ahead position. Remove the wheel and secure the boss to the column using nyloc nut (4) and washer (9). Finally re-secure the wheel to the boss using the fixing provided.

## SECTION 3 - STEERING

### Quick release column

24 The Quick Release (QR) column has a keyway in the QR boss and the steering wheel must be centred by removing the upper bolt on the lower steering column universal joint, withdrawing the column and then turning the steering wheel and column to the straight ahead position. Re-engage the column to the universal joint, re-insert the bolt and tighten the securing nyloc nut to 20 Nm.

25 Ensure that the steering wheel can be rotated smoothly with no tight spots. Tighten the steering rack clamp bolts and steering column universal joint bolts/nylocs to the torque figures specified in Table 1.

**TABLE 1 STEERING COMPONENT TORQUE FIGURES**

Location	Washers	Nut Torque
Steering rack clamps	Plain under bolt head	Nyloc 11 Nm
Universal joint	None	Nyloc 20 Nm
Column clamp	Spring and plain under bolt head	Bolt 14 Nm

### ASSOCIATED TASKS

26 Whilst the pedal box lid is removed fit the brake light switch harness and the throttle cable, refer to Section 6.

*NOTE*

*Before refitting the pedal box lid, check that the pedal positions are acceptable and that the brake switch operates correctly. Adjust as necessary.*

27 Refit the pedal box lid ensuring that the brake pipes are not trapped or kinked and that the 'P' clips are secured under the pedal box lid screws.

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## SECTION 4 - FRONT SUSPENSION

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## SECTION 4 - FRONT SUSPENSION

### PREPARATION

1 It is recommended that the front wings are not fitted until the front suspension is assembled and the engine installed. This reduces the risk of damage to the wings and maintains easy access to the engine bay.

2 It is recommended that the steering rack is fitted before assembling the front suspension, refer to Section 3.

3 When assembling the front suspension, there is a risk that the aluminium body skin can be damaged, especially when fitting the top mounting bolts and the spring damper units. It is therefore advisable, particularly with painted cars, to protect the bodywork with 2 or 3 layers of masking tape in key areas. It is recommended that the bodywork under the front bonnet catches is protected using card and masking tape, refer to Fig 1.

4 Apply a thin coat of copper grease to all fixings prior to fitment (avoid contaminating any threads where Loctite is to be used).



Fig 1 Bodywork protection

### LOWER WISHBONES

#### WARNING

**Never work underneath a car without supporting it on axle stands or equivalent. Do not rely on a jack alone.**

5 The lower wishbones are assembled with the longer leg forward and the bearing retaining circlip facing downward.

### NOTE

*Ensure that the circlip is correctly located in the retaining groove prior to assembling the lower wishbone.*

6 Fit the rear leg of the lower wishbone through the slot in the bottom skin immediately behind the vertical chassis member. Secure using bolt (Fastener pack 30F015A Item 1) and nut (7) and inserting two plain washers (9) either side of the wishbone refer to Fig 2.

### NOTE

*On wide track front suspension, plain washer usage is shown in text boxes below the fig.*

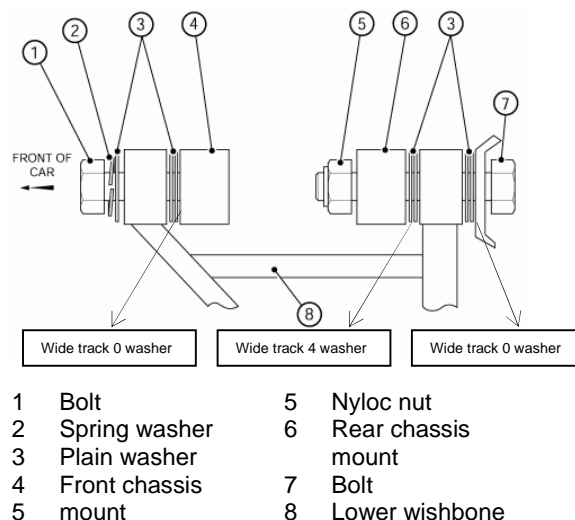


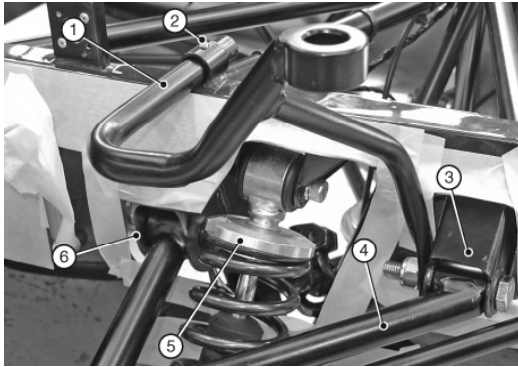
Fig 2 Washer usage - lower wishbone (LH side)

7 The front leg of the lower wishbone is secured to the front of the chassis using bolt (2), with washer (9) and spring washer (12) next to the bolt head. Two washers (9) are inserted between the wishbone and the chassis, refer to Fig 2.

### UPPER WISHBONES

8 The upper wishbones are handed and are assembled with the longer leg facing the front of the car. Prior to locating the upper wishbone a spacer bush 10 mm id x 1/2" od x 35 mm (polythene bag marked 'front suspension'), must be inserted into the rear bush. The rear leg of the upper wishbone, refer to Fig 3, is secured to the rear mount using bolts (3) inserted from the front of the mounting. The spacer bush must be coated with copper slip. The bolt is secured with a nut (8). Do not tighten fixings.

## SECTION 4 - FRONT SUSPENSION



- 1 Headlight bracket
- 2 Headlight bracket mounting
- 3 Upper wishbone front mount
- 4 Upper wishbone
- 5 Spring damper unit
- 6 Upper wishbone rear mount

Fig 3 Upper wishbone securing

9 The front leg of the upper wishbone is secured to the front mount using bolt (4). Prior to inserting the bolt the headlight bracket rear arm must be inserted into the chassis mount (do not tighten the grub screws at this stage). The front arm is secured at the rear of the upper wishbone front mounting by nut (8).

10 Since access to the upper and lower wishbone mountings is restricted by other components installed later in the build process the mounting fasteners must be fully tightened at this point. Hold the wishbone horizontal and tighten the upper and lower wishbone mounting bolts/nuts to 34 Nm.

### SPRING DAMPER UNITS

11 An aluminium spacer bush 8 mm id x 1/2" od x 32 mm (polythene bag marked 'front suspension') must be coated in copper slip and inserted into the top mounting bush of the front spring damper unit. The spring damper is secured to the top mounting by the M8 cap head bolt supplied in the chassis with a spring washer (13) under the bolt head. This bolt should be torqued to 20 Nm.

### NOTES

(1) It is necessary to gently press the body panel inwards to allow sufficient clearance for the bolt to be located.

(2) To prevent damage to the paintwork it is recommended that the plain washer and spring washer are placed closest to the spring damper mounting during bolt location.

12 An aluminium spacer 8 mm id x 1/2" od x 32 mm must be coated in copper slip and inserted into the lower mounting bush of the spring damper unit. The spring damper unit is secured using an M8 caphead bolt (supplied in wishbone) which passes through the rear leg of the lower wishbone through the aluminium spacer bush and into a captive thread on the front leg. This bolt should be torqued to 20 Nm.

### NOTE

Do not tighten any other fixings at this stage.

### UPRIGHT ATTACHMENT

### WARNING

**Correct use of fixtures is required to ensure full engagement of the nyloc nut.**

13 Remove and retain the upper wishbone ball-joint nyloc nut and the nyloc nut from the bottom of the upright assembly. The upright assembly must be mounted with the steering arm facing forward. Mount the upright assembly as follows:

### NOTE

The upright assemblies are marked RHS or LHS on the inside of the assembly.

- **Standard.** The upright is located into the spherical joint on the lower wishbone and secured using the retained 1/2" nyloc nut. Tighten the nyloc nut to 55 Nm.

### WARNING

**Correct use of fixings is required in order to ensure full engagement of the nyloc nut.**

- **Wide track.** The upright is located into the spherical joint on the lower wishbone. Prior to locating the upright, a spacer (5/8" mm id x 3/4" od x 8 mm) located in the polythene bag marked 'front suspension') must be inserted onto the bottom of the upright. The upright is secured using the special turned down nyloc nut supplied. Tighten the special nyloc nut to 55 Nm.

## SECTION 4 - FRONT SUSPENSION

14 The cycle wingstay locates on the upright. Remove and discard the 1/2" UNF nyloc nut and plain washer fitted to the inner end of the stub axle. Place cycle wingstay over the stub axle and secure using the 1/2" UNF nyloc provided. Do not tighten.

**NOTE**

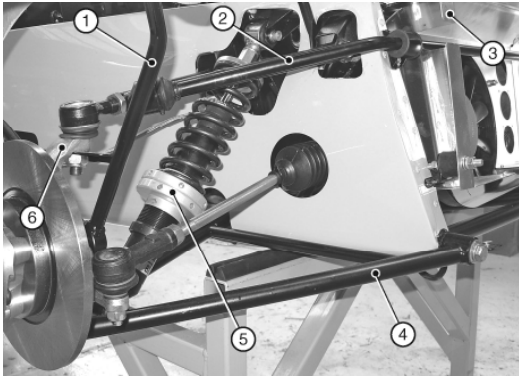
*If uprated front brake callipers have been specified ensure that the brake pads are installed before fitting the cycle wingstays.*

15 Pass the top wishbone ball-joint down through the top of the upright and through the wingstay. To fully engage the tapers of the wishbone and ball-joint, fit the M14 plain nut (6) from the fastener pack, apply pressure to the top of the ball-joint and tighten the plain nut. Once the ball-joint is locked in place remove the plain nut and replace it with the nyloc supplied on the ball-joint. Tighten the nyloc nut to 55 Nm.

16 Tighten the inner stub axle nut to 82 Nm and ensure that the upright turns freely on the wishbones.

17 Remove and retain the nyloc nut from the track rod end. Remove and discard the hard plastic boot protector from the track rod end taper and pass the tapered shaft down through the steering arm on the upright, secure with the nyloc nut. Tighten nyloc nut to 34 Nm.

18 Your front suspension should now resemble that shown in Fig 4.



- |                       |                      |
|-----------------------|----------------------|
| 1 Cycle wingstay      | 4 Lower wishbone     |
| 2 Anti-roll bar       | 5 Spring damper unit |
| 3 Inner radiator cowl | 6 Upright assembly   |

Fig 4 Front suspension

## FRONT ANTI-ROLL BAR

**NOTES**

(1) On R400 the inner radiator cowl is located inboard of the anti-roll bar and must be fitted first, refer to section 6. (Sigma 125/150 does not have radiator cowling please ignore the cowling shown in the picture 4 in this section and fig 26 in section 6)

(2) Check that the colour of the bushes corresponds to the colour marked on the front anti-roll bar.

19 The anti-roll bar is attached to the front of the chassis using the special mounting brackets and cotton reel shaped bushes (supplied in the polythene bag marked 'front suspension'). Liberally coat the bushes with rubber lubricant and fit the bushes into the brackets. Slide the brackets over the ends of the anti-roll bar and around so they will align with the holes drilled in the front face of the chassis tube.

20 The rubber boots should be slid over the anti-roll bar, ensuring that the larger diameter of the rubber boot is outboard. Apply Loctite to the threads at each end of the anti-roll bar and fit the plastic balls, tighten using protected grips.

21 Liberally coat the balls with bearing grease. Assemble the anti-roll bar onto the chassis by pushing the plastic balls, one at a time, into the mounting cups in the upper wishbones. Fit the spring washers (13) to the bolts (5) and pass forward through the vertical chassis tubes and into the captive nuts on the mounting brackets. Tighten to 20 Nm.

22 The rubber boots are slid over the mounting cups and secured to the top wishbone using cable ties which fit into the grooves provided. A further cable tie is used to hold the boot onto the anti-roll bar itself with the tails of the cable tie being cut off underneath for neatness.

## SECTION 4 - FRONT SUSPENSION

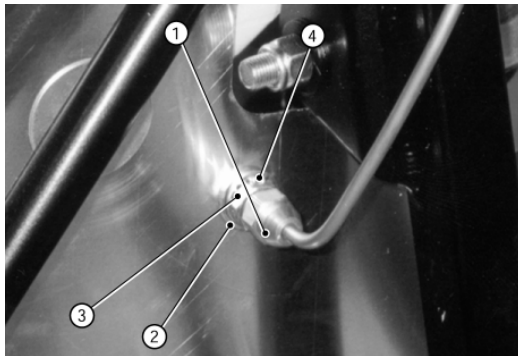
### FRONT BRAKE HOSES

#### NOTE

*All connections should initially be made finger tight.*

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

24 Attach the inner, threaded end of each brake hose through the hole in the aluminium body. Plain washers (fastener pack 30F015A item 11) should be fitted directly next to the aluminium body on both the inside and outside of the body panel. Secure using the 3/8" nut and shakeproof washer (14). The shakeproof washer must be between the nut and the plain washer. Do not tighten.

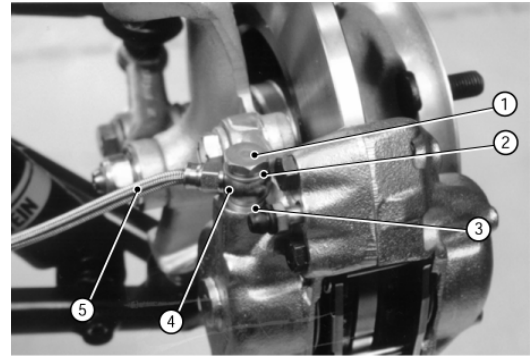


- |                             |                     |
|-----------------------------|---------------------|
| 1 Female union (brake pipe) | 3 Shakeproof washer |
| 2 Plain washer              | 4 Locknut           |

Fig 5 Brake pipe union

25 The outer end should be attached to the brake calliper as follows:

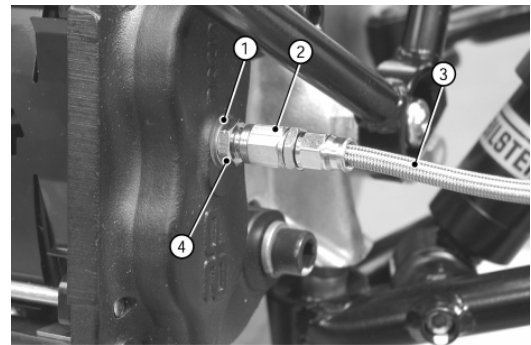
- **Standard calliper.** The outer end is attached to the brake calliper using the banjo bolt provided. The large copper washer is placed next to the bolt head and smaller copper washer placed between the banjo union and the calliper, refer to Fig 6. Do not over tighten. Torque to 10 Nm.



- |                       |                      |
|-----------------------|----------------------|
| 1 Banjo bolt          | 4 Banjo union        |
| 2 Large copper washer | 5 Braided brake hose |
| 3 Small copper washer |                      |

Fig 6 Standard calliper

- **Up-rated calliper.** On the up-rated brake calliper the braided brake hose has a female union at the calliper end, refer to Fig 7. The braided hoses are supplied with an adaptor that screws into a threaded drilling inboard of the calliper body. The adaptor must be fitted with the tapered end outward, this provides the seal between the adaptor and the braided brake hose female union, and a copper washer between the adaptor and the brake calliper. The female union on the braided hose screws directly to the adaptor. Do not over tighten. Torque to 10 Nm.



- |                 |                      |
|-----------------|----------------------|
| 1 Copper washer | 3 Braided brake hose |
| 2 Female union  | 4 Adaptor            |

Fig 7 Up-rated calliper

## SECTION 4 - FRONT SUSPENSION

26 Located on the inside of the body are the female unions, refer to Fig 5, on the end of the brake pipes from the brake master cylinder. Fix the female union to the braided brake hose connection and tighten to 10 Nm. Tighten the locknut to 10 Nm.

27 Turn the steering from lock to lock and ensure that the braided brake hoses do not foul on the suspension. If fouling is observed remove the braided brake hose from the calliper and twist the hose through 180°. Refit the braided brake hose to the calliper and tighten unions to 10 Nm.

### FINAL TIGHTENING

28 Tighten the fixings detailed in Table 1 now.

**TABLE 1 TORQUE FIGURES**

Location	Washer	Torque
Stub axle		81 Nm
Damper to lower wishbone (lower fixing)		20 Nm
Damper to chassis (top fixing)		20 Nm
Front anti-roll bar fixing		20 Nm
Upright top ball-joint	None	54 Nm
Upright - bottom	Spacer - wide track only	54 Nm

29 The remaining front suspension fixings should not be tightened until the suspension is loaded. This is achieved when the engine is in place and the car wheels are on the ground. This ensures that the rubber bushes are correctly preloaded. All bolts should then be tightened according to Table 2.

**TABLE 2 TORQUE FIGURES**

Location	Washer	Torque
Lower wishbone front	Spring under head then plain as shown in Fig 2	81 Nm
Lower wishbone rear	Plain spacers as shown in Fig 2	81 Nm

### CARS FITTED WITH ADJUSTABLE DAMPER PLATFORM

30 Cars fitted with adjustable damper platforms need to be adjusted to achieve the optimum ride height. This is done by lowering or raising the height of the platforms on the threaded sleeve. It is essential that this task is carried out on level ground.

#### NOTE

*Lowering the platforms will decrease ride height, and raising the platforms will increase ride height. For the best results the ride height should be set with the driver in the car and fuel in the tank.*

30.1 Start by adjusting the front dampers to achieve a minimum distance of 150 mm (this can be increased for road use to a maximum of 190 mm) between the ground and the bottom of the lower chassis rail, where the rear leg of the front lower wishbone exits the side of the car. This measurement should be the same on both sides with the car loaded.

30.2 Now adjust the rear dampers in the same manner to achieve a height 15 mm higher than the front, measured to the underside of the lower chassis rail immediately in front of the 'A' frame mounting point.

#### NOTE

*Adjusting the rear may have an effect on the front therefore it is good practice to check between front and rear several times during adjustment.*

30.3 Once the desired ride heights have been set ensure that the platforms are locked together to avoid movement.

## SECTION 5 - FITMENT OF GEARBOX TO ENGINE

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## SECTION 5 - FITMENT OF GEARBOX TO ENGINE

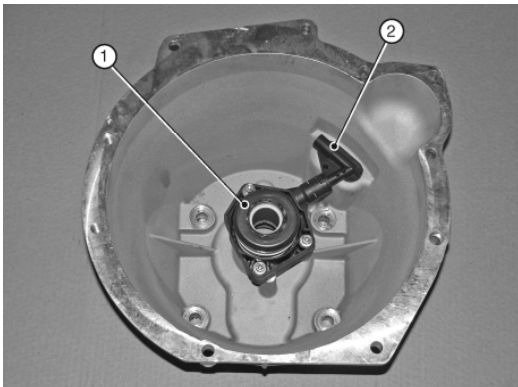
### ASSEMBLY OF GEARBOX KIT - 5 AND 6-SPEED

1 Both the 5 and 6-speed gearboxes are interchangeable and utilise all the same ancillaries. Assembly is identical for both 5 and 6-speed gearboxes with the exception of the sealing method for bell-housing to gearbox.

2 To assemble the gearbox to bell-housing, proceed as follows:

- **5-Speed.** Smear the gasket (polythene bag 'miscellaneous') on both sides with silicone sealant and position on the bell-housing. Using the four cap-head bolts (fastener pack 36G006A Item 9) and spring washers (12), bolt the bell-housing to the gearbox. Tighten the bolts to 47 Nm.
- **6-Speed.** Apply a thin layer of silicone sealant to the front face of the gearbox and to the 'O' ring around the selector rod. Ensure sealant is applied to all of the 'O' ring. Using the four cap-head bolts (fastener pack 36G006A Item 9) and spring washers (12), bolt the bell-housing to the gearbox. Tighten the bolts to 47 Nm.

3 Place the clutch release mechanism in position in the bell-housing and secure using the three cap-head bolts (7) and spring washers (13), refer to Fig 1.



- 1 Clutch release bearing
- 2 Hydraulic connection

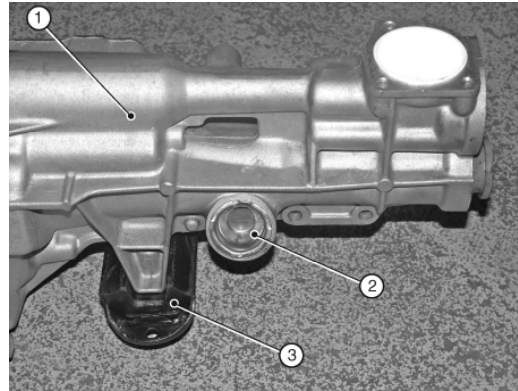
Fig 1 Clutch actuation mechanism

4 Apply RTV silicone gasket sealant to the speedo drive opening on the LH side of the gearbox and insert the large plug supplied, refer to Fig 2.

5 Apply RTV silicone gasket sealant to the speedo output shaft opening on the RH side of the gearbox and insert the small plug supplied, refer to Fig 3.

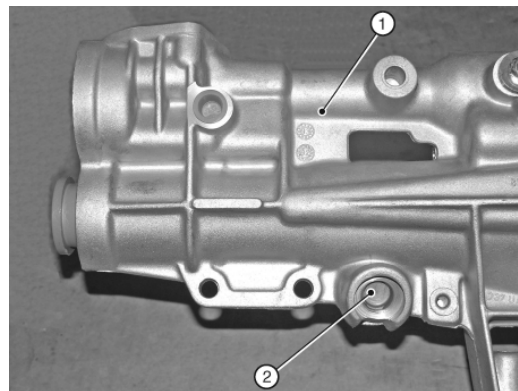
**NOTE**

*The plugs are a drive fit and are installed closed end first.*



- 1 Gearbox
- 2 Plug
- 3 Gearbox mounting

Fig 2 Speedo drive plug



- 1 Gearbox
- 2 Plug

Fig 3 Speedo shaft plug

6 Bolt the metal/rubber/metal gearbox mounting, chamfered edge rearward, refer to Fig 2, to the underside of the tailshaft housing using one bolt (8) and spring washer (12). Tighten to 61 Nm.



## SECTION 5 - FITMENT OF GEARBOX TO ENGINE

### FITTING GEARBOX TO ENGINE

7 Slide the gearbox into place on the rear of the engine. It may be necessary to rotate the gearbox assembly in order to line up the gearbox first motion shaft splines with the splines of the clutch plate.

8 Using the fixings supplied, connect the engine and gearbox; two bolts (2) and spring washers (10), pass forward from the top of the bell-housing into the cylinder block, two more bolts (2) and spring washers, pass forward from the bottom of the bell-housing into the sump. Two bolts (1) and spring washers pass rearward through the 'ears' on the engine assembly and into the bell-housing on the RH side, one further bolt (1) and spring washer passes rearward from the LH side of the engine into the bell-housing.

### STARTER MOTOR

9 Install the starter motor into the front of the bell-housing and secure with two bolts (3) and spring washers (10) and one bolt (1) and spring washer. The short bolt fits in the outermost hole of the top two.

10 Tighten all starter motor and bell-housing the bolts to the torques specified in Table 1.

**TABLE 1 TORQUE FIGURES**

Fixing	Torque
Bell-housing to gearbox	47 Nm
Gearbox rubber mounting to tailshaft housing	61 Nm
Engine to bell-housing	47 Nm
Bell-housing to sump	20 Nm
Starter motor	34 Nm

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## SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)

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## SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)

### PREPARATION

1 The special tools detailed in Table 1 will be required.

**TABLE 1 SPECIAL TOOLS REQUIRED**

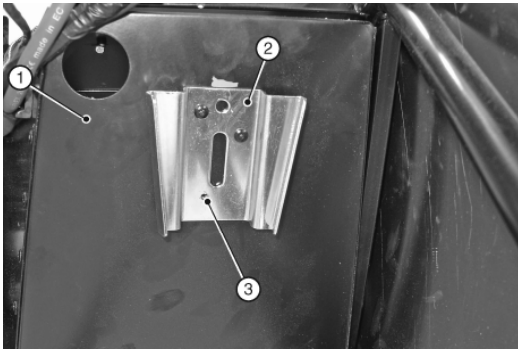
Item	Description
Engine hoist and sling	SWL of 150 Kg (min)

### Screen wash/wipe

*NOTE*

*The bracket for the washer bottle must be fixed to the front of the passenger side foot box before the engine is installed.*

2 Offer up the bracket with the washer bottle attached and mark the position of the two fixing holes. Remove the bracket and bottle and drill the marked positions using a 3/16" drill. Secure the bracket with rivets. Drill a third hole through the bracket and foot box, refer to Fig 1. Secure the third hole with a rivet and fit the washer bottle.



- 1 Footbox
- 2 Washer bottle bracket
- 3 Third hole

Fig 1 Washer bottle bracket

3 Remove the securing nut from the base of the washer jet (polythene bag marked 'miscellaneous') and pass the washer jet through the hole in the centre of the scuttle and secure with the plastic securing nut. Fit the clear plastic tubing to the washer jet. Dip the end of the clear plastic tubing in hot water to soften in order to make fitting easier.

4 Route the clear washer tubing along the wiring loom behind the dashboard and attach using cable ties, to prevent it falling down into view. Pass it down through the large grommet in the top of the transmission tunnel and along the engine bay diagonal tube until in line with the washer bottle. Trim the tube to length and attach to the washer motor.

5 Connect the washer motor to the wiring loom via the two pin plug adjacent to the washer bottle mounting. To ease fitment of the two pin plug the washer motor can be removed from the washer bottle, the two pin plug fitted and the washer motor reinserted into the washer bottle.

6 The windscreen wipers must not be fitted until the wiper motor has been run and allowed to park in order to prevent damage to the paintwork. Fit the wiper arms so that they are horizontal when parked. The wiper arms must move smoothly through their range of travel.

*NOTE*

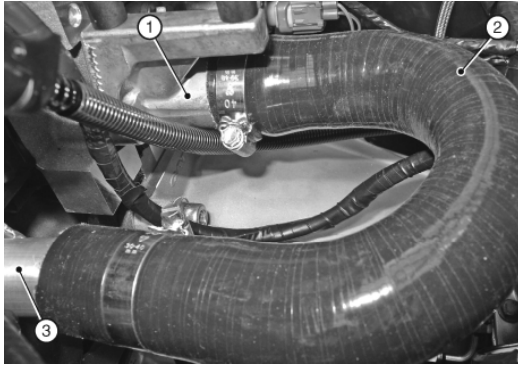
*A small amount of water splashed on the windscreen will prevent the wiper blades from juddering during test and adjustment.*

### Engine preparation

7 The large diameter pre-formed 'U' hose should be fitted onto the aluminium water outlet located on the rear of the cylinder head, refer to Fig 2. Apply rubber lubricant to the short end of the hose (hose may require trimming) and push over the outlet; rotate the hose until the long end sits along the LH side of the engine within the curve of the inlet manifold. Secure using a hose clip (Polythene bag 'cooling').

8 Apply rubber lubricant to the end of the water rail; pass the rail from the front of the engine, over the alternator, and through the curve of the inlet manifold. Insert the pipe into the long end of the 'U' hose and secure using a hose clip (Trim the 'U' hose as necessary). Align the rail mountings with the lugs on the inlet manifold and secure using screws, nuts and washers provided.

## SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)



- 1 Engine connection
- 2 'U' hose
- 3 Water rail

Fig 2 Water rail and 'U' hose

9 Remove and retain the gearbox filler plug. Remove the plastic plug from the gearbox tailshaft housing. Removal of these plugs is not essential; however access is restricted within the confines of the transmission tunnel.

### Chassis preparation

10 Protect the appearance of the engine bay chassis tubes and pedal box sides and edges by covering with card and/or masking tape.

11 Ensure that all wires and connector plugs are secured and will not snag or catch the engine/gearbox as it is lowered.

### NOTE

*Before fitting engine mounting rubber blocks (polythene bag marked 'miscellaneous') ensure that the large threaded (1/2" UNF) boss in the centre is clear of rubber and that the bolt will thread in cleanly.*

12 Fit the engine mounting rubber block to the RH side of the engine bay. The two bolts (fastener pack 30P012A Item 3), plain washer (12) are passed downwards through the mounting, through the chassis and are secured with nyloc nuts (9) and plain washers (12). Do not tighten.

13 Fit the engine mounting rubber block to the LH side of the engine bay, locate the engine earth lead (a black lead approximately 300 mm long), pass bolt (2) and washer (12) downwards through the lead, through the front hole of the engine mounting block, through the chassis and secure with nyloc nut (9) and plain washer (12). Remove a little paint from the chassis/mounting to ensure that a good electrical contact is made. Pass bolt (3), plain washer (12) downwards through the rear hole of the engine mounting block, through the chassis and secure with nyloc (9) and plain washer (12). Do not tighten.

14 Locate the twin electric horns on the two studs near the rear edge of the steering rack platform. Before fitting the horns, loosen the 13 mm nut in the centre of each horn, this will allow rotation of the horns so that the electrical connections are closer together.

15 Secure the horns with the nyloc nuts provided and ensure that it is not possible for the horns to come into contact with each other, the steering rack or other components in the engine bay refer to Fig 3.



Fig 3 Horn location

16 Tighten the 13 mm nut in the centre of each horn and connect the horns to the electrical harness by the purple and yellow wires and connectors located above the horns on the front upper cross member.

## SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)

### INSTALLATION OF ENGINE/GEARBOX INTO CHASSIS

*NOTE*

*If the optional oil/air separator tank is to be installed then the mountings for the separator tank must be fitted before the engine is installed and the horns must be relocated to an alternate position beneath the coolant expansion bottle (refer to Section 16).*

**WARNINGS**

**(1) Never work underneath a car without supporting it on axle stands or equivalent. Do not rely on a jack alone.**

**(2) Use appropriate eye protection whilst working under the car.**

17 Using the lifting hoist and sling detailed in Table 1, attach the engine/gearbox using the lifting eyes provided on the engine, lower the engine/gearbox assembly into the engine bay at an angle of between 30-40° (with the engine higher than the gearbox). Insert the gearbox assembly into the transmission tunnel.

18 Continue to slide the engine/gearbox rearward until the holes in the gearbox mounting line up with the holes in the chassis cross member. If the differential and propshaft have already been fitted, ensure that the propshaft locates into the gearbox tailshaft housing.

19 Attach the LH engine mounting using the two M8 x 20 mm bolts (fastener pack 36G006A Item 4) and one M8 x 30 mm bolt (5), do not fully tighten the bolts.

20 Attach the RH engine mounting using the two M8 x 35 mm bolts (6) and one M10 x 40 mm bolt (2). Do not finally tighten the engine mounting retaining bolts until advised later in this section.

21 Lower the engine onto the rubber engine mountings and pass the bolts (fastener pack 30P012A Item 1 (LHS) and 21 (RHS)) down through the tube on the outer end of the engine mounting brackets. Screw the bolts loosely into the threaded bush in the centre of the rubber engine mounting. It is recommended that the engine is not removed from the hoist until all the bolts have been tightened (detailed later in this section).

22 Adjust the gearbox on its slotted mountings to achieve equal clearance within the transmission tunnel. This must be checked carefully as clearances are tight and poor alignment can cause the gearbox to contact the chassis under cornering.

23 Bolt the gearbox mounting rubber to the chassis using bolts (fastener pack 30P012A Item 4) passed down through the outer metal part of the rubber mounting and then through the elongated holes in the chassis. Secure with a plain washer (12) and nyloc nut (9) on each bolt and tighten to 20 Nm.

24 Finally tighten the fixings detailed in Table 2.

**TABLE 2 TORQUE FIGURES**

Fixing	Torque
Engine mounting to block	34 Nm
Engine mounting to mounting rubbers	41 Nm
Engine mounting rubbers to chassis	20 Nm
Gearbox mounting rubber to chassis	20 Nm

*NOTES*

(1) *It is now safe to remove the engine hoist.*

(2) *Wiring – Every effort is made to clearly explain and identify all the electrical connections as you go through this section; however the loom fitted to your car may have additional wires and connectors that are not required on your vehicle. To help clarify this, a wiring diagram can be found in section 17.*

25 Fit the gear lever to the top of gearbox tailshaft housing and secure with three setscrews (7). No washers are required; tighten to a torque of 20 Nm.

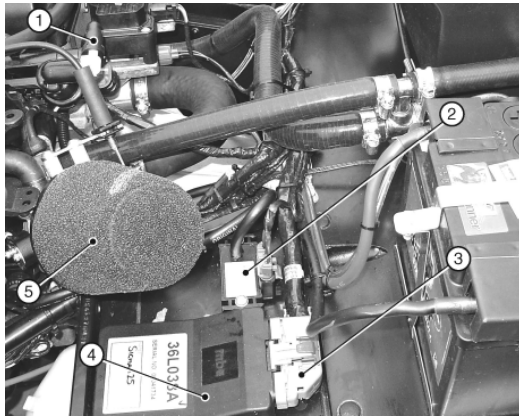
26 Fit the reverse light switch (polythene bag) into the side of the gearbox. This can be accessed via the hole in the RH side of the transmission tunnel. The switch should be inserted finger tight and then tightened a further quarter of a turn using a suitable sized spanner. Connect the wiring loom to the reverse light switch. From the cockpit, insert the large grommet (polythene bag) to cover the access hole in the transmission tunnel.

## SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)

### ELECTRICAL CONNECTIONS

27 The engine wiring loom is already attached to the engine and some ancillaries, however it is necessary to link the engine wiring loom to the remaining ancillaries and the vehicle wiring loom. All the plastic connecting plugs are matched pairs so it is not possible to connect them incorrectly.

28 Attach the grey, multi-pin plug to the respective socket on the Engine Control Unit (ECU), which is located on the passenger side heater tray, forward of the battery. Make the connection and ensure that the red retaining clip is pushed fully home, refer to Fig 4.



- |                        |                  |
|------------------------|------------------|
| 1 Fuel pipe connection | 3 Multi-pin plug |
| 2 MAP unit             | 4 ECU            |
|                        | 5 Air filter     |

Fig 4 ECU and MAP unit

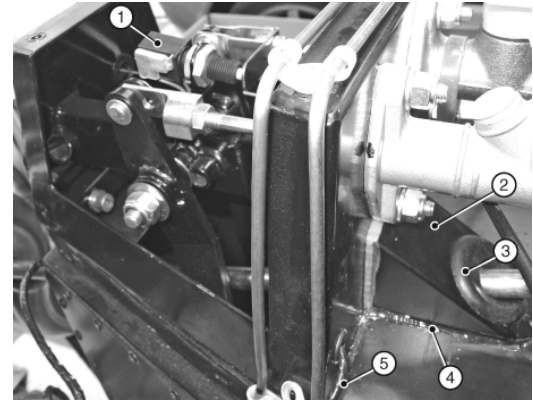
29 Position the MAP unit adjacent to the ECU and secure using two screws provided (fastener pack ZCH01 items 12 and 13).

30 Connect the green 3-pin plug on the engine loom to the connection on the MAP unit. Connect the short pipe on the MAP unit to the corresponding connection on the throttle body using the rubber vacuum hose provided.

31 Connect the white/brown wire from the vehicle loom to the oil pressure sender on the LH side of the engine block.

32 The two, paired, black/yellow wires with ring terminals in the engine loom are earth connections. Attach both pairs to a suitable earth point on the bulkhead.

33 The green, green/purple pair (with grommet) in the engine loom is for the brake light switch. The brake light switch is inside the drivers pedal box and the harness may be connected during installation of the steering column, refer to Section 3. Pass the brake light switch harness through the hole in the rear of the pedal box, refer to Fig 5 and push the two female connectors onto the male connectors of the brake light switch (orientation is not important). Fit the grommet into the hole and ensure that the harness will not foul the steering column or pedals.



- |                      |                              |
|----------------------|------------------------------|
| 1 Brake light switch | 4 Sealant                    |
| 2 Cheese wedge       | 5 Brake light switch harness |
| 3 Grommet            |                              |

Fig 5 Brake light switch harness

34 The longest wire from the engine loom (terminating in a 4-pin plug) is the connection for the exhaust mounted lambda probe. This cannot be connected until the exhaust primary pipes and collector/catalyst is fitted, refer to Para 50.

35 Remove the outermost Bell housing securing bolt and spring washer. Pass the Bell housing mounting bolt and attached spring washer through the black battery earth lead and secure to the bell-housing. Tighten to 34 Nm.

36 Connect the red lead from the starter motor to the battery. Also connect the black lead on the main vehicle loom to the starter motor on the same terminal.

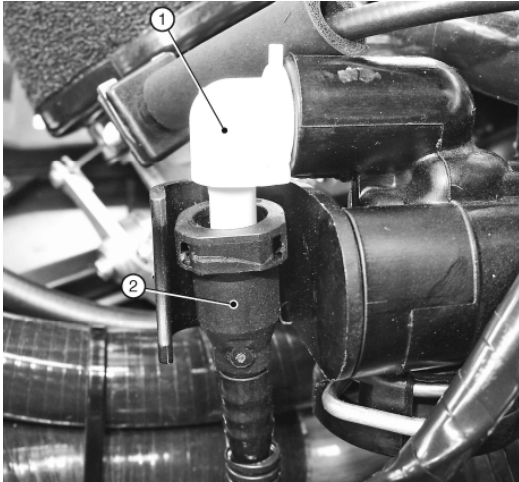
37 Connect the brown lead from the alternator to the starter.

38 Connect the brown/red wire from the chassis loom to the starter solenoid.

**SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)**

**FUEL SYSTEM**

39 The black, corrugated plastic, high pressure fuel pipe from the fuel pump emerges from the transmission tunnel and is a push-fit on the white elbow connection at the rear of the fuel rail, refer to Fig 6. Note that there is no fuel return pipe with this system.



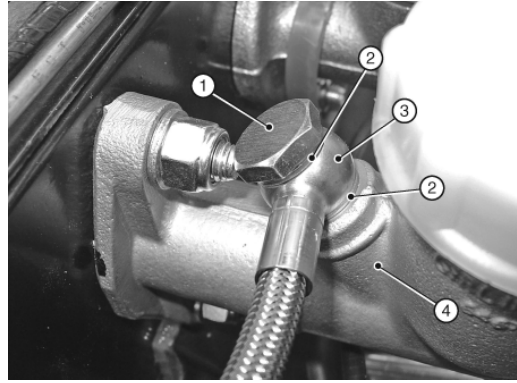
- 1 Fuel rail connection
- 2 Fuel pipe (from pump)

Fig 6 Fuel pipe connection

40 Once fitted the pipe cannot be removed without a special tool. Ensure that the pipe is kink free and routed away from possible snags or chafe points. Push the connection on the pipe firmly onto the elbow and check that it is securely attached. Secure the pipe with cable ties if necessary.

**CLUTCH HYDRAULIC HOSE**

41 Remove all packaging from the clutch hydraulic hose. Fit a copper washer to the banjo bolt and pass the banjo bolt through the union at the end of the hose, refer to Fig 7. Fit the second copper washer to the banjo bolt and screw the banjo bolt into the clutch master cylinder outlet port (remove the port plug). Do not fully tighten the banjo bolt.



- 1 Banjo bolt
- 2 Copper washers
- 4 Hose union
- 5 Clutch master cylinder

Fig 7 Clutch master cylinder hose union

42 Route the hose down the side of the pedal box, over the wiring loom (under the heater hose if fitted) and across the top of the bell-housing, Refer to Fig 8. Push the end of the hose into the connector in the clutch release bearing assembly and ensure that the hose is firmly attached. Secure the hose with cable ties if necessary, to prevent chafing and tighten the banjo bolt (the clutch system is filled and bled during start-up/final checks, refer to Section 14.



Fig 8 Clutch hydraulic hose

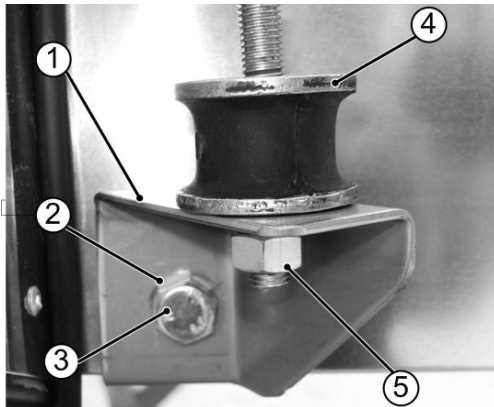


## SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)

### EXHAUST SYSTEM

43 The standard exhaust system consists of four primary pipes, a collector assembly which also incorporates the catalytic converter and a one piece silencer and tail pipe.

44 Bolt the exhaust mounting bracket (polythene bag marked 'exhaust') to the RH side of the car forward of the rear wheel, using setscrew (fastener pack 30X020A Item 1) and spring washers (3), refer to Fig 9. Secure the bobbin to the angle bracket with a nut (2) and spring washer (3).



- |   |               |   |        |
|---|---------------|---|--------|
| 1 | Angle bracket | 4 | Bobbin |
| 2 | Spring washer | 5 | Nut    |
| 3 | Setscrew      |   |        |

Fig 9 Exhaust mounting

45 Remove the exhaust gasket and associated fasteners from the RH side of the cylinder head, remove any masking tape protecting the exhaust ports and clean off any adhesive residue.

46 The exhaust primary pipes are marked with their part numbers:

- 36X014A is for # 1 (front) cylinder.
- 36X015A is for # 2 cylinder.
- 36X016A is for # 3 cylinder.
- 36X017A is for # 4 (rear) cylinder.

47 Protect the area around the square aperture in the side panel with masking tape and card, place the exhaust gasket over the remaining studs and fit the primary pipes in the following sequence:

47.1 Pass the flanged end of # 4 pipe inwards, attach the flange loosely to the

cylinder head and ensure that the pipe sits in the bottom LH corner of the aperture (viewed from outside).

47.2 Pass the flanged end of # 1 pipe inwards, attach the flange loosely to the cylinder head and ensure that the pipe sits in the top RH corner of the aperture.

47.3 Pass the plain end of # 3 pipe outwards, attach the flange loosely to the cylinder head and ensure that the pipe sits in the bottom RH corner of the aperture.

47.4 Pass the plain end of # 2 pipe outwards, attach the flange loosely to the cylinder head and ensure that the pipe sits in the top LH corner of the aperture.

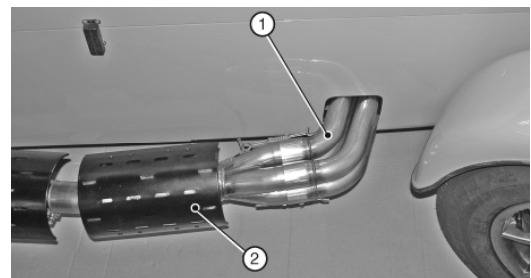
#### NOTE

For series 5 use the same procedure to fit the primary, the sequence to fit the primary is 4,3,1,2

- 56X005A is for #1(front) cylinder.
- 56X006A is for #2 cylinder.
- 56X007A is for #3 cylinder.
- 56X008A is for #4 (rear) cylinder.

48 When the primary pipes are in place fit any remaining fasteners but do not tighten them.

49 Install the collector/catalyst over the assembled primary pipes with the threaded hole for the lambda probe faces towards the side panel. Secure the collector to the primary pipes with the two springs, refer to Fig 10. Support the weight of the collector such that the primary pipes are not in contact with the sides of the aperture and tighten the primary pipe/cylinder head fasteners to 34 Nm.



- |   |                                   |
|---|-----------------------------------|
| 1 | Primary pipe                      |
| 2 | Collector/catalyst (guard fitted) |

Fig 10 Primary pipes and collector/catalyst

## SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)

50 Fit the Lambda probe into the threaded hole in the collector/catalyst and connect the probe plug to the corresponding socket from the engine wiring loom. Secure the Lambda probe connection and wiring to the chassis ensuring that it cannot contact the hot exhaust or any moving part, refer to Fig 11.

**NOTE**

*The lambda probe wiring passes under the side of the car below the lower chassis tube, it must not be routed through the primary pipe aperture in the side panel.*

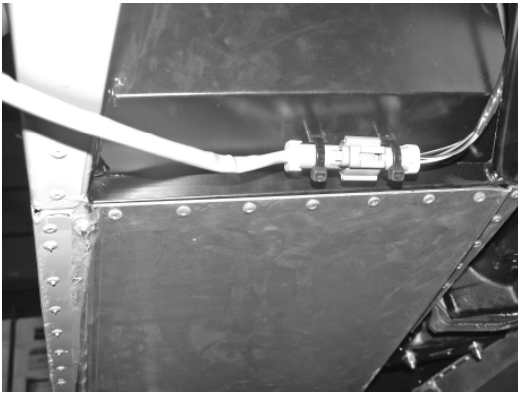


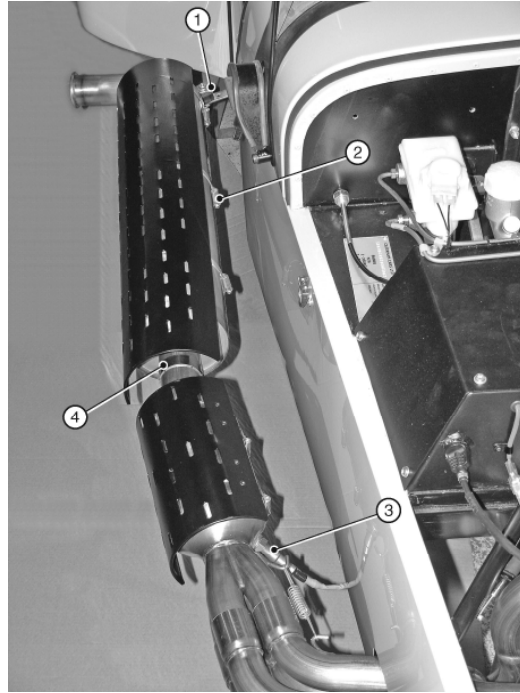
Fig 11 Lambda probe connection

51 Undo the large worm drive clips and feed them through the channels on the inside of the silencer and collector/catalyst guard. Fit the silencer guard to the silencer body with the channels offset towards the rear of the silencer and tighten the clips, refer to Fig 12. Ensure that the clip drives are not at the bottom of the silencer where they could contact the road. Attach the collector/catalyst guard in the same manner.

**NOTES**

(1) *For a neater appearance position the clips with the drive screw towards the ground so that the clip 'tail' is out of sight beneath the exhaust.*

(2) *To reduce the risk of damage it is advisable to fit the silencer after the RH rear wing has been attached.*



- |   |                  |   |              |
|---|------------------|---|--------------|
| 1 | Silencer bracket | 3 | Lambda probe |
| 2 | Worm drive clip  | 4 | Band clamp   |

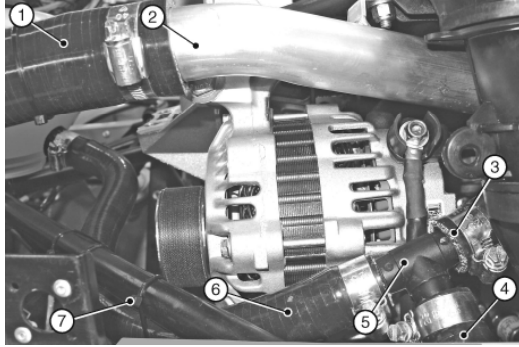
Fig 12 Exhaust arrangement

52 Loosely fit the single band clamp to the front of the silencer and position the front of the silencer over the collector/catalyst outlet pipe. Locate the bracket at the rear of the silencer over the bobbin on the silencer mounting bracket and secure with a nut and spring washer. Tighten the nut and band clamp. It may be necessary to reposition the guards slightly.

## SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)

### COOLING SYSTEM

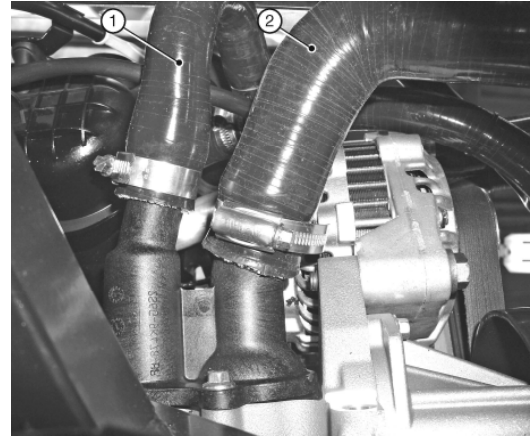
53 Position a hose clip on the flexible top radiator hose, apply rubber lubricant and fit the hose to the end of the water rail pipe emerging from the curve of the inlet manifold, Refer to Fig 13. Do not tighten the clip.



- 1 Top radiator hose
- 2 Water rail
- 3 Hose to heater outlet
- 4 Hose to cylinder block
- 5 'T' piece
- 6 Hose to expansion tank
- 7 Cable tie

Fig 13 Coolant hoses

54 Position a hose clip on the flexible bottom radiator hose, apply rubber lubricant and fit the hose to the larger of the two outlets on the LH side of the engine block, Refer to Fig 14. The hose passes forwards along the LH side of the engine bay before turning to pass along the top of the steering rack and turns again to meet the radiator connection. Do not tighten the clip.

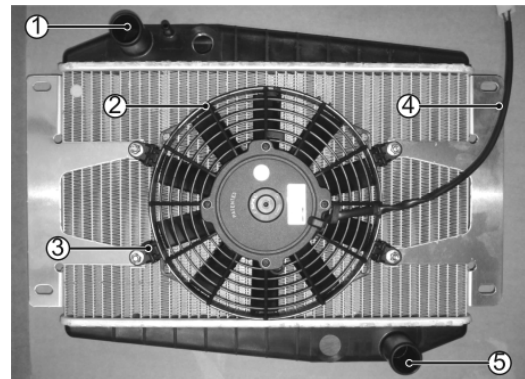


- 1 Hose to 'T' piece
- 2 Bottom radiator hose

Fig 14 Bottom hose engine connection (viewed from below)

55 Fit the four rubber radiator mountings to the front of the chassis and secure using nuts, plain washer and spring washers provided in the cooling pack.

56 Fit the four fan legs (polythene bag marked 'cooling') to the cooling fan. Secure the fan complete with legs to the radiator, ensuring that the fan electrical connector is located on the RH side of the radiator, using four nuts and washer provided in fastener pack (fastener pack 30C047A, Item 6 & 9). Refer fig 15



- 1 Top hose connection
- 2 Fan
- 3 Fan legs
- 4 Fan power lead
- 5 Bottom hose connection

Fig 15 Radiator/Fan prior to fitting

## SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)

### CAUTION

**Do not over tighten the blanking plug.**

57 Position the copper sealing washer on the blanking plug and fit the blanking plug into the threaded boss in the radiator, adjacent to the top hose connection.

### NOTE

*The blanking plug occupies the location previously used for a thermostatic fan switch. In the event that a switch is supplied in lieu of a blanking plug, fit the switch as described but **do not** connect it to the vehicle wiring harness.*

58 Fit the radiator/fan assembly onto the rubber radiator mountings ensuring that the hose connections face towards the engine. Secure using nuts, plain washers and spring washers.

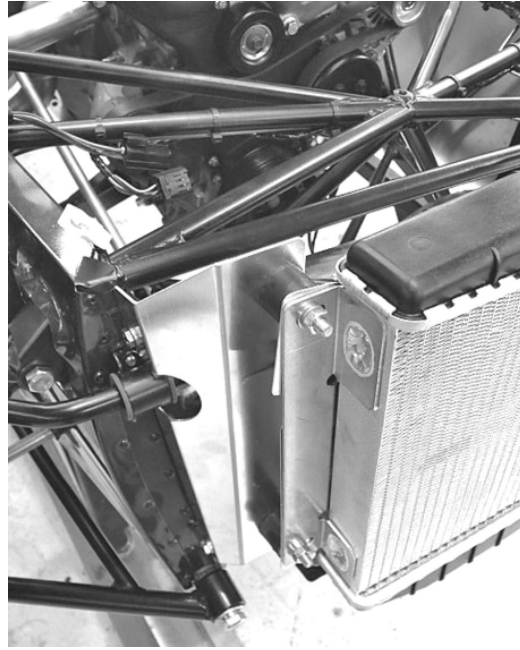
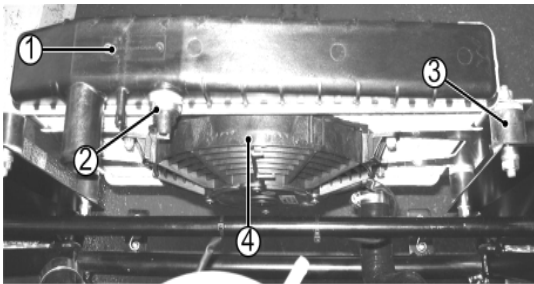


Fig 17 SV radiator arrangement



- 1 Radiator
- 2 Blanking plug
- 3 Rubber mounting
- 4 Fan

Fig 16 Standard radiator arrangement

59 The radiator mounting arrangement on SV models differs considerably from that shown. SV kits include LH and RH radiator mounting plates, refer to Fig 17; these plates must be fixed to the body before attaching the rubber mountings and the radiator

60 Position hose clips on the forward ends of the flexible top and bottom radiator hoses; apply rubber lubricant and fit the hoses over the connections on the radiator. Tighten the clips at both ends of both hoses.

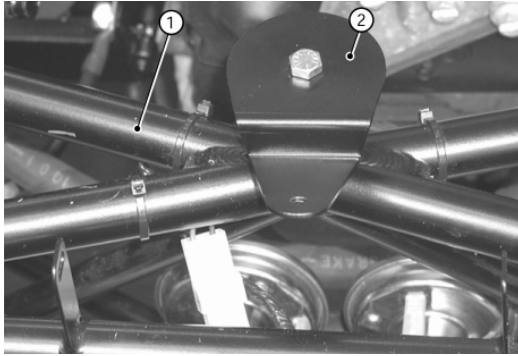
### NOTE

*The flexible radiator hoses may need to be trimmed to length.*

61 Locate the two-pin plug containing the black/green and black wires situated on the upper front diagonal chassis member. Connect the two-pin plug to the cooling fan electrical connector. Secure the cable to the chassis members using cable ties.

62 Fit the expansion bottle mounting bracket on the top of the cruciform, immediately behind the radiator, refer to Fig 18, and secure using bolt, plain washer and spring washer. Tighten to 11 Nm.

**SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)**



- 1 Cruciform
- 2 Expansion bottle mounting bracket

Fig 18 Coolant expansion bottle mounting bracket

63 The round coolant expansion bottle sits on the mounting bracket and is secured using a setscrew, plain washer and nyloc nut, refer to Fig 26 for correct orientation of the expansion tank hose connections.

**NOTE**

*If an oil/air separator kit has been fitted the expansion bottle must be relocated, refer to Section 16.*

**Water bleed hoses**

64 The smaller of the two inlets on the coolant expansion bottle connects to the stem of the small 'T' piece in the 5/16" bore hose that must connect the top of the radiator (near the blanking plug) to the small diameter connector at the rear RH side of the cylinder head, refer to Fig 26.

**NOTE**

*There may be a metal 'water bleed pipe' fitted to the engine along the LH side and behind the cam cover. In this event, connect the 5/16" bore hose to the front of the water bleed pipe and connect the rear of the water bleed pipe to the connection at the rear RH side of the cylinder head using a short length of 5/16" hose. Secure all hose connections with hose clips.*

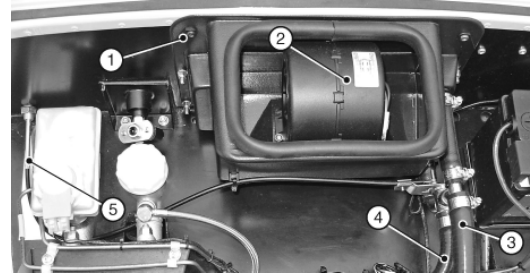
65 Route the 5/16" bore hose, back from the radiator to the 'T' piece and from the 'T' piece along the top radiator hose and fuel rail and around the back of the cylinder head. Cut pieces of 5/16" hose to length, apply rubber lubricant to each open end and fit to the connections and 'T' piece as described. Secure using hose clips (10). Secure the hose to the top radiator hose using cable ties.

**Heater and associated hoses**

66 Remove and retain the four screws, nyloc nuts and washers and the two washer plates securing the diffuser panel to the heater. Position the diffuser panel on the inside surface of the scuttle and insert the four screws from the inside. Pass the heater harness through the large hole in the scuttle panel and locate the heater over the screws, secure with the washer plates, nyloc nuts, washers and two additional screws from the fastener pack, refer to Fig 19. Connect the heater harness connector heater to the matching plug, located under the dashboard.

**NOTE**

*Cars not fitted with a heater will be supplied with a blanking plate. Apply a small amount of silicon sealant around the edge of the plate to seal it.*



- 1 Washer plate
- 2 Heater
- 3 Heater inlet hose
- 4 Heater outlet hose
- 5 Heater control cable

Fig 19 Heater installation

67 Heater hose is supplied as three pre-formed pieces; a short 'L' shape, a long 'L' shape and a long 'J' shape:

67.1 The short 'L' connects the 'T' piece to the engine inlet next to the bottom radiator hose.

## SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)

67.2 The long 'L' shape must be cut in two to provide a long straight hose (to connect the 'T' piece to the heater outlet) and a short 'L' shape (to connect the expansion tank to the 'T' piece). Measure the relevant distances carefully before cutting the hose.

67.3 The long 'J' hose connects the heater inlet to the water outlet at the rear of the cylinder head (next to the top hose 'U' bend). This hose must be trimmed to length. Cut a 240 mm length of hose from the straight leg and cut this into two 120 mm pieces. Use the 120 mm pieces to connect the heater inlet and outlet to the heater valve.

68 The larger of the two inlets on the coolant expansion bottle must connect to one end of the cross-bar of the large 'T' piece (near the alternator) that also connects to the heater valve (outlet side) and to the smaller of the two connections at the front LH side of the engine block, refer to Fig 13. Measure and cut the long, 5/8" bore, 'L' shaped hose as described at 67. Apply rubber lubricant to the hose and fit to the coolant expansion bottle and 'T' piece securing with a hose clip at each end.

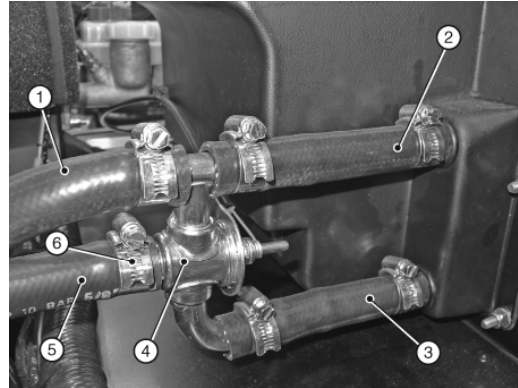
69 Apply rubber lubricant and connect the short 'L' shaped hose to the smaller of the two connections at the LH front of the engine block, connect this hose to the stem of the large 'T' piece. Secure using hose clips.

70 Use the cut length of 5/8" bore hose (from the long 'L' hose) to connect the remaining leg of the 'T' piece to the upper (outlet) connection on the heater valve, refer to Fig 20. Connect the other side of the heater valve upper (outlet) connection to the straight connector at the top of the heater. Apply rubber lubricant where necessary and secure using hose clips. Ensure that the hose is routed to avoid chafing, use cable ties as necessary.

71 Trim to length and connect the long 'J' hose between the lower (inlet) connection of the heater valve and the outlet at the back of the cylinder head (next to the top 'U' hose). Connect the curved pipe on the heater valve to the lower (inlet) connection on the heater using a short length of 5/8" bore hose, refer to Fig 20. Apply rubber lubricant where necessary and secure using hose clips. Ensure that the hose is routed to avoid chafing, use cable ties as necessary. Do not fully tighten the hose clips at the heater end at this point.

### NOTE

*On cars where no heater is fitted the relevant connections at the rear of the cylinder head and on the front LH side of the engine block must be joined by a suitable length of hose.*



- |   |                   |   |                       |
|---|-------------------|---|-----------------------|
| 1 | Hose to large 'T' | 5 | Hose to cylinder head |
| 2 | Heater outlet     | 6 | Hose clip(s)          |
| 3 | Heater inlet      |   |                       |
| 4 | Heater valve      |   |                       |

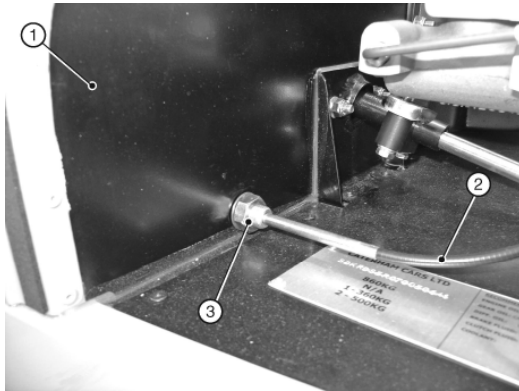
Fig 20 Heater valve arrangement

72 Remove and retain the locknut and washer from the heater control cable and pass it from inside the cockpit, through the hole in the front face of the scuttle, refer to Figs 21 and 22. Secure the cable in place using the locknut and washer provided.



Fig 21 Heater control location

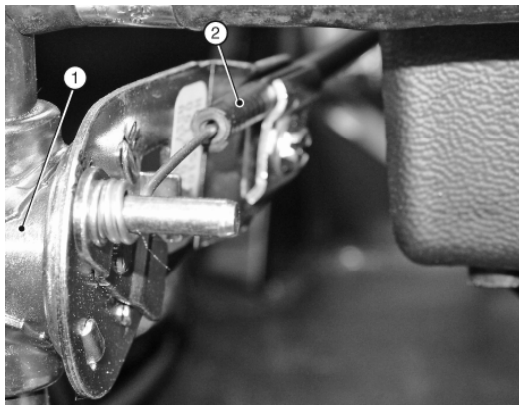
**SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)**



- 1 Scuttle panel
- 2 Heater control cable
- 3 Locknut

Fig 22 Heater control cable

73 Connect the other end to the heater control valve by sliding the eyelet on the inner cable over the peg on the heater valve operating arm then slide the outer cable under the adjacent clamp and tighten the screw to secure in place, refer to Fig 23. Ensure that the valve travels through its full range when operated from inside the car. This can be adjusted by slackening the clamp that locates the outer cable to the valve and sliding the cable one way or another.



- 1 Heater valve
- 2 Heater control cable

Fig 23 Heater control cable attachment

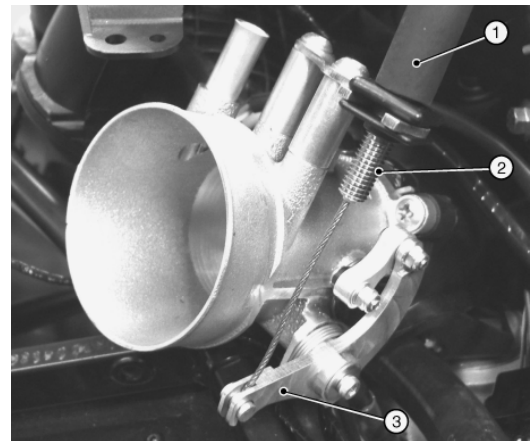
**WARNING**

Due consideration should be given to the highly flammable nature of petroleum or alcohol based products and their vapours. Serious burns can result from incorrect use.

74 Fill the cooling system with a 50% antifreeze solution (refer to Owner's Handbook for Caterham recommended coolant). Add the coolant solution to the expansion bottle. Place paper or cloth on the scuttle in the area below the heater inlet/outlet hoses. Ensure that the heater valve is in the fully open position (control knob pulled towards the driver) and remove the heater inlet (top connector) hose which was previously left loose. Temporarily seal off the heater valve inlet and at the same time back fill the heater inlet hose with coolant solution. When the hose is full refit it to the heater inlet and secure with the hose clip. This procedure should minimise the amount of bleeding required once the engine is running for the first time.

**THROTTLE CABLE FITMENT**

75 Attach the throttle cable to the linkage on the throttle body by engaging the nipple in the throttle operating lever and then clipping its square shaped black plastic adjuster onto the adjacent bracket. This adjuster can be threaded up and down the cable outer to adjust the throttle pedal position, refer to Fig 24.



- 1 Throttle cable
- 2 Throttle cable adjuster
- 3 Throttle body linkage

Fig 24 Throttle cable to throttle body

## SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)

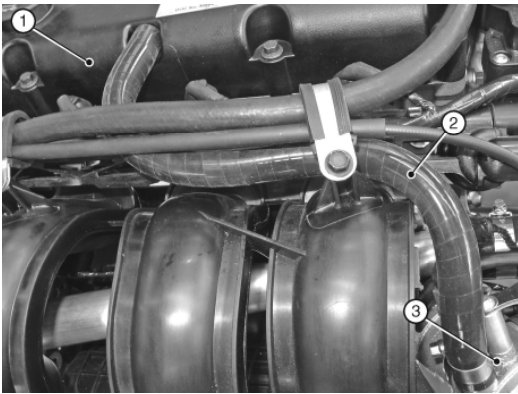
76 Route the other end of the cable around the front of the cam cover, refer to Fig 25 and through the 22 mm hole in the front of the pedal box and clip the plastic seat into place. The inner cable is fed into the slot on the top of the pedal with the portion of cable protruding past the cable termination located through the hole. The top of the pedal should be gently squeezed with a pair of pliers to capture the cable and prevent it escaping.

### NOTE

*In order to obtain a preferred pedal height and achieve adequate cable tension it may be necessary to bend the top of the pedal prior to locating the cable. This is done by inserting a Phillips screwdriver into the top of the pedal, bracing the bottom of the pedal with a block of wood, and gently bending the top of the pedal so as to take up the slack in the cable. Finally use the adjusting mechanism at the throttle body end of the cable to remove any free play.*

### BREATHER PIPE FITMENT

77 Fit the breather pipe between the throttle body and engine cam cover, refer to Fig 25. Apply rubber lubricant where necessary and secure using hose clips. Ensure that the pipe is routed to avoid chafing, use cable ties as necessary.



- 1 Cam cover
- 2 Breather pipe
- 3 Throttle body

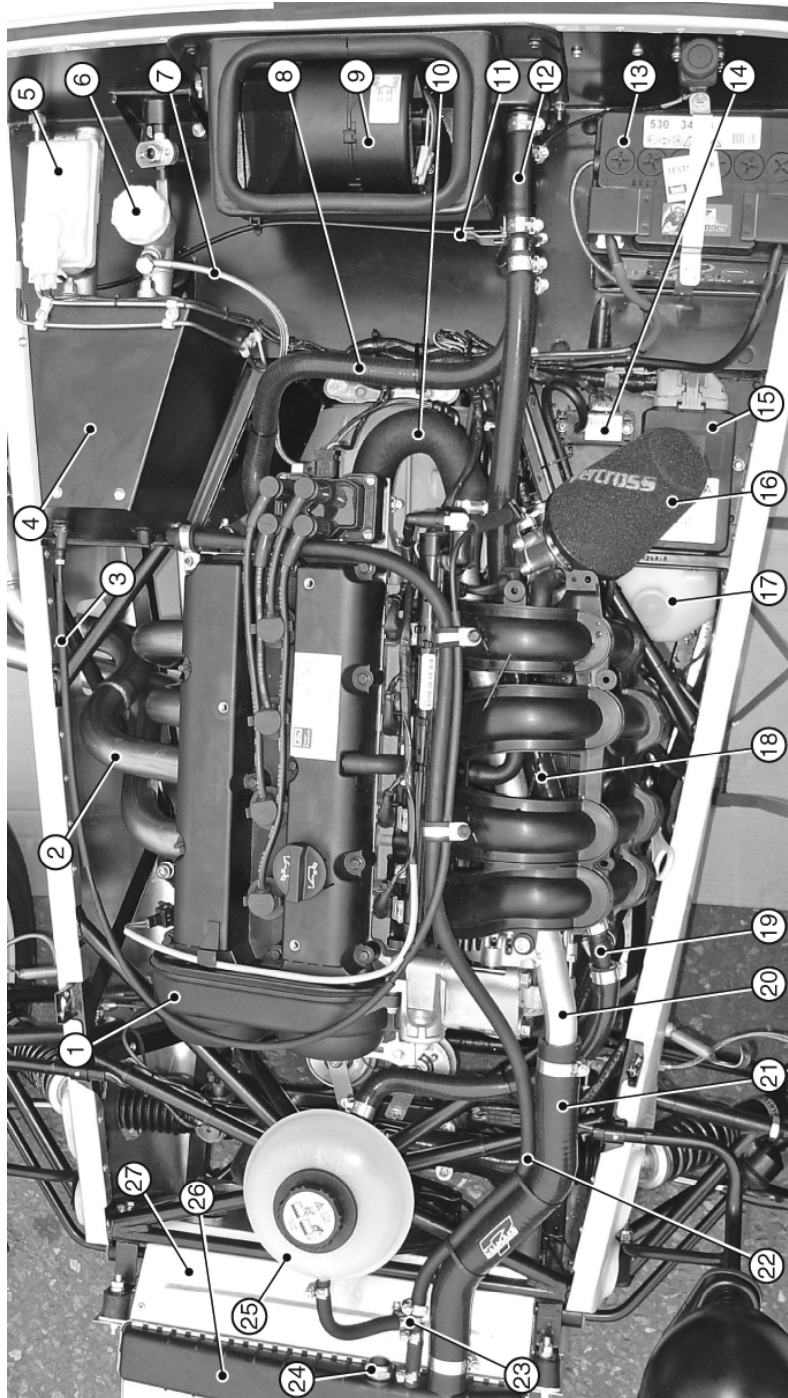
Fig 25 Breather pipe

### AIR FILTER FITMENT

78 Fit the Caterham air filter element to the throttle body housing and secure using the hose clip provided. The hose clip should not be over tightened as it is possible to distort the throttle body and prevent smooth operation of the throttle. Check that the throttle operates smoothly without sticking.



**SECTION 6 - INSTALLATION OF ENGINE AND GEARBOX (SIGMA 125)**



- |   |                        |    |                      |    |                     |
|---|------------------------|----|----------------------|----|---------------------|
| 1 | Engine                 | 10 | 'U' hose             | 19 | Large 'T' piece     |
| 2 | Exhaust primary pipe   | 11 | Heater control cable | 20 | Water rail          |
| 3 | Throttle cable         | 12 | Heater outlet        | 21 | Top radiator hose   |
| 4 | Pedal box              | 13 | Battery              | 22 | Water bleed hose    |
| 5 | Brake master cylinder  | 14 | MAP unit             | 23 | Small 'T' piece     |
| 6 | Clutch master cylinder | 15 | ECU                  | 24 | Blanking plug       |
| 7 | Clutch hose            | 16 | Air filter           | 25 | Expansion bottle    |
| 8 | Heater inlet hose      | 17 | Washer bottle        | 26 | Radiator            |
| 9 | Heater                 | 18 | Heater outlet hose   | 27 | Radiator inner cowl |

Fig 26 Sigma 125 Engine bay overview

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## SECTION 7 - PREPARATION AND INSTALLATION OF THE DIFFERENTIAL

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## SECTION 7 - PREPARATION AND INSTALLATION OF THE DIFFERENTIAL

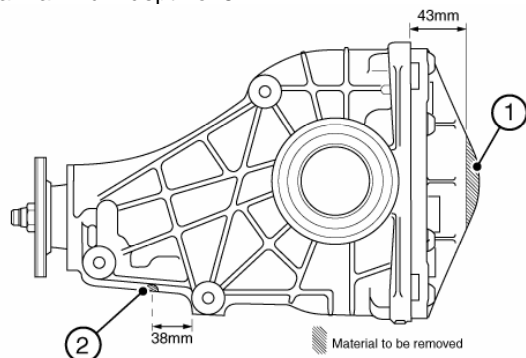
### PREPARATION

1 In order to give clearance for the De Dion tube, material may need to be removed from the rear cover on the differential, refer to Fig 1. On a Caterham supplied part it is likely that this has been removed prior to supply however if this is not the case it can easily be removed using a hacksaw/file. Measure and mark 43 mm from the machined surface of the backplate where it mates with the main differential casing.

#### CAUTION

**If less than 43 mm is measured then the differential casing may be holed. If more than 43 mm is measured it is possible that the De Dion tube may hit the differential.**

2 If a rear anti-roll bar is to be fitted then you may also need to remove some material from the underside of the casing. Again on a Caterham supplied part this has most likely already been done, however if necessary, measure and mark a line on the differential casing 38 mm from the forward face of the lower mounting. Using a file remove material from the differential web, 15 mm either side of this line to a maximum depth of 5 mm.



- 1 Rear cover
- 2 Underside

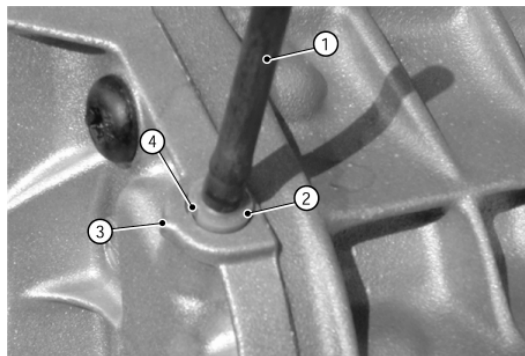
Fig 1 Differential material to be removed

3 Fit the plastic breather (this may be pre-fitted) (polythene bag 'rear axle') to the top of the differential assembly ensuring that the groove on the breather is aligned with the pip on the differential, refer to Fig 2. The cutaway portion of the breather should face the rear of the differential in order to prevent oil splashing out of the breather. This part is a tight fit and it may be necessary to smooth the breather with fine emery paper to aid fitting. Remove the rubber tubing and place a 10 mm socket in place over

the breather. The breather can be gently tapped into place. Remove the 10 mm socket and replace the rubber tube.

4 Apply a thin coat of copper grease to all fixings prior to fitment (avoid contaminating any threads where Loctite is to be used).

5 Slacken the differential oil level/filler plug before (once the differential is installed access is limited).



- 1 Rubber tube
- 2 Plastic breather
- 3 Pip (differential)
- 4 Groove (plastic breather)

Fig 2 Differential breather

### PROPSHAFT

#### NOTE

*The handbrake mechanism and cable must be installed prior to installing the propshaft and differential, refer to Section 8.*

6 Remove any protective packaging and lay the propshaft in the transmission tunnel with the bolt type flange towards the rear of the car. If the gearbox has been installed, engage the splined sleeve at the front of the propshaft with the mating spline on the gearbox tailshaft and push the propshaft fully forwards.

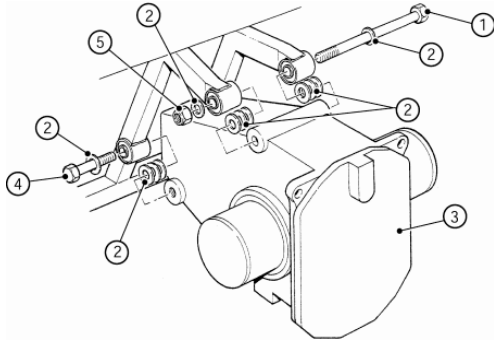
### FITTING THE DIFFERENTIAL

7 Check that the upper mounting bolt, (fastener pack 30A001A Item 1), slides into the upper mounting bushes on the chassis prior to offering up the differential, refer to Fig 3.

## SECTION 7 - PREPARATION AND INSTALLATION OF THE DIFFERENTIAL

### WARNINGS

- (1) Never work underneath a car without supporting it on axle stands or equivalent. Do not rely on a jack.
- (2) Use appropriate eye protection whilst working under the car.



- |                       |                       |
|-----------------------|-----------------------|
| 1 Upper mounting bolt | 4 Lower mounting bolt |
| 2 Plain washer        | 5 Nyloc nut           |
| 3 Differential        |                       |

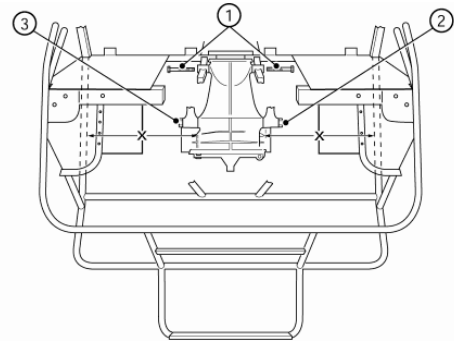
Fig 3 Differential mounting in chassis

8 Offer the differential assembly up to its mounting points as shown. Suspend the differential from the upper mounting using bolt (1). Do not secure.

9 The lower mounting is attached to the chassis using bolts (2) through the metallistic bushes with a washer (12) between the bolt head and the bush. Washers (13) are then placed between the bushes and the differential to obtain correct position of the differential. The differential has to be located centrally in the chassis, refer to Fig 4.

10 The position of the differential should be measured from the machined surface of the two unused lower mounting bosses, on the side of the differential casing, to the inner edge of the outer chassis tubes. This measurement 'X' should be identical on both sides  $\pm 2$  mm.

11 Use further washers (13) between the metallistic bushes and the differential. Care must be taken not to force too many washers between the chassis and the differential since the small amount of movement allowed by the rubber bushes will be eliminated thus causing excessive noise and vibration to be transmitted into the car. All free play must be taken up and washers (15) are supplied to aid this.



- |                        |
|------------------------|
| 1 Lower mounting bolts |
| 2 Upper mounting bolt  |
| 3 Nyloc                |

Fig 4 Position of the differential in the chassis

### NOTES

- (1) Some tubes not shown for clarity.
- (2) Washers not shown for clarity.
- (3) Measurements 'X' to be identical  $\pm 2$  mm.

12 Remove the upper mounting bolt (1) and refit with washer (12) under the bolt head. Centralise the differential using washers (13) and (15), as required, between the metallistic bushes and the differential. Use a further washer (12) and nyloc nut (6) on the end of the bolt. Tighten the upper mounting bolt and lower mounting bolts to 54 Nm. Check that the differential is central  $\pm 2$  mm. Adjust if necessary.

### PROPSHAFT TO DIFFERENTIAL FITMENT

13 Attach the propshaft to the differential output flange using the four caphead bolts (polythene bag 'miscellaneous'). No washers are required. Tighten to 74 Nm.

### LUBRICATION

14 The driveshafts must be inserted into the differential prior to oil being added. Instructions for installing the driveshafts and filling the differential can be found in Section 8.

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## SECTION 8 - REAR SUSPENSION

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## SECTION 8 - REAR SUSPENSION

### GENERAL

1 The special tools identified in Table 1 will be required to tighten the rear hub nuts.

**TABLE 1 SPECIAL TOOLS REQUIRED**

Item	Description
41 mm	Socket
274 Nm	Torque wrench

2 Copper grease should be applied to all fixings prior to assembly (excluding brake pipe nuts and items secured with Loctite).

### PREPARATION

3 It is recommended that the lower chassis tubes that will be under the De Dion tube are protected. Several layers of masking tape or a thin card taped to the tubes is sufficient.

### FITTING OF REAR BRAKE PIPES

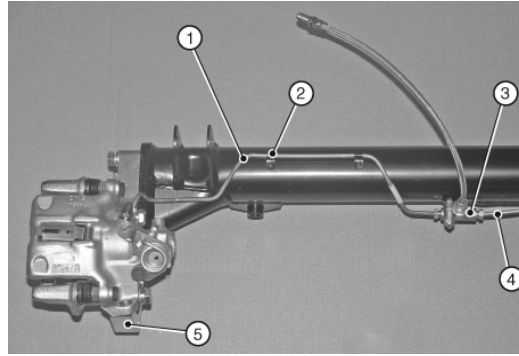
4 Place the De Dion tube on the work bench with the outer flange facing forward and the buttress facing downwards.

5 Fit the aluminium De Dion ears and brake calliper to the De Dion tube, refer to Para 31 and 42. Do not use lock washers or Loctite at this stage as the ears and brake callipers are temporarily fitted to ensure correct alignment and routing of the brake pipe.

### WARNING

**Both imperial and metric threads are used on the De Dion brake pipes. The threads on the three way union are imperial whilst those on the brake callipers are metric. To aid recognition a small notch is machined into the hexagon of the metric unions on the pipes.**

6 With the fixing boss offset towards the RH side of the tube fit the three way union (polythene bag marked 'rear axle') to the threaded stud situated towards the RH end of the De Dion tube, refer to Fig 1, and secure using a nyloc nut (fastener pack 30R011A Item 11). Ensure that the three-way union is located with the input uppermost.



- |                   |                    |
|-------------------|--------------------|
| 1 Brake pipe (RH) | 4 Brake pipe (LH)  |
| 2 'P' clip        | 5 De Dion ear (RH) |
| 3 Three way union |                    |

Fig 1 De Dion tube RH brake pipe fitting

7 Fit the RH short brake pipe loosely to the three way union and secure the brake pipe to the top of the De Dion tube using 'P' clips (fastener pack 30A001A Item 21) and rivet (20). The De Dion tube is predrilled with the correct spacing.

### NOTE

*The existing holes may require cleaning with a 1/8" drill bit to remove paint but under no circumstances should additional holes be drilled.*

8 Fit the LH longer brake pipe loosely to the three way union as shown in Fig 2. Ensure that the brake pipe runs along the centre of the top of the De Dion tube. Secure the brake pipe using the 'P' clips (21) and rivets (20). Remove the brake callipers and De Dion ears.

### NOTE

*The existing holes may require cleaning with a 1/8" drill bit to remove paint but under no circumstances should additional holes be drilled.*

### REAR BRAKE HOSE

### NOTE

*All connections should initially be made finger tight.*

9 The rear braided hose can now be fitted. Thread the locknut onto the male union on one end of the hose then attach the braided hose to the three way union on the De Dion tube and tighten to 10 Nm. Lock into place using the locknut. The locknut supplied should not restrict the union from tightening fully.



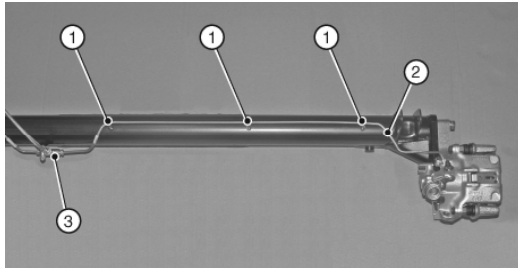
## SECTION 8 - REAR SUSPENSION

10 Place a plain washer over the male union on the other end of the braided hose then pass the union forwards through the vertical aluminium panel, apply a further plain washer then the shakeproof washer and secure in place with the locknut provided. Finally, attach the rigid brake pipe from the transmission tunnel.

### NOTES

(1) The rigid brake pipe may need slight realignment.

(2) Sharp kinks must not be created.



- 1 P-clip
- 2 Brake pipe LH
- 3 Three way connector

Fig 2 LH brake pipe fitting

## ASSEMBLY OF THE REAR SUSPENSION

### WARNINGS

(1) **Never work underneath a car without supporting it on axle stands or equivalent. Do not rely on a jack alone.**

(2) **Use appropriate eye protection whilst working under the car.**

11 Place the De Dion tube into the chassis from the RH side ensuring that the central buttress faces downwards and that the flanges face forward. Care must be taken to prevent damage to the brake pipes.

## REAR SPRING DAMPER ASSEMBLIES

### NOTES

(1) The rear spring damper units are only fitted at this point if the standard roll over bar is to be installed.

(2) If the track day roll over bar or roll cage is to be installed do not install the spring damper units yet, refer to Section 16.

12 Insert a sleeve into the top bush of the damper unit (close coils of spring are at the top), align the top bush with the top mounting and insert the top mounting bolt (4) through the access holes provided in the seat back panel. Tighten to 54 Nm once the spring damper unit has been attached to the De Dion tube.

13 The lower spring damper mounting is secured to the threaded boss welded to the underside of the De Dion tube. Pass bolt (3) through spring washer (16), plain washer (13), the spring damper unit and plain washer and secure to the De Dion tube. Tighten to 54 Nm.

### NOTE

*Because the suspension is not under load, the bottom bush of the damper unit and the mounting on the De Dion tube will not be in alignment. Take great care not to cross-thread the bottom mounting bolt. If necessary remove the mounting bolt from the rear of the 'A' frame to allow more movement of the De Dion tube.*

## RADIUS ARMS

14 If Watts link has been specified refer to Para 17.

15 Fit the radius arms to the upper chassis bush with the waisted section facing outboard, to provide maximum clearance to the brake calliper. The arms are fitted using M10 x 65 mm cap head bolts (fastener pack 30R011A Item 2) passed from the inside of the cockpit through the radius arm and secured with nyloc nut (8) and plain washer (14). The bolts should be tightened to 34 Nm with the arms parallel to the ground. This preloads the bushes in the correct position for when the suspension is properly loaded.

### NOTE

*On some series 3 chassis a lower fixing boss is supplied to give optimum suspension geometry when used only for race and track purposes. This setting is not recommended for road usage.*

16 Fit the rear end of the radius arm between the brackets on the top of the De Dion tube using bolt (3) passed inboard and secure using a nyloc nut (6). Do not fully tighten.

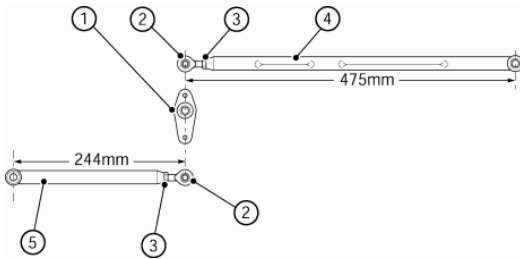
## SECTION 8 - REAR SUSPENSION

### WATTS LINK ASSEMBLY (OPTIONAL)

17 The Watts link replaces the conventional single radius arm location of the De Dion tube by employing two links, one facing forward and one facing rearward connected via a bellcrank.

#### Construction of link arms

18 Thread the rod ends (polythene bag marked 'rear suspension') with nut (fastener pack 30R012A Item 6) and fit into the four linkage arms. Adjust the length of the link arms as shown in Fig 3. Tighten locknuts.



- 1 Bellcrank
- 2 Rod end
- 3 Locknut
- 4 Link arm (forward)
- 5 Link arm (rearward)

Fig 3 Watts link - RH side

#### Link arms to bellcrank

19 Fit the short rearward link arm (waisted section inboard) to the larger offset mounting on the bellcrank using bolt (3) passing from inboard to outboard and secure with nyloc nut (6). Ensure that the larger offset of the bellcrank faces downwards and the links are inset towards the vehicle centre line.

20 Fit the long forward link arm to the upper mounting on the bellcrank using bolt (3) passing from inboard to outboard and secure with nyloc nut (6). Ensure that the waisted sections in the forward link arm are facing outboard.

#### Link arms to chassis

21 With the De Dion tube in place attach the forward link arm to the chassis using caphead bolt (fastener pack 30R011A Item 2) pass from inside the cockpit, through the link arm. Secure using nyloc nut (8) and plain washer (14).

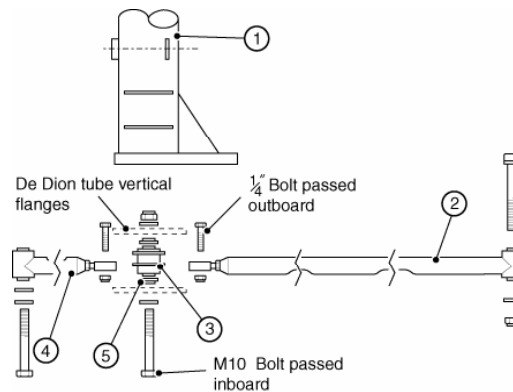
### NOTE

*On Series 3 chassis this fixing must be located in the upper of the two possible radius arm bushes.*

22 The rear link arm attaches to the rear of the wheel arch into a threaded boss. Apply Loctite to the thread and secure the rear link arm to the boss using bolt (fastener pack 30R012A Item 2) spring washer (8) and plain washer (7). Hold link arms horizontally and tighten to 34 Nm.

#### Bellcrank to De Dion tube

23 Drop the bellcrank into the vertical flanges on top of the De Dion tube. It should be noted that the bellcrank is secured using an M10 bolt but the vertical flanges have a 1/2" hole for traditional radius arm fitment. Two bellcrank spacers are used on the inner sides of the flanges to centre the bolt in the hole, refer to Fig 4. Assemble the bellcrank into the vertical flanges ensuring that the two bellcrank spacers are correctly located; pass bolt (1) and plain washer (7) inboard through the vertical flanges. Secure with nyloc nut (4) and plain washer (7). Tighten to 34 Nm. It is essential that plain washers are used on the outside of both flanges in order to pass the load to the flanges rather than the bellcrank spacers.



- 1 De Dion tube (RH) end
- 2 Link arm (forward)
- 3 Bellcrank
- 4 Link arm (rearward)
- 5 Bellcrank spacer

Fig 4 Watts link - RH top view

## SECTION 8 - REAR SUSPENSION

### REAR ANTI-ROLL BAR (OPTIONAL)

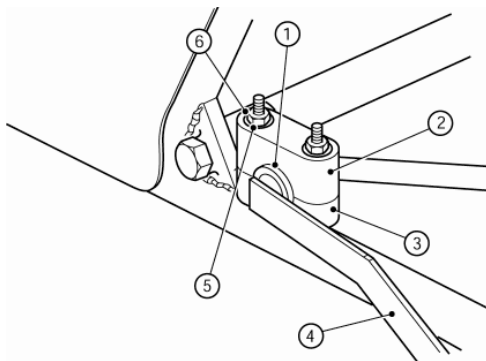
#### WARNINGS

(1) **Never work underneath a car without supporting it on axle stands or equivalent. Do not rely on a jack alone.**

(2) **Use appropriate eye protection whilst working under the car.**

24 Ensure that the colour of the rubber 'cotton reel' bushes (polythene bag marked 'rear suspension') corresponds to the colour dot on the rear anti-roll bar. Apply rubber lubricant to the centre of the bushes and slide them down over the flat blades and onto the round section of the rear anti-roll bar.

25 Feed the rear anti-roll bar across the top of the lower chassis tubes and below the differential. The rear anti-roll bar is clamped to the chassis by the aluminium anti-roll bar mounting block and secured using bolt (fastener pack 30R011A Item 4) and plain washer (15). The bolt is passed vertically up through the chassis tube, through the thin mounting block. Secure using plain washer (15) and nyloc nut (10), refer to Fig 5. Tighten to 14 Nm.

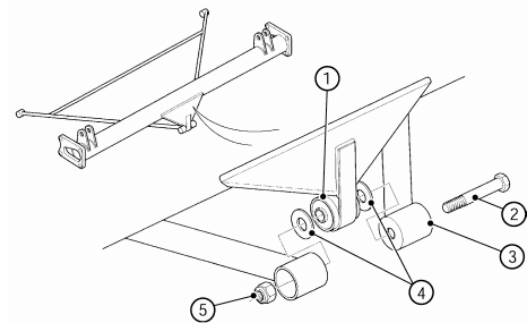


- |                       |                 |
|-----------------------|-----------------|
| 1 Cotton reel bush    | 4 Anti-roll bar |
| 2 Clamp (upper thick) | 5 Plain washer  |
| 3 Clamp (lower thin)  | 6 Nut           |

Fig 5 Rear anti-roll bar mounting

#### 'A' FRAME

26 The De Dion tube is located laterally using an 'A' frame which has bushes fitted to the forward ends. The De Dion tube has a metallistic bush fitted to the attachment point for the 'A' frame, refer to Fig 6. Place the 'A' frame under the car with the forward mountings offset upwards.



- |                    |                 |
|--------------------|-----------------|
| 1 Metallistic bush | 4 Nylon washers |
| 2 Bolt             | 5 Nyloc nut     |
| 3 'A' frame        |                 |

Fig 6 Metallistic bush - De Dion tube

27 Attach the 'A' frame to the De Dion tube using bolt (18) passed through the 'A' frame, through the metallistic bush and back through the 'A' frame. Secure using nyloc nut (6) but do not fully tighten unless the spring damper assemblies have been installed (spring damper installation depends on roll over bar/cage specified).

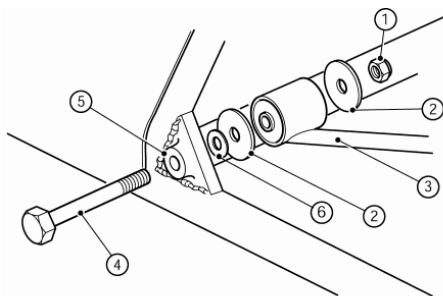
#### NOTE

*Nylon 'Race' washers are provided in some applications and if supplied should be fitted over the centre part of the bush between the De Dion tube and the 'A' frame, refer to Fig 6.*

28 Attach the forward ends of the 'A' frame to the mounting provided on the chassis, refer to Fig 7, using bolts (fastener pack 30R011A Item 1), passed inboard, with large diameter plain washers (13) either side of the 'A' frame bushes and secure with nyloc nuts (7). Do not tighten the 'A' frame fixings.

29 Check that the De Dion tube is centralised in the chassis. Measure the gaps between the De Dion tube end plates and the outer edge of the chassis tube, these should be identical  $\pm 2$  mm. If adjustment is required insert differential spacing washers between the chassis and the large chamfered washer at the forward ends of the 'A' frame until the required position is achieved.

## SECTION 8 - REAR SUSPENSION



- 1 Nyloc nut
- 2 Large diameter washers
- 3 'A' frame
- 4 Bolt
- 5 Chassis mount
- 6 Diff spacer washer (as required)

Fig 7 Forward 'A' frame mounting

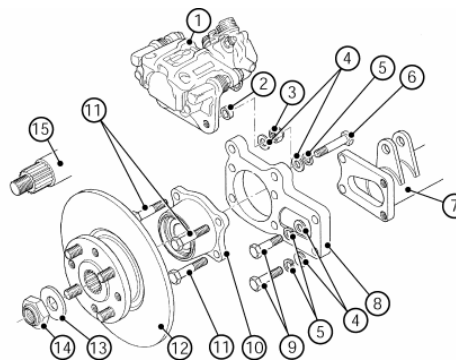
30 Insert the unthreaded end of the driveshaft into the differential taking care not to damage the seals in the differential. The longer driveshaft is fitted to the RH side. The shorter driveshaft is fitted to the LH side. To aid insertion, lightly grease the splines of the driveshaft and if necessary gently tap the outer end of the driveshaft with a soft faced hammer. Ensure that the driveshaft is held as straight as possible to prevent damage to the boot.

### ASSEMBLY OF DE DION TUBE

31 Position the aluminium ears over the driveshaft and attach to the De Dion tube, refer to Fig 8.

#### NOTES

- (1) The ears are not handed however the calliper fixing lugs protruding from the ear must be uppermost.
- (2) The holes in the ears are not symmetrical and therefore will ensure correct orientation.



- 1 Brake calliper
- 2 Spacer
- 3 Nyloc nut
- 4 Plain washer
- 5 Spring washer
- 6 Bolt
- 7 De Dion tube
- 8 De Dion ear
- 9 Bolt
- 10 Hub carrier
- 11 Bolt
- 12 Rear disc/flange assembly
- 13 Thrust washer
- 14 Nyloc nut (41 mm)
- 15 Driveshaft

Fig 8 De Dion tube end (LH)

32 Apply Loctite to the threads of bolt (fastener pack 30A001A Item 5) and bolt the ears into place using spring washers (18) and plain washers (16) into the threaded holes at the rear of the De Dion tube.

33 Locate the rear hub carrier, with the rounded edge of the flange uppermost. Carefully slide the hub over the end of the driveshaft taking care not to damage bearings or seals. Bolt the hubs to the ear by passing the two bolts (3) through the rear holes of the hub, the centre holes in the ear and the front holes in the De Dion tube and tighten into place with the nyloc nuts (7). No washers are required on these bolts.

34 Secure the hub to the ear via the forward holes passing the two bolts (4) through the hub and ear then securing into place with plain washers (16) and nyloc nut (7).

#### NOTE

*On the RH side only, the speed sensor bracket is mounted on the forward two bolts on the inboard side of the ear, refer to Fig 9.*

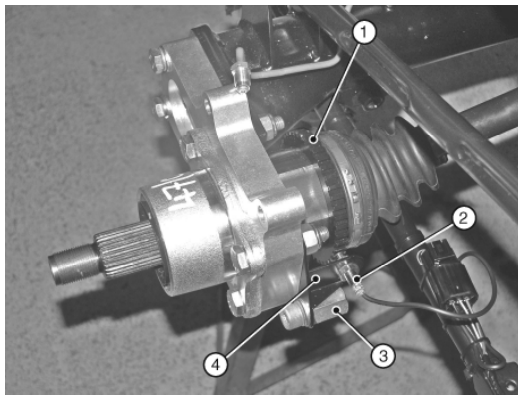
35 In the case of cars fitted with a rear anti-roll bar, coat the threads of bolt (fastener pack 30R011A Item 17) with Loctite and pass through the lower front hole in the speed sensor bracket, through a plain washer (fastener pack 30A001A Item 16) and into the hexagonal, threaded, extension piece.

## SECTION 8 - REAR SUSPENSION

36 Tighten all fixings installed in Paras 32 to 35 to a torque of 47 Nm.

37 Remove the outer locknut from the speed sensor. Pass the speed sensor through the bracket and replace the locknut ensuring that the serrated face is against the bracket. Adjust the two locknuts until there is a 1 mm clearance between the sensor and the serrated disc on the driveshaft. Tighten the locknuts without disturbing this clearance.

38 Connect the sensor plug to the 3-pin connector on the chassis loom near the 'A' frame mounting boss. Secure the assembled connector to the lower chassis rail ensuring that there is sufficient free play in the sensor lead to accommodate suspension movement.



- 1 Serrated disc
- 2 Speed sensor
- 3 Anti-roll bar extension piece
- 4 Speed sensor bracket

Fig 9 Speed sensor

39 Slide the rear disc/flange assembly over the splined end of the driveshaft and ease into position through the seal in the hub until it is tight against the bearing. (It may be necessary to use the driveshaft nut and washer to pull the flange finally home). Place the thrust washer over the driveshaft and secure using the 41 mm nyloc nut (LH plain insert, RH green insert) noting that the LH nyloc nut has a LH thread. These can initially be tightened to 81 Nm. These nuts must be finally torqued to 270 Nm. This is most easily achieved once the brakes have been bled and the foot brake is applied.

40 Check that there is clearance between the outboard rubber boot on the driveshaft and the lower damper mounting bolt.

41 Check that the outboard driveshaft CV joints do not foul the inner edges of the De Dion ears. If contact occurs, slacken the bolts holding the hub carrier to the ear and adjust until there is sufficient clearance. Re-tighten to the specified torque figures.

### CAUTION

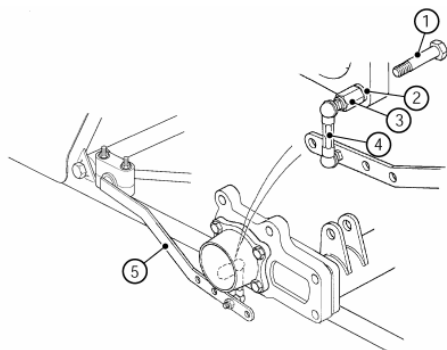
**The brake pads fitted to the REAR callipers may be incorrect. Cars equipped with standard FRONT brakes should bear the number 3460 on the REAR pads. Cars equipped with uprated FRONT brakes, should have blue tabs on the REAR pads. Using the incorrect rear brake pads will result in SVA failure.**

42 The brake callipers are handed and must be fitted with the handbrake cable abutments towards the front of the car. Fit the correct brake pads fully into the callipers ensuring that the range of movement of the pads is not hindered by the calliper body. Slide the calliper over the brake disc whilst separating the brake pads. Secure using bolt (fastener pack 30A001A Item 4) with spring washer (18) and plain washer (16). Pass through the De Dion ear, through the spacer (Fig 8 item 2) and into the calliper. Tighten fixing bolts to 47 Nm. Finally attach and tighten the brake pipes.

### ANTI-ROLL BAR CONNECTION AND ADJUSTMENT

43 Shorten the droplinks as much as possible ensuring the threaded ends face in the same direction. Tighten locknuts. Apply Loctite to the threaded arm of the droplink and screw into the extension piece (fitted in Para 35) using washer (16), refer to Fig 10. Pass the threaded portion of the lower droplink through the anti-roll bar and secure with nyloc nut (fastener pack 30R011A Item 9).

## SECTION 8 - REAR SUSPENSION



- |                   |                 |
|-------------------|-----------------|
| 1 Bolt            | 4 Droplink      |
| 2 Plain washer    | 5 Anti-roll bar |
| 3 Extension piece |                 |

Fig 10 Anti-roll bar connections

### NOTE

*Droplink assembly and connections, shown rotated through 180° for clarity.*

44 The position of the droplinks in the anti-roll bar determines the degree of the anti-roll given. Positioning the droplinks closer to the pivot (at the cotton reel bushes) will give more roll resistance. The same position must be set both LH and RH. The rearmost hole is the softest and forward most hole is the stiffest position.

## HANDBRAKE MECHANISM

### WARNINGS

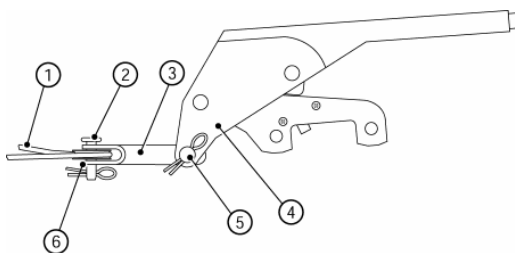
- (1) **Never work underneath a car without supporting it on axle stands or equivalent. Do not rely on a jack alone.**
- (2) **Use appropriate eye protection whilst working under the car.**

### NOTES

- (1) *Prior to installing the handbrake cable ensure that the adjustable boss is slackened off to allow easier location.*
- (2) *The grommet and short section of flexible tubing on each section of outer cable are not required in this application and may be removed.*
- (3) *The switch on the handbrake assembly is not used in this application.*

45 Install the handbrake mechanism and cables, refer to Paras 46 to 51, before installing the differential and propshaft. The handbrake cables are connected to the rear brake callipers and adjusted later.

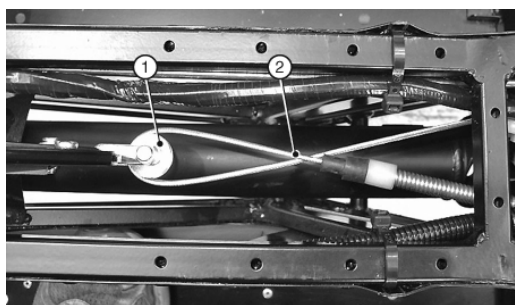
46 Pull the two sections of outer cable to the opposite ends of the inner cable with the nylon adjuster nuts to the right. Place the inner cable, refer to Fig 11, around the pulley (polythene bag). Install the pulley into the handbrake clevis and insert the thin clevis pin through the handbrake clevis through the pulley and back into the handbrake clevis. Secure the clevis pin in place with split pin (fastener pack 30P12A Item 14).



- 1 Handbrake inner cable
- 2 Thin clevis pin and split pin
- 3 Handbrake clevis
- 4 Handbrake assembly
- 5 Thick clevis pin and split pin
- 6 Pulley

Fig 11 Handbrake assembly

47 Insert the handbrake cables into the transmission tunnel with the nylon adjusting nuts to the LH side of the transmission tunnel; the inner cable should now cross over itself immediately behind the pulley, refer to Fig 12.



- 1 Pulley
- 2 Handbrake cable twist

Fig 12 Handbrake cable arrangement

## SECTION 8 - REAR SUSPENSION

48 Locate the fixed nylon boss on the outer cable into the RH bracket on the chassis above the differential and locate the adjuster on the outer cable into the LH bracket on the chassis above the differential.

49 Secure the handbrake assembly to the chassis using the screws (fastener pack 30P012A Item 4) and nyloc nuts (9). The front hole in the handbrake mechanism is elongated to allow adjustment of the handbrake lever in the 'off' position .

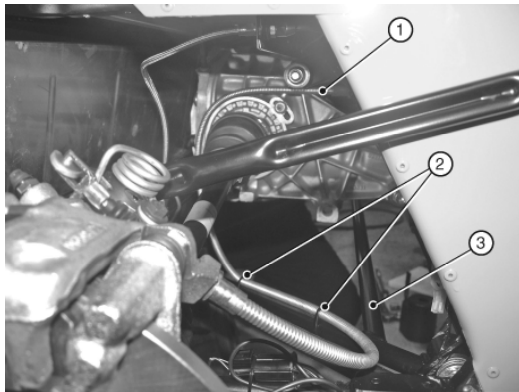
### NOTE

*For SV installation refer to Section 15 before proceeding.*

50 The two ends of the handbrake cable emerge from the rear of the transmission tunnel rearwards. Each end of the handbrake cable should be routed over the respective driveshaft then turned through 180° under the driveshaft and secured to the chassis diagonals, using cable ties, just outboard of the 'A' frame. Finally the handbrake cable is turned back on itself and attached to the calliper through the abutments, refer to Fig 13.

### NOTE

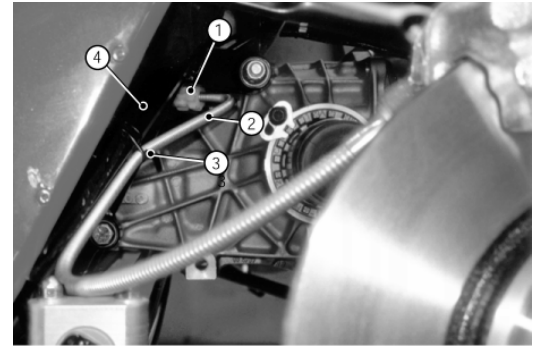
*Ensure that cable cannot foul flexible brake pipe during suspension movement.*



- 1 Handbrake cable
- 2 Cable tie
- 3 'A' frame

Fig 13 Handbrake cable routing (non adjustable side)

51 On SV models the RH side of the handbrake cable is routed as shown in Fig 12. Due to the design of the SV chassis LH side of the handbrake cable emerges from the rear of the transmission tunnel and is turned through 90° across the seat back towards the wheel hub and is attached to the calliper through the abutment. Secure the handbrake cable to the diagonal chassis member using cable ties, refer to Fig 14.

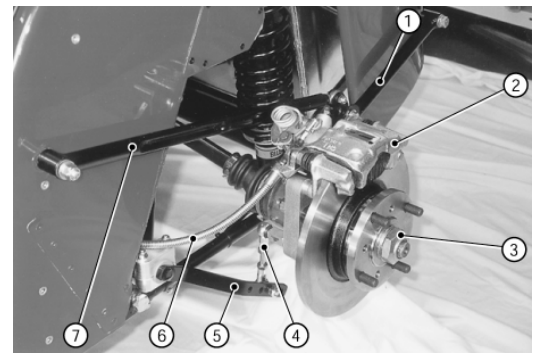


- 1 Handbrake adjuster
- 2 Handbrake cable
- 3 Cable tie
- 4 Chassis

Fig 14 Handbrake cable routing - adjustable side (SV model)

52 The handbrake cable should not be adjusted until the transmission tunnel cover (interior trim) has been fitted as the handbrake lever is required to be in the vertical position during fitment of the trim.

53 The complete rear suspension arrangement can be seen in Fig 15.



- 1 Watts link rear arm
- 2 Brake calliper
- 3 Hub assembly
- 4 Drop link
- 5 Anti-roll bar
- 6 Handbrake cable
- 7 Watts link front arm

Fig 15 Rear suspension arrangement

## SECTION 8 - REAR SUSPENSION

### HANDBRAKE ADJUSTMENT

54 Adjust the handbrake by rotating the knurled nut that locates in the bracket above the differential. The handbrake should be set to lock the rear wheels on three clicks of the ratchet mechanism. Ensure that the pads are not binding and tighten the second knurled nut to lock the adjuster.

### FINAL ADJUSTMENTS

#### WARNINGS

- (1) **Never work underneath a car without supporting it on axle stands or equivalent. Do not rely on a jack alone.**
- (2) **Use appropriate eye protection whilst working under the car.**

55 If the damper units have been fitted, place the axle stands under the De Dion tube so that the weight of the car is taken up through the spring damper units. Ensure that all the suspension securing bolts are tightened as detailed in Table 2.

**TABLE 2 TORQUE FIGURES**

Location	Torque (Nm)
Watts link locknut	20
Bellcrank to link	14
Watts link rear mount	34
Bellcrank to De Dion	34
Watts link front mount	34
Radius arm	34
'A' frame	81
Rear damper bolts (All)	54
Hub nuts	270
Hub mountings	47
Brake calliper	47
Rear anti-roll bar clamp	14
De Dion ears	47

### FILLING OF DIFFERENTIAL

#### WARNING

**Oils - prolonged and repeated contact may cause serious skin disorders:**

- (a) **Avoid contact with the skin as far as possible and wash thoroughly after any contact.**
- (b) **Keep out of reach of children.**
- (c) **First aid treatment should be obtained for open cuts and wounds.**
- (d) **Use appropriate barrier creams.**

56 Once the driveshafts have been located the differential can be filled with oil. It is recommended that the differential is filled with EP90 gear oil (Including those fitted with a limited slip differential). Refer to your Owner's Handbook for a complete list of recommended lubricants.

57 An LSD additive may be used in LSD's to reduce differential operating noise when cornering. This is available from Caterham spare parts counter.

#### NOTE

*This operation is made easier if the boot floor has been removed to allow access.*

58 Ensure the filler plug is to hand. Fill the differential with approximately 1.1 litres of EP90 gear oil until the oil runs out of the filler hole. Screw the filler plug in and tighten.

59 Secure the boot floor to the chassis.



**SECTION 9 - INTERIOR & TRIM**

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## SECTION 9 - INTERIOR & TRIM

### GENERAL

- 1 Superlight models are not supplied with any carpets unless otherwise specified.
- 2 Before fitting the carpets ensure that all operations that require access under the carpets have been completed.
- 3 The items specified in Table 1 will be required during procedures detailed in this section.

**TABLE 1 ADHESIVE AND SPECIAL TOOLS REQUIRED**

Item	Remarks
Adhesive	Contact adhesive
Durable dot fastening tool (Part No. 76068)	Supplied in chassis pack

- 4 It is recommended that a dry run is completed before cutting or gluing the carpets in the final position.

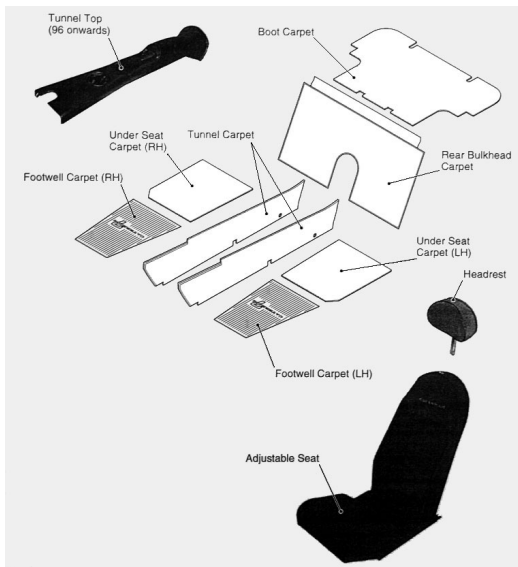


Fig 1 Carpets

### SEAT BACK CARPETS

#### WARNING

**Ensure adhesive is applied in a well-ventilated area. Follow instructions on adhesive packaging. Care must be taken whilst working in a confined area e.g. the footwell.**

- 5 The carpet that covers the seat back area has a vinyl strip along the upper edge. Lay the carpet into place ensuring that the carpet covers the aluminium seat back right down to the floor. Apply adhesive to the vinyl strip and stick to the square tube at the top of the seat back panel.

- 6 The seatback carpet will need to be cut to allow the seat belt through it. Mark the carpet where the inertia reel seat belt exits the seat back and cut a slot.

- 7 The carpet must fit flat at the transmission tunnel. If necessary small cuts should be made in the area of the corners to allow the tabs on the carpet to hinge out against the transmission tunnel.

- 8 Once the carpet has been fitted around the transmission tunnel apply adhesive to the carpet and press into position against the seat back. It is only necessary to apply adhesive as far down as the top of the transmission tunnel as the remainder of the carpet is behind the seats.

### TRANSMISSION TUNNEL CARPET

- 9 Attach the small aluminium transmission tunnel cover on the rear of the transmission tunnel top using the 5/32" rivets provided.

- 10 Ensure that the reverse light switch and associated blanking grommet have been installed prior to fitting the transmission tunnel carpets. The transmission tunnel carpets are handed so ensure that the correct carpet is fitted to each side.

- 11 Coat the transmission tunnel with adhesive and stick the transmission tunnel carpets to the transmission tunnel. Ensure that good adhesive coverage is maintained, particularly in the forward section of the transmission tunnel.

## SECTION 9 - INTERIOR & TRIM

### TRANSMISSION TUNNEL TOP

#### NOTE

*Do not attempt to fit the tunnel top until the tunnel carpet adhesive is dry completely.*

12 The transmission tunnel top incorporates a padded armrest, the gear lever gaiter and the handbrake gaiter.

13 Pull the handbrake near vertical. Fit the transmission tunnel top, ensuring that the handbrake and gearlever locate in the respective gaiter and press firmly into position over the sides of the transmission tunnel carpets.

14 Screw the gearknob into position and lock with a grubscrew.

### RUBBER FOOTWELL MATS

15 Place the mats in the respective footwell (mats are handed). No fixings are required.

### FOOTWELL CARPETS (SV MODEL ONLY)

16 The footwell carpets are handed and are secured into the footwell using the three poppers fitted at the rear of the footwell.

17 Attach 3 popper bases (fastener pack ZIT03 Item 2) to the rear of the front footwell using rivets (1) through the pre-drilled holes in the floor panel.

18 Stick masking tape to the underside of the carpet in the approximate position of the floor mounted poppers and lay the carpet into position. Press down firmly on the carpet so that the bases make an impression on the masking tape. Make appropriate holes in the carpet and rivet together the popper (3) and fastener button (4), using the Durable Dot fastening tool, refer to Table 1. Ensure that the fastener button is uppermost on the carpet.

#### NOTE

*For correct use of the popper fastener tool refer to Section 12.*

19 Fit the footwell carpet into place and secure using the poppers.

### UNDER SEAT CARPETS (SV MODEL ONLY)

20 The under seat carpets are handed and are secured into position by the seats. Place the carpet into position ensuring that the four holes in the carpets align with the seat mounting holes in the cockpit floor.

### BOOT CARPET

21 The boot carpet is laid into position and requires no adhesive. It will be necessary to cut the carpet to fit around the fuel filler pipe. Tuck the edges of boot carpet down the sides of the aluminium honeycomb bootboard at the rear and the sides taking care not to damage the aluminium body panel.

22 SV models are provided with carpet for the boot interior side and front panels. Apply adhesive and secure the carpet shape into the relevant space.

23 Fit the fuel filler cover plate into position and drill through the cover plate into the boot board using a 2 mm drill. Attach the cover plate using self tapping screws (fastener pack ZCH01 Item 7). It may be necessary to relocate the fuel filler hose clips to fit the cover.

### SIDE AND KNEE TRIM PANELS

#### NOTES

(1) *If specified, the optional sill protectors and roll cage must be fitted before the installation of the knee trim panels, side panels and associated piping can be completed.*

(2) *If the optional roll cage is to be fitted, shorten the sill protectors to 370 mm long and position them towards the rear of the sill.*

24 Not all of the rivets used to secure the interior side panels into place will have been fitted. This is to allow fitting of sill protectors and to provide access to the front roll cage mountings, if required.

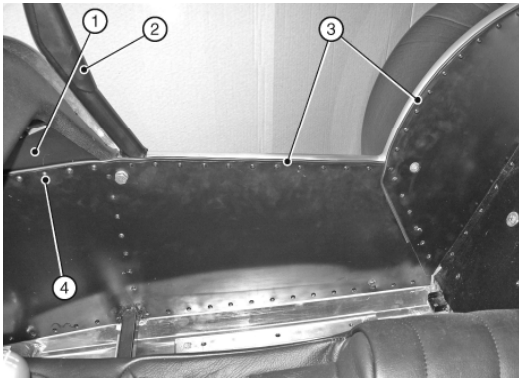
#### CAUTION

**When drilling the sill protectors take care not to drill through both sides of the chassis tube.**

## SECTION 9 - INTERIOR & TRIM

25 If necessary, position the sill protector on the sill, with the long edge between the chassis tube and trim panel, press down on the sill protector and drill (5/32") through the existing holes in the trim panel, through the sill protector and through the existing holes in the chassis tube. When all of the holes have been drilled, remove the sill protector and clear the holes of swarf, burrs and raised edges.

26 Position a length of trim piping with the flat portion between the interior side panel and the chassis tube and cut to length. The piping should reach from the front of the knee trim panel to just behind the point where the side panel meets the rear wheel arch panel, refer to Fig 2. Ensure that the rounded edge of the piping sits neatly along the top edge of the side panel.



- |                        |                       |
|------------------------|-----------------------|
| 1 Knee trim panel      | 4 Self-tapping screws |
| 2 Roll cage (optional) |                       |
| 3 Piping               |                       |

Fig 2 Side panel detail

27 Position the pre-bent and drilled knee trim panel between the piping and the chassis tube, secure the knee trim panel, piping and side panel to the chassis tube using self-tapping screws (fastener pack ZCH01 Item 8).

### NOTE

*If the optional roll cage is to be fitted leave the screws out of the rearmost two holes.*

28 Fit the sill protector between the piping and the chassis rail and align the holes drilled previously. Drill through the holes again to pierce the flat portion of the piping and secure the sill protector, piping and side panel using rivets (5), refer to Fig 3.

### NOTE

*If the optional roll cage is to be fitted leave the rivets out of the forward three holes in the horizontal row and the top three holes in the vertical row.*

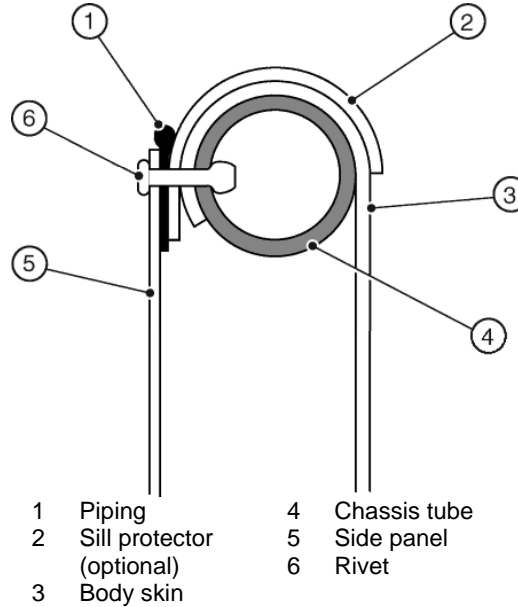


Fig 3 Trim fixings

29 Fit the piping and secure the curved section of side panel in a similar manner. Ensure that this section of piping overlays the horizontal section. Cut a series of 'V' shaped notches in the flat portion of the piping so that it follows the curve of the side panel neatly.

## INERTIA REEL SEAT BELT

30 If specified, the inertia reel seat belts will have been positioned by Caterham, however none of the visible chassis mountings will be tightened. The belts should be tightened at the same time as the interior trim is fitted. The top and bottom mountings should be tightened to 47 Nm.

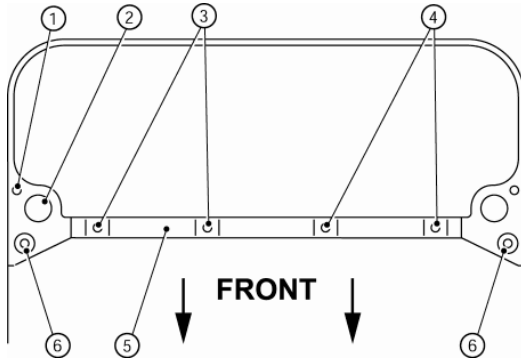
### WARNING

**Use appropriate eye protection whilst working under the car.**

## SECTION 9 - INTERIOR & TRIM

### FOUR-POINT HARNESS

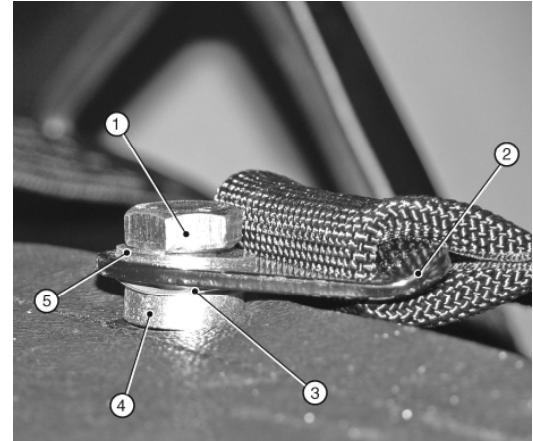
31 The harness should be fitted after the seat back carpet, tunnel carpets and boot cover have been fitted (if specified). Locate the threaded mounting holes in the top of the chassis, (refer to Fig 4), and carefully cut away the material covering the holes.



- 1 Roll over bar mounting
- 2 Roll over bar locating recess
- 3 Drivers harness mounting
- 4 Passenger harness mounting
- 5 Chassis member
- 6 Inertia reel mounting

Fig 4 Mounting holes four-point harness upper

32 From the mounting kit supplied with the harness, assemble a 7/16" UNF x 1 3/4" bolt, plain washer next to the bolt head, and pass through the broad shoulder strap, crinkle washer and through the bush. Ensure the smaller diameter of the bush is closest to the bolt head. Screw the bolt into the harness mounting point, refer to Fig 5.



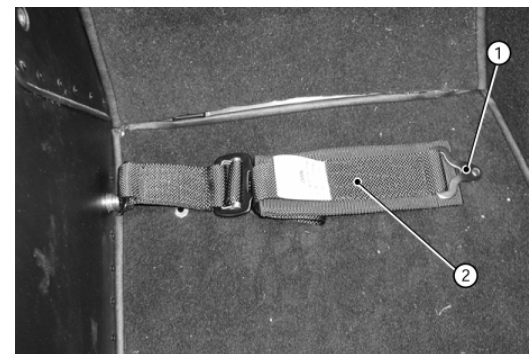
- 1 Bolt
- 2 Shoulder restraint
- 3 Crinkle washer
- 4 Bush
- 5 Plain washer

Fig 5 Shoulder strap with Track day roll over bar (Shown with bolt loose)

33 To fit the outboard lap strap, assemble a 7/16" UNF x 1" bolt, with a plain washer next to the bolt head, pass through the outboard lap strap crinkle washer, and through the bush. Ensure the smaller diameter of the bush is closest to the bolt head. Insert the bolt in the threaded boss and tighten to 48 Nm refer to Fig 6. Ensure lap strap buckle is uppermost.

#### NOTE

*Use of a longer bolt to secure the outer lap strap will result in damage to outer body side panel.*

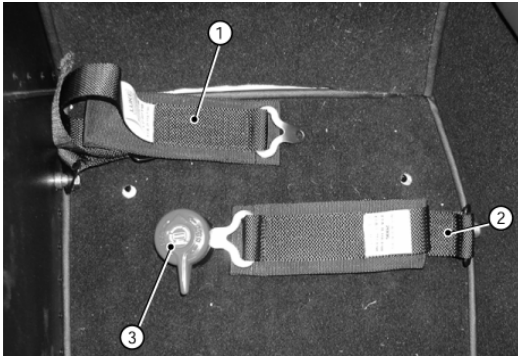


- 1 Buckle
- 2 Outboard lap strap

Fig 6 Outboard lap strap

## SECTION 9 - INTERIOR & TRIM

34 To fit the inboard lap strap, assemble a 7/16" UNF x 1" bolt, with a plain washer next to the bolt head, pass through the inboard lap strap, crinkle washer, and through the bush. Ensure the smaller diameter of the bush is closest to the bolt head. Insert the bolt into the threaded boss and tighten to 47 Nm, refer to Fig 7. Ensure lap strap buckle is uppermost.



- 1 Outboard lap strap
- 2 Inboard lap strap
- 3 Buckle

Fig 7 Lap straps

### SIX-POINT HARNESS

#### Standard floor

35 To fit the crutch strap drill an 11 mm hole through the two crutch strap mounting points located at the rear of the cockpit and through the floor of the cockpit. Assemble an M10 x 25 bolt with a plain washer next to the bolt head. Pass the bolt through the hole in the crutch strap, through the crinkle washer and top hat spacer, down through the chassis mounting ensuring the strap is offset downwards, and through the cockpit floor. Secure the bolt in place using a plain washer and nyloc nut. Tighten to 47 Nm. Ensure the crutch strap fixing plate has the bend facing the cockpit floor.

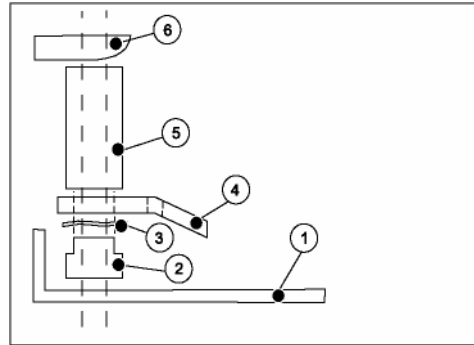
#### Low floor

36 Drill a 7/16" hole through the crutch strap-fixing bracket then through the floor pan directly below it.

37 Lay out the crutch strap to assure the correct orientation and assemble the harness eyelets and spacers, refer to Fig 8.

38 Insert the long 7/16" x 3" bolt upwards through the floor pan and assembled spacers detailed above. Secure in place using the plain washers and nyloc nuts supplied. Tighten all fixings to 61 Nm.

39 Fit the shoulder and lap straps as detailed in Paras 31 to 34.



- 1 Lowered floor pan
- 2 Top hat spacer bush
- 3 Crinkle washer
- 4 Fixing eyelet
- 5 Aluminium spacer
- 6 Crutch strap fixing bracket

Fig 8 Crutch strap spacer location

### SEATS

#### Standard cloth or leather seats

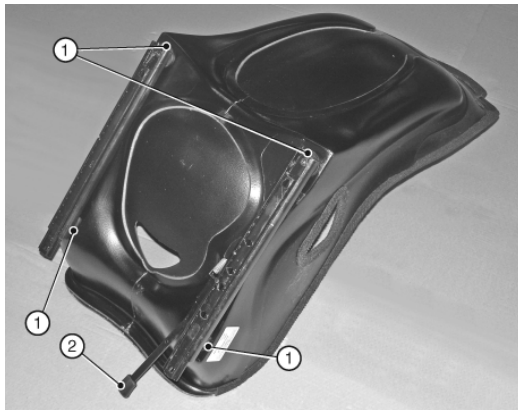
40 The adjustable seats are supplied attached to the seat runner. Place the seat into position over the underseat carpet (SV only) and secure the front mountings by passing setscrew (fastener pack ZSE03 Item 1) down through the mounting and securing using plain washer (3) and nyloc nut (2). Slide the seat fully forward and pass setscrew (1) down through the rear mountings and secure using plain washer (3) and nyloc nut (2). Tighten the fastenings.

## SECTION 9 - INTERIOR & TRIM

### Composite seats

#### Adjustable seat

41 Fit the runner with the adjusting handle to the RH side of the seat with the handle facing forwards and inboard of the runner. Secure the front mounting using reduced head cap head bolt (fastener pack ZSE06 Item 2) through the round hole then through two thick spacers (8) and into the threaded seat base. Secure the rear with cap head bolt (2) through the square hole, through 1 thick spacer (8) and 1 thin spacer (7) and into the threaded seat base, refer to Fig 9.



- 1 Spacers
- 2 Adjusting handle

Fig 9 Adjustable seat

42 Fit the LH runner in the same way ensuring that the outer part of the runner is towards the seat base. Secure using bolt (2), one thick spacer (8) and one thin spacer (7) on each fixing ensuring they are between the runner and the seat. Torque all fixings to 14 Nm.

43 Ensure that the harness option specified has been installed prior to fitting the seat. Place the seat into position feeding the lap and shoulder straps through the apertures in the seat body and the crutch strap (if specified) through the aperture in the seat base, refer to Fig 10. Ensure that the harness straps are not twisted.

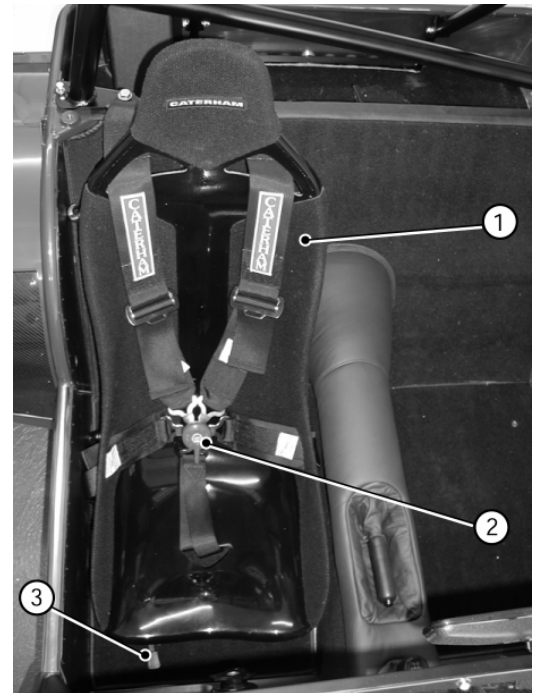
44 On low-floor cars the seat adjusting handle must pass beneath the square chassis tube and through the aperture in the vertical section of aluminium panel.

45 Secure the front mountings with bolt (2) passed down through the runner and secure under the floor using plain washer (5) and nyloc nut (4).

46 Slide the seat fully forwards and pass a bolt (2) down through the rear holes in the runner and secure under the floor using plain washer (5) and nyloc nut (4).

#### NOTE

*If the car has a honeycomb floor, bolt (1) is passed through the runner, through spacer (6) and secured using plain washer (5) and nyloc nut (4).*



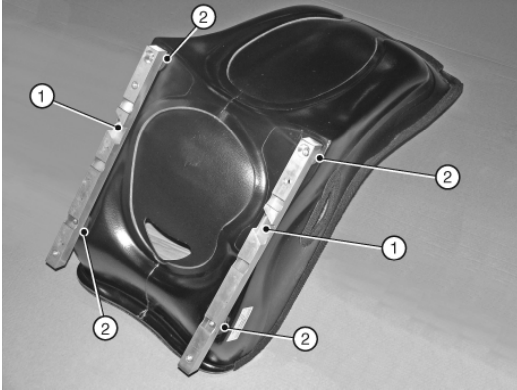
- 1 Composite seat
- 2 Six-point harness
- 3 Seat adjuster

Fig 10 Composite seat and six-point harness

## SECTION 9 - INTERIOR & TRIM

### Fixed seat

47 The fixed seat is bolted to the floor via two 25 mm square section, aluminium tubes. This tube has a series of cut-outs on one side and plain holes in the opposite side. It is important that this tube is fitted in the correct orientation. The cut-outs must face away from the seat base allowing flush fitment to the floor. The large cut-out must be biased towards the rear of the seat. Both tubes are identical and are fitted in the same orientation, refer to Fig 11.



- 1 Large recess
- 2 Spacer

Fig 11 Fixed seat

48 Position the square section aluminium tubes on the seat base and pass bolt (fastener pack ZSE05 Item 2) through the large hole in the underside of the spacer and into the small hole opposite, through one thick spacer (8) and into the threaded seat base. Torque all fixings to 14 Nm.

#### NOTE

*If a track day roll over bar and Petty strut is installed, the seat can reclined slightly by replacing the front fixing with bolt (1) and additional thick plastic spacers (8) on each side at the front, between the seat base and the aluminium tube.*

49 Ensure that the harness option specified has been installed prior to fitting the seat. Place the seat into position feeding the lap and shoulder straps through the apertures in the seat body and the crutch strap (if specified) through the aperture in the seat base, refer to Fig 4. Ensure that the harness straps are not twisted.

50 Secure the seat with bolts (2) and plain washers (5) passed upwards through the floor into the threaded bosses in the aluminium tubes.

### MINOR TRIM ITEMS

#### Scuttle edge trim

51 This strip (chassis kit) is designed both to finish off the scuttle around the dashboard tidily and to protect the occupants from the hard aluminium edge. Cut the trim to length and secure by firmly pushing the trim into place by hand. The scuttle edge trim is an SVA requirement, refer to Section 15.

#### Nose badge

52 The circular nose badge (polythene bag marked 'miscellaneous') is mounted on the nose cone of the vehicle. It is self adhesive but has two locating dowels. Before removing the paper to reveal the adhesive on the underside of the badge, carry out a trial fit to ensure the badge will sit square. It may be necessary to remove the paint from the pre-drilled holes on the nose cone before fitting the badge.

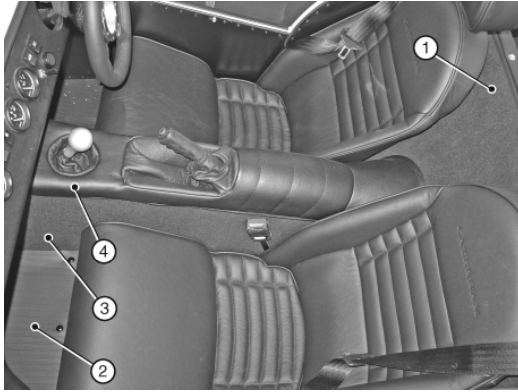
### REAR VIEW MIRROR (INTERIOR)

53 The centre mounted mirror is a legal requirement and must be fitted. The mirror has a self adhesive pad and should be stuck as high as possible on the interior of the windscreen on the centre line of the car. Prior to removing the paper backing from the self adhesive pad ensure the area where the mirror is to be placed has been thoroughly cleaned using an alcohol based degreaser. Note that the mirror can be inverted on its stalk to minimise windscreen obstruction.

54 On Superlight models without a windscreen, the mirror must be secured to the scuttle top on the centreline of the vehicle. Ensure that the area where the mirror is to be placed has been thoroughly cleaned using an alcohol based degreaser.



## SECTION 9 - INTERIOR & TRIM



- 1 Rear bulkhead carpet
- 2 Footwell carpet
- 3 Tunnel carpet
- 4 Tunnel top

Fig 12 Completed interior

**NOTE**

*Items may differ from those shown, dependant on the chosen specification.*

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**SECTION 10 - FIBREGLASS**

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## SECTION 10 - FIBREGLASS

### CYCLE WINGS

1 Cycle wings are supplied in two sizes; these are dependant upon wheel size. Ensure wheels and cycle wings are compatible, refer to Table 1.

**TABLE 1 CYCLE WINGS**

Wing size (approx.)	Wheel size
78 cm over circumference	13", 14" and 15"
94 cm over circumference	16"

2 Piping (polythene bag marked 'SVA') should be fitted around the edge of the cycle wing. This is an SVA requirement, refer to Section 15.

3 It is easier to fit the front indicator repeaters to the cycle wings prior to fitting them to the cycle wingstay. Dismantle the repeater assemblies removing and retaining both bulb and lens. Remove the studs in the base and discard.

#### WARNINGS

**(1) Use appropriate eye protection whilst carrying out drilling operations.**

**(2) Use a suitable face mask to prevent inhalation of dust when drilling fibreglass or carbon fibre.**

#### CAUTION

**When drilling fibreglass use tape on the surface over the drill holes to prevent damage to the gel coat or painted finish. Slow drill speeds must be used.**

4 Drill through the cycle wing at the pre-marked points using a 5 mm drill. Then enlarge the centre hole to 15 mm.

5 Feed the repeater wire through the cycle wing from the outside then secure the base using screws (fastener pack 30L002A) and nyloc nuts. Replace the bulb and repeater lens.

6 The cycle wing will have been marked with the positions for the front two mounting bolts for each wing. These should be drilled through using a 5 mm drill.

7 The front cycle wings bolt to the tubular wingstays which are rigidly mounted to the front uprights.

8 Fit the front wheels ensuring that the steering rack is centred. Place the cycle wing over the wingstay so that the bolt holes are over the centre line of the forward wingstay tube such that the wing overhangs evenly on either side of the tyre. The wing can be held in position using masking tape. It is possible that the wingstay will need to be bent to allow the cycle wing to fit centrally over the tyre. Mark the positions for the bolt holes onto the wingstay.

9 Remove the cycle wing and with the tyre protected centre punch the wingstay. Drill the holes through the wingstay using a 6 mm drill. Ensure that the drill cannot contact the tyre.

10 Drill an additional hole in the underside of the front wingstay near the open end using a 5/32" drill. Remove all sharp edges on the inside and outside of the wingstay tube.

11 Loosely fit the cycle wing to check the alignment of the cycle wing and wingstays relative to the tyre. The cycle wing should be checked to ensure that it is centrally located over the tyre. Remove the cycle wing. Place a strip of masking tape across the tyre underneath the drilled wingstay. Using a ruler held at 90° to the surface of the tyre, mark 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 position to the wingstay tube. Centre punch and drill using a 6 mm drill as for the front holes.

12 Refit the cycle wing, loosely bolting it at the front and aligning it over the tyre and then carefully remove the wheel without disturbing the wing. Masking tape can be used to hold the wing in place. Carefully mark the underneath of the wing with the bolt hole positions and then remove the wing. Drill a small pilot hole from underneath the cycle wing, taking care not to damage the gel coat/painted surface. Check alignment of the holes with the wingstays, adjusting if required, then drill through from the top of the cycle wing with a 5 mm drill.

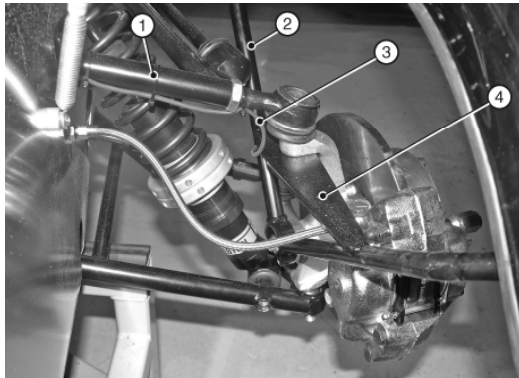
## SECTION 10 - FIBREGLASS

13 Place a strip of self adhesive foam (fastener pack ZFG12 Item 7) on the top of each cycle wingstay tube. Cut two rubber grommets in half to provide four rubber washers. Pass screw (5) through the manufactured washers and down through the cycle wing and wingstay. Secure using washers (4) and nyloc nuts (2). Tighten until the rubber washer is slightly larger than the screw head. The black wire from the indicator repeater is the earth lead and should be attached to the front wingstay using a pop rivet in the 5/32" hole drilled at Para 10. Remove paint to ensure a good contact.

14 Route the green wire from the indicator repeater inside the wingstay until it emerges from the pre-drilled hole near the wingstay brace. From the wingstay the wire must be routed along the rear of the upper wishbone ball joint, and the upper wishbone. Secure using small cable ties at 50 mm intervals, refer to Fig 1.

### NOTE

To comply with SVA requirements the green repeater wire must be covered with heatshrink sleeving.



- |                  |                  |
|------------------|------------------|
| 1 Upper wishbone | 3 Repeater wire  |
| 2 Front wingstay | 4 Wingstay brace |

Fig 1 Indicator repeater wiring

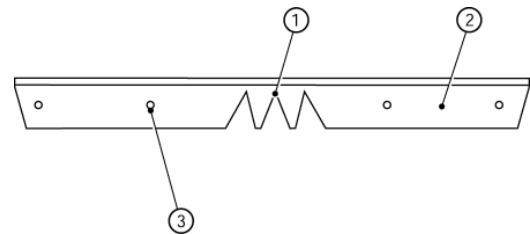
15 Once inside the aluminium body skin the green wire should be fitted into the 6 pin econoseal plug. It is recommended that this connection is made at the same time as the headlamp and indicator wiring, refer to Section 11.

## REAR WING PROTECTORS (STONE GUARDS)

### NOTE

It is advisable to fit the wing protectors to the wings before fitting the wings to the car. Once the wings are fitted there is very little clearance between bodywork and drill chuck when drilling holes for the inner row of rivets.

16 The wing piping (fastener pack ZWS01 or ZWS02 (option) Item 2) fits between the rear wing protector and the rear wing. Cut the piping to length and fit around the top, outer and lower edges of the wing protector so the bead is against the edge of the protector. 'V' shaped notches (refer to Fig 2) should be cut to allow the piping to smoothly follow the shape of the protector. Position the piping under the protector, ensure correct orientation of the protector (refer to Fig 3) and drill through the existing holes into the piping with a 1/8" drill.



- 1 'V' shaped notch
- 2 Wing piping
- 3 Holes

Fig 2 Rear wing protector piping

17 The wing protector should be placed on the lower front of the rear wings. The correct position can be obtained by placing the lower angled edge approximately 5 mm up from the lower edge of the wing and the inboard side of the protector tight up against the inboard side of the wing (the side of the wing that bolts to the car).

### NOTES

(1) The protectors are supplied flat so will need to be gently shaped to follow the contour of the wing.

(2) The protective film on stainless steel wing protectors should be removed from around the rivet heads before fitting. The protected side faces outward.

**SECTION 10 - FIBREGLASS**

(3) The LH wing protector is shorter than the RH protector to allow for the cut away section at the bottom of the LH wing. Both LH and RH protectors should be fitted equidistant from the bottom of the respective wing to ensure the tops of both protectors are the same height on the car.

18 Position the protector on the rear wing and mark one of the corner holes. Ensure correct spacing and orientation. Drill the hole using a 1/8" drill. Fit the rear wing piping into position under the protector and rivet into position using rivet (1).

**NOTE**

*Carbon fibre wing protector uses black rivets and the stainless steel wing protector uses plain rivets.*

19 Attach the wing protector working outwards, one rivet at a time, from the corner ensuring that the wing piping is in the correct position. Drill 1/8" holes and attach using rivets (1).

**REAR WINGS**

20 The rear wings are provided pre-drilled with both the wing fixing holes and further holes for the suspension arms. To enable the wing to be fitted to the car you will need to trim out the fibreglass from the larger holes to enable fitment over the radius arm or Watts link arms, refer to Fig 3). The wings are supplied in this way to maintain their strength prior to them being fitted to the car. An alternative fixing method would be to remove the suspension arms then refit them once the wing is secured in place.

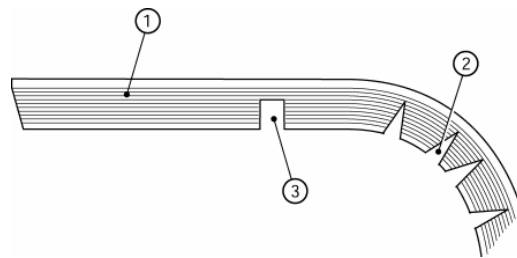


- 1 Rear wing fixings
- 2 Rear wing

Fig 3 Rear wing fitment

21 Offer the rear wing up to the side of the car and bolt in place using a setscrew (fastener pack ZFG12 Item 1) and plain washers (3) into rivnuts at the front of the rear wing and bolts (1), plain washers (3) through the rear of the wing and secured using plain washers (3) and nyloc nuts (2). The setscrews used to secure the rear upper section of the wing should be passed through the body from inside the boot. Loosely fit all fasteners.

22 Wing piping (6) is provided to fit between the rear wing and the car body. The wing piping should be positioned against the rear wing and cut to length. The wing piping has six ribs running longitudinally. 'V' shaped notches, refer to Fig 4, should be cut to the sixth rib to allow the piping to smoothly follow the curve of the rear wing. Where the wing mounting bolts occur, rectangular shapes should be cut to the fifth rib to accommodate.



- 1 Wing piping
- 2 'V' shaped notches
- 3 Rectangular notches

Fig 4 Wing piping

## SECTION 10 - FIBREGLASS

23 Secure the rear wing ensuring that the bead of the wing piping is protruding. Do not over tighten fixings, refer to Fig 5.



- 1 Piping between wing and panel
- 2 Piping on three sides of wing protector

Fig 5 Rear wing

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**SECTION 11 - LIGHTING**

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## SECTION 11 - LIGHTING

### GENERAL

1 The lighting kit includes all the parts needed to make the car comply with the lighting requirements of SVA. It is imperative that these instructions are adhered to in order to fulfil the legal requirements of the lighting.

2 If fitted, remove the lead from the battery negative terminal.

### HEADLIGHTS AND FRONT INDICATORS

3 The headlight brackets will have been fitted during assembly of the front suspension.

4 Fit a length of edge strip (polythene bag 'SVA') to the underside edge of the indicator cone. It is an SVA requirement that the edge strip covers the entire edge of the mounting cone, including the portion directly beneath the lens.

5 Remove the lens from the front indicator. Ensure that the drainage hole on the indicator seal is at the bottom, line up the holes in the indicator base with the holes in the indicator cone and secure using three setscrews (fastener pack 30L002A Item 3) and nyloc nuts (6). Do not over tighten. Replace the lens.

6 Tighten the two grub screws securing each headlight bracket into the chassis. Tighten to 7 Nm.

7 Remove the headlight rim by undoing the clamping screw located on top of the headlight bowl and unhooking the lens from the headlight bowl. Remove the plug from the back of the headlight bulb and remove the sidelight housing from the reflector.

8 Remove the securing nut and lock washer from the headlight mounting stud and smear a thin layer of oil to the thread. Insert the headlight harness and headlight mounting stud through the indicator cone and into the headlight bracket.

9 Refit the headlight securing nut and lock washer and tighten until the headlight unit cannot move freely, this will aid assembly however these nuts will need to be slackened off to allow the headlights to be correctly adjusted, refer to Fig 1.

### NOTE

*Ensure that the locating tang on the headlight shell engages with the recess in the mounting stud.*



- 1 Headlight unit
- 2 Headlight bracket
- 3 Indicator cone
- 4 Indicator

Fig 1 Headlight and indicator LH

10 Pass the black indicator earth wire (terminated in a ring terminal) through the hollow headlight unit mounting stud and secure to the earth screw at the base of the headlight unit. Pull excess wire into headlight unit.

11 Refit the sidelight housing into the reflector and refit the plug to the headlight bulb. Hook the bottom of the headlight rim into the lip on the headlight bowl and swing the headlight rim up into position. Secure using the clamping screw.

12 Feed the headlight wiring and the green indicator wire through the hollow headlight bracket so that it exits into the engine bay.

### FRONT INDICATOR REPEATERS

13 The front indicator repeaters are fitted at the same time as the front cycle wings, refer to Section 10.

## SECTION 11 - LIGHTING

### FRONT WIRING ELECTRICAL CONNECTIONS

14 Locate the 2 loose econoseal plugs supplied in the chassis pack (2 part black plug and yellow insert). Take the six wires (the sixth wire is the indicator repeater wire which may not be fitted at this point) and push them into the back of the loose black plug ensuring that the connections click into place. If they do not locate correctly turn them through 180° and try again. Refer to Table 1 for the correct terminal position within the connector.

**TABLE 1 FRONT LIGHTING WIRING CONNECTIONS**

Function	Wiring loom colour	Light unit wire colour
Earth	Black	Black
Headlight (Dip beam)	Blue/red	Blue/red
Headlight (Main beam)	Blue/white	Blue/white
Indicator	Green/white	Green
Repeater	Green/white	Green
Sidelight	Red	Red

15 Once the indicator repeaters have been fitted and all the connections have been located into the plug fit the yellow insert into the front of the plug. Connect the plug to the wiring loom and secure the cables to the chassis.

### REAR LIGHTS

16 The kit includes two identical rear light assemblies which comprise of tail, brake and indicator lights. They are mounted on rubber blocks which ensure that the lights are vertical when fitted and are secured with four self-tapping screws. Turn one light unit around on the rubber block and ensure that the amber indicator lens is on the outside.

#### WARNINGS

**(1) Use appropriate eye protection whilst carrying out drilling operations.**

**(2) Use a suitable face mask to prevent inhalation of dust when drilling fibreglass or carbon fibre.**

### CAUTION

**When drilling fibreglass use tape on the surface over the drill holes to prevent damage to the gel coat or painted finish. Slow drill speeds must be used.**

17 The rear wings have been pre-drilled with two holes for the rear light assemblies. The outermost hole has been drilled to 30 mm and this takes the wiring and the econoseal plug. The innermost takes one of the retaining screws. Enlarge the innermost hole using a 4 mm drill.

18 Remove the lenses from the rear light assemblies along with the bulbs noting that the indicator uses a single filament bulb and the brake light uses a double filament bulb.

#### NOTE

*The rear light assemblies are not 'handed'. One of the metal baseplates must be inverted to create a LH/RH pair with the indicator fitting to the outside edge of each light.*

19 Using the metal baseplate as a guide, drill a 4 mm hole through the rubber block in each corner. Ensure that the drill is kept at 90° to the baseplate.

20 Feed the electrical wiring and the econoseal plug through the 30 mm hole ensuring that the grommet is passed through the hole. Attach the rear light unit at the lower inboard corner using screw (2). Do not over tighten. Ensure that the rear light unit is horizontal and drill through the rear light unit into the rear wing. Remove the light unit. Clear away the swarf and refit the light unit using screws (1) on the upper holes and screws (2) on the lower holes. Do not over tighten. Replace the bulbs and lens cover ensuring correct orientation of the lens cover (indicator to the outside).

21 Connect the econoseal plug to the corresponding socket protruding from a hole inside the rear wing. Ensure that the plugs are correctly mated and push the plug inside the rear side panel. Fit the grommet to the hole in the body side panel.

## SECTION 11 - LIGHTING

22 For reference the rear electrical connections are detailed in Table 2.

**TABLE 2 REAR LIGHTING WIRING CONNECTIONS**

Function	Wiring loom colour	Light unit wire colour
Rear light	Red/white	Red
Brake	Green/mauve	Green
Left indicator	Green/red	Green
Right indicator	Green/white	Green
Earth	Black	Black

23 Secure the wiring inside the body using cable ties.

### REVERSING LIGHT AND FOG LIGHT

24 The reversing light and the fog light are fixed to the rear panel and the wiring connections have been made at the factory.

### REAR NUMBER PLATE LIGHT

25 Remove and retain the cross-point screw retaining the light cover and lens; remove and retain the cover and lens. Remove and retain the two nuts and spring washers from the metal baseplate.

26 Pass the wire from the chassis loom through the RH upper hole of the light bracket on the chassis and through the back of baseplate. Fit the baseplate to the bracket and secure with the nuts and spring washers. Ensure that the baseplate studs earth to the bracket through the nuts (remove paint from the bracket as necessary).

#### NOTE

*Cars that are not supplied with a spare wheel bracket will be pre-fitted with a number plate light bracket located below the lower chassis tubes.*

27 Remove and discard the two brass bullet connectors supplied in the light. Shorten the wire to a convenient length, strip back sufficient insulation and attach (crimp) a male bullet connector. Insert the bullet connector into the central terminal on the light. Replace the lens, cover and cross-point screw.

### TESTING

28 Reconnect the battery negative lead. Check all the lights for correct operation.

29 In the event that there are problems check that the bulbs have not been damaged during transit and replace as necessary. If the problem persists check every earth point on the chassis both on the wiring loom and the battery earth lead. If the problem is related to a particular system or side, check the fuse box located under the dashboard in the passenger side of the cockpit further information on fuse identification can be found in your Owner's Handbook.

### HEADLIGHT BEAM SETTING

30 If possible the headlight beam setting should be carried out using professional equipment; if such equipment is not available, proceed as detailed below:

30.1 Position the car on a firm level surface, 2 m from a vertical surface (measured from the front edge of the lower lip of the nose cone). Slacken the headlight securing nuts and switch on the lights (dipped). Adjust the lights until the brightest spot of each light pool (at the apex of the dip-beam cut-off) is 650 mm above the ground.

30.2 Measure the distance between the centres of the headlights on the car and the distance between the centres of the bright spots on the wall. Adjust the headlights as necessary until the two measurements are approximately the same. When alignment is satisfactory, re-check the vertical measurement and tighten the headlight securing nuts.

30.3 The alignment will be tested and adjusted during the post build check. If the car is not being submitted for a post build check, we strongly advise kit builders to get the headlights professionally adjusted.

## SECTION 12 - WEATHER EQUIPMENT

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## SECTION 12 - WEATHER EQUIPMENT

### GENERAL

1 This section explains how to perform the initial fitment of the weather equipment, the tool identified in Table 1 will be required. However, if the specification for your car included hood fitment then instructions on how to refit, remove and fold for storage can be found in your Owner's Handbook.

**TABLE 1 ADDITIONAL TOOLS**

Item	Description
Durable Dot Fastening Tool	Part No. 76068 (supplied in fastener pack ZBC02)

2 Correctly fitted weather equipment is shown in Fig 1.



Fig 1 Weather equipment

### FITTING OF HOODSTICKS AND HOODSTRAPS

#### NOTE

*Whichever option of roll over protection has been specified must be fitted before the hoodsticks.*

3 Remove the inner hoodstick from the hoodstick assembly and feed the end loop of hoodstraps over the front hoodstick and loop in the centre of the hoodstraps over the rear hoodstick ensuring that the adjusting buckle faces downwards when the hoodsticks are erect, refer to Fig 2.

4 Reassemble the hoodstick assembly and attach to the triangular brackets on the chassis using the fixings provided. Ensure that one plain washer is fitted under the head of the screw and the other between the fixing bracket and the hoodstick.

5 Before fitting the hood you must first secure the rearward part of the hoodstick in the correct position. Measure distance A from the top surface of the rear chassis tube to the centre of the rear hoodstick to obtain the correct positioning (standard chassis 395 mm or SV 420 mm), refer to Fig 2.

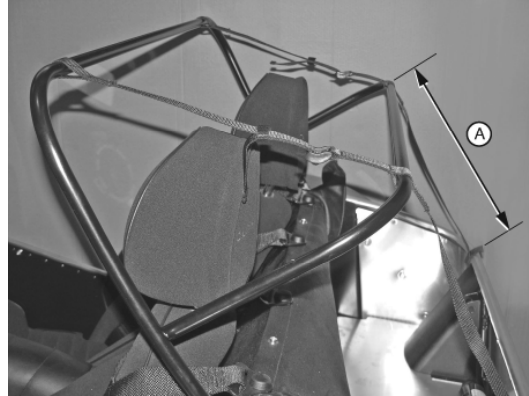


Fig 2 Hoodstick spacing

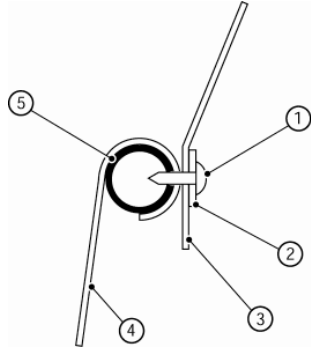
6 Drill two 7/64" holes into the upper chassis tube, one either side, on the inside rear edge of the boot, opposite the outermost popper base (145 mm from the roll cage mounting lug). Make a small hole in the loose end of each hoodstrap and using the two self-tapping screws (fastener pack ZWE05 Item 10) and washers, fix the straps to the rear panel on the inside of the top chassis rail, refer to Fig 3.

#### NOTES

(1) *With the hoodstraps taut, check the position of the rear hoodstick, as this will affect the tension of the hood when finally adjusted.*

(2) *For a neater appearance, popper bases may be used with the self-tapping screws used to secure the hoodstraps.*

**SECTION 12 - WEATHER EQUIPMENT**



- 1 Screw
- 2 Washer (or popper base)
- 3 Hoodstrap
- 4 Rear body skin
- 5 Chassis tube

Fig 3 Hoodstrap fixing

**HOOD FITTING**

7 With the hoodsticks in the upright position and the adjusting buckle fully slackened, drape the hood over the car and attach it to the windscreen with the pre-fitted fasteners. Start with the two outer most fasteners and ensure that the felt seal is correctly located along the top face of the windscreen frame.

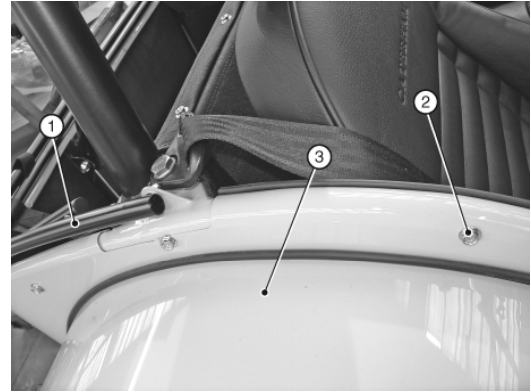
8 Move to the rear of the car and attach the back of the hood again with the pre-fitted fasteners.

9 Tension the hood by adjusting the hoodstraps until the front hoodstick is in line with the stitched darts in the hood. Use the Velcro lined sleeve stitched to the inside of the hood to capture the front hoodstick as this will ensure that it is correctly adjusted.

10 The front popper base for the side of the hood can now be fitted. To do this pull the side of the hood down and assess the approximate position for the popper base. Apply several layers of masking tape to this area.

11 Pull the side of the hood down again and press on the fastener to create an imprint in the masking tape. Drill a 3/32" hole through the centre of the impression, remove the tape and secure a popper base using a self-tapping screw.

12 Repeat the above procedure for the remaining popper bases along the cockpit and boot sides, refer to Fig 4.



- 1 Hoodsticks
- 2 Popper base
- 3 Rear wing

Fig 4 Hood side fasteners

**SIDESCREEEN FITMENT**

13 Using the setscrews (5) and nyloc nuts (13) attach the sidescreen hinges to the outside of the windscreen stanchions with the eyelet towards the rear of the car, refer to Fig 5. Fit the brass hinge pins (8) into the 4 remaining hinges. Now slide the hinges with the pins fitted into the top of hinges attached to the car.

**NOTE**

*SV sidescreens hinges are now supplied with pre-fitted hinge pins.*

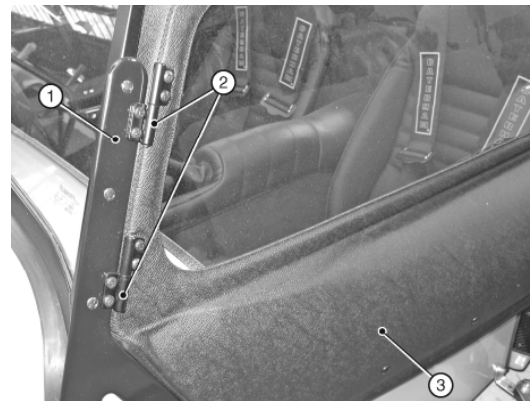


Fig 5 Hinge and sidescreen fitting

## SECTION 12 - WEATHER EQUIPMENT

14 The sidescreen is constructed using a steel frame around the window section. This is covered with the vinyl which continues away from the frame giving a soft flexible area of about 35 mm around the outside. The correct position for the sidescreen is with the soft part at the top tucked up between the two parts of the hood that make up the seal along the top of the door aperture and the soft area towards the front tucked inside the stanchion. The lower rear radius of the sidescreen should follow the lower edge of the hood and the metal frame at the top should be just below the top of the door aperture.

15 With the hood still fitted and correctly tensioned, offer up the sidescreen into position and mark the position of the four fixing holes. (For ease of marking it may help to run a strip of masking tape down the front edge of the sidescreen).

### WARNING

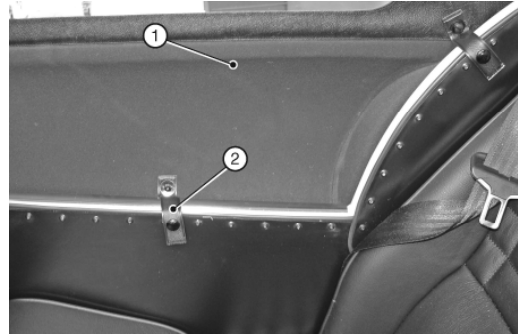
**Use appropriate eye protection whilst carrying out drilling operations.**

16 Next remove the sidescreen and place it on a solid surface and protect the window from damage caused by swarf before drilling the holes for the fixings. The metal frame inside the sidescreen is very hard so it is advisable to centre punch and drill through with a 3 mm pilot hole then finally with a 5 mm drill to enable fitment of the hinge.

17 Remove the top part of the hinges from the chassis and secure them to the outside of the sidescreen, using setscrew (5) and nyloc nut (13), with the pin towards the front and pointing downwards. Fit SVA covers to the nuts on the inside of the sidescreen and fit SVA protectors to the non-chamfered ends of the hinge halves, refer to Fig 7 and Section 15.

18 Refit the sidescreen by sliding the pins down into the hinges on the car. With the sidescreen closed, tuck the top in between the flap of the hood.

19 Each sidescreen is held shut by two vinyl straps and fasteners. From inside the car, pull the straps in over the top edge of the chassis and mark the place for the fastener base. Drill a 7/64" hole in line with the rivets holding the side panel in place. (You will be drilling into a round tube so care should be taken to avoid the drill wandering as it hits the tube).



- 1 Sidescreen
- 2 Vinyl strap

Fig 6 Sidescreen straps

### NOTE

*Optional arm restraints are available. If these have been specified on your car then only the top strap is required to locate the sidescreen.*

20 Attach a popper base (2) using rivet (1). Next pull the strap down over the popper base and mark the centre to position the fastener. Whilst doing this ensure the sidescreen is pulled tight up against the body of the car to reduce draughts and water ingress. Fix a fastener to the marked position on the strap using the durable dot tool, refer to Para 41. Repeat this process for all fixing straps.

### EXTERIOR MIRRORS

### NOTE

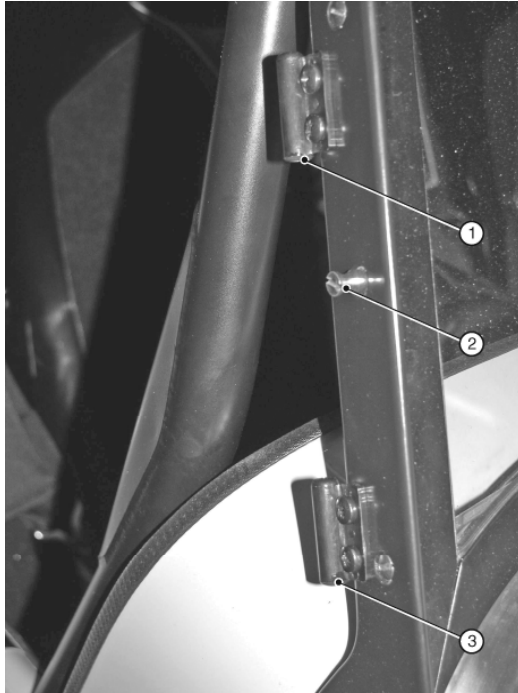
*After the SVA inspection, the mirrors may be fitted to the side screens but in order to pass SVA inspection, the mirrors must be fitted to the windscreen stanchions.*

### Fitment to screen stanchion

21 Remove and retain the central, slot-head screw, in the screen stanchion and screw in the SVA mirror stalk adaptor, refer to Fig 7. Fit a fibre washer and the mirror stalk over the adaptor and tighten the grubscrew to secure the stalk (ensure that the large recess in the stalk faces rearwards).



**SECTION 12 - WEATHER EQUIPMENT**



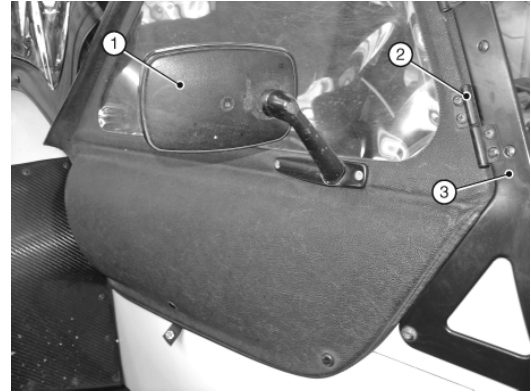
- 1 SVA protector (1/2 grommet)
- 2 Mirror stalk adaptor
- 3 Hinge

Fig 7 SVA mirror stalk adaptor

22 Remove the mirror head from the original stalk noting the relationship of all parts. Assemble the mirror head to the SVA stalk and adjust as required (retain the remains of the original mirror for use post-SVA).

**Fitment to side screens**

23 Exterior mirrors are fitted to the sidescreens, towards the front, just below the clear window panel. Locate the holes pre-drilled in the metal frames (approximately 130 mm from front corner and 104 mm apart) then drill through the material with a sharp 5 mm drill. Attach the mirrors to the hidden metal frame of the sidescreen using the countersunk screws (6), washers (14) and secure with nyloc nuts (13).



- 1 Mirror
- 2 Hinges
- 3 Screen stanchion
- 4 Sidescreen

Fig 8 Mirror fitted to sidescreen

24 Plastic M5 caps (polythene bag marked 'SVA') should be fitted to the nuts securing the mirror to the sidescreen. These can be secured in place using a little silicone sealant.

**BOOT COVER**

25 When correctly fitted, the boot cover should be as shown in Fig 9.



Fig 9 Boot cover

26 The boot cover is designed to attach permanently to the top of the bulkhead behind the seat and clip onto the same fasteners as those provided for the hood at the rear of the car. It is designed to fit over the hoodsticks when not in use therefore it is essential that these are fitted prior to fitting the boot cover. When the hood is erected, the boot cover is folded away and stored in the boot.

## SECTION 12 - WEATHER EQUIPMENT

27 The boot cover is designed to fit around the roll bar, since these vary according to specification, ensure the correct boot cover has been supplied. There is a special boot cover designed for use with the roll cage.

*NOTE*

*For cars fitted with harness type seat belts go to Para 29.*

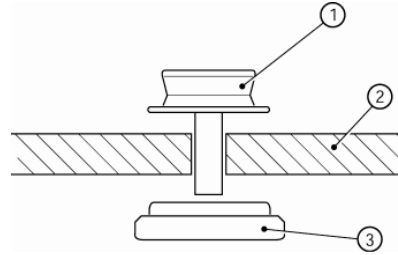
28 All boot covers have a metal insert along the forward edge, with pre-drilled holes to locate the fastener bases. The forward edge of the boot cover should align with the front edge of the seat bulkhead. Ensure that the boot cover is centrally located and mark the holes through the forward edge of the boot cover. Drill a 7/64" hole through each marked location and fit a popper base (fastener pack ZBC02 Item 5) secured with a self-tapping screw (6).

29 If harness type seat belts are being fitted the metal insert in the boot cover must be removed. Align the boot cover as previously described and mark the location of the four threaded bosses. Punch a hole in each of the marked locations and fit the harness shoulder strap securing bolts through the boot cover, refer to Section 9.

30 Additionally fit four fasteners (5) using screws (6) in the following locations; one fastener 1 1/4" either side of the car centreline and one fastener at the midpoint between each pair of shoulder restrains. If a tonneau cover is to be fitted, the position of the fasteners will have to be adjusted accordingly.

31 Stretch the boot cover over the luggage area. Secure around the rear stays of the roll over bar using the Velcro and establish locations for the remaining fasteners (boot cover fastens to the hood fastenings on the body). Fit the popper bases (3) and buttons (4) starting from the rear centre working outwards and then forwards.

32 If a tonneau cover is to be fitted then the forward button on each side is substituted by a popper base (fastener pack ZTC01 Item 6), assembled as shown in Fig 10 and fitted to the fastener socket (4) using the punch provided (for correct usage of fastener fixing tool refer to Para 42).



- 1 Popper base
- 2 Boot cover
- 3 Fastener socket

Fig 10 Forward fastener boot cover

### TONNEAU COVER

33 When correctly fitted the tonneau cover should be as shown in Fig 11.

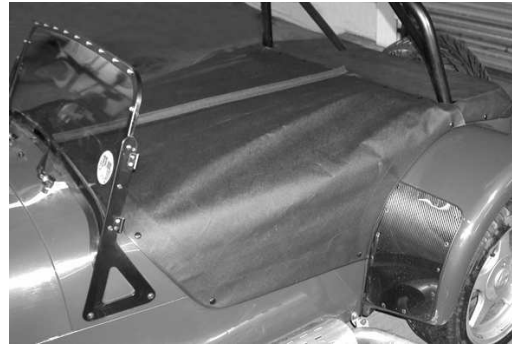


Fig 11 Tonneau cover

34 Before the tonneau cover can be fitted both the boot cover and seat belts must be installed and the detachable head restraints must be removed. The tonneau cover should be fitted with the steering wheel in place. However, if a Quick Release (QR) column has been specified to function as an anti theft device and is intended to be removed when the car is unattended then this should also be removed prior to fitting the tonneau.

35 Carefully align the tonneau along the centre line of the car and stretch it so that there is about 25 mm of tonneau ahead of the fasteners fitted to the centre of the scuttle. Mark and fit two fasteners (4) and buttons (5) in the tonneau to correspond with these fasteners.

**SECTION 12 - WEATHER EQUIPMENT**

36 Carefully measure the positioning of the rear edge of the tonneau relative to the fastener bases securing the front of the boot cover ensuring that the rear edge of the tonneau is exactly parallel to the seat bulkhead and it is properly centred, refer to Fig 12. Mark the position of the fastener bases and fit the six fasteners (4) and buttons (5) across the back. It is important that these fasteners are located correctly as these set the correct tension for the whole cover. It should not be stretched so tight that it puts tension on the fittings, bearing in mind it will not stretch so well in cold weather, nor so loose as to allow water to collect on it.

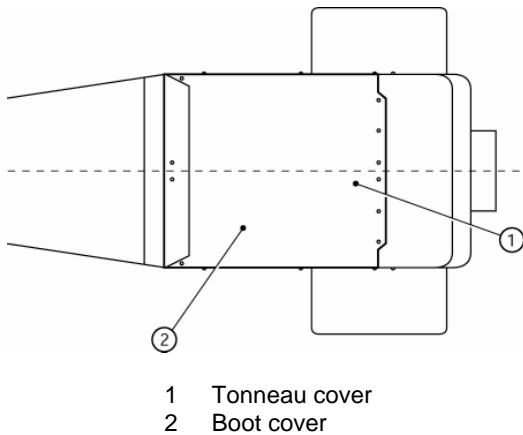
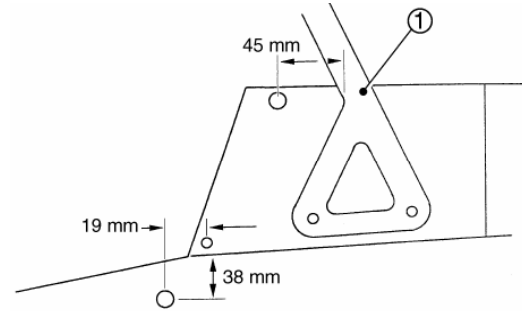


Fig 12 Tonneau cover positioning

37 Starting with the passenger side, mark and drill a 5/32" hole and fit a further fastener (3) securing the rivet (1) on the scuttle 45 mm inward from the lower edge of the windscreen support where it joins the triangular base, refer to Fig 13. 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, mark and drill a 5/32" hole and fit a further fastener (3) securing with a rivet (1). Fit a fastener (4) and button (5) in the tonneau to correspond.



1 Windscreen support

Fig 13 Tonneau cover fasteners (front)

38 Mark and drill a 5/32" hole and fit a further fastener (3) securing with rivet (1) 38 mm below the rear lower edge of the scuttle, 19 mm rearward of the centreline of the large scuttle securing rivet. Stretch the tonneau and secure with a fastener (4) and button (5).

39 Mark, drill a 5/32" hole and fit a further fastener (3) securing with rivet (1) 50 mm down from the top rear of the sill and 45 mm forward of the wheel arch. Pull down the tonneau and secure with a fastener (4) and button (5).

40 Unzip the tonneau when fitting the fasteners to the driver's side, leaving the rear fasteners in place along the seat bulkhead. Repeat the fitting procedure as per the passenger's side 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.

41 Fastening the zip will correctly tension the tonneau.

**NOTE**

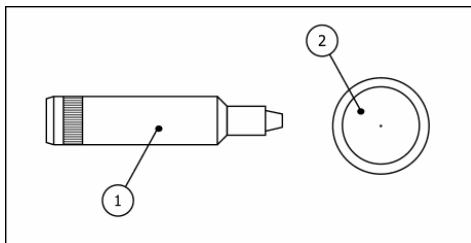
*If a roll cage is fitted, additional fasteners must be fitted to the body to match the tonneau cover fasteners on either side of the Velcro-fastened splits for the roll cage forward supports.*

## SECTION 12 - WEATHER EQUIPMENT

### CORRECT USAGE OF FASTENER FIXING TOOL

42 The fastener tool, Fig 14, consists of two parts; the dished base part and the punch.

- Place the base on a solid surface dished side upwards.
- Put the fastener button through the material and rest it in the dished part of the base.
- Then place the fastener socket over the tube part of the button so that the cupped section is facing upwards.
- Place the punch on the end of the tube and hit it with a hammer until the tube has peened over gripping the two parts together.



- 1 Punch
- 2 Dished base

Fig 14 Durable Dot fastener tool

**SECTION 13 - WHEEL FITMENT**

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## SECTION 13 - WHEEL FITMENT

### WHEEL FITMENT

#### WARNING

#### Re-tighten wheel nuts after 200 miles.

1 Some Caterham supplied alloy wheels are fitted with steel inserts enabling secure tightening of the wheel nuts. The wheel nuts can settle into the wheels over the first few hundred miles causing loss of torque so should be re-tightened to the correct torque after approximately 200 miles.

2 Many of the tyres supplied by Caterham are directional. Check that the tyre orientation is correct before fitting the wheel to the car.

3 Fit the wheel using the wheel nuts provided ensuring that the cone on each wheel nut is correctly located in the wheel. The wheel nuts should not be over tightened. It is recommended that they are tightened whilst the car wheels are on the ground. Tighten wheel nuts to 74 Nm.

4 Fit the wheel centre caps as follows:

- **13", 14" and 15" wheels.** Place wheel centre cap into wheel and push fully home ensuring correct seating.
- **16" wheels.** Align securing screw in wheel centre cap with corresponding thread insert in the wheel and secure using the tool provided. Place wheel centre cap badge into the wheel centre cap and push fully home ensuring correct seating.

### SPARE WHEEL FITMENT

#### NOTE

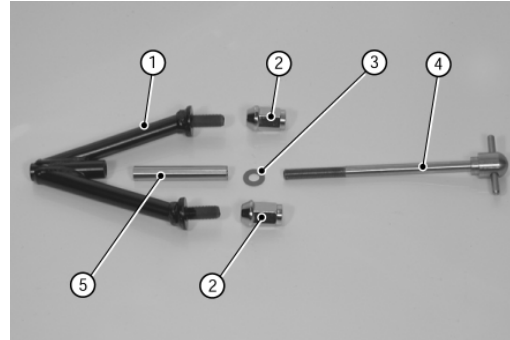
*If specified for your kit, the spare wheel carrier will have been fitted at the factory.*

5 Locate the mounting wishbone, Fig 1 (1) (polythene bag marked 'spare wheel') and secure to the spare wheel using two wheel nuts (2). The wishbone should be placed on the inboard side of the spare wheel.

6 Place the spare wheel in the spare wheel carrier with the point of the mounting wishbone inboard of the wheel. Care must be taken to avoid damage to the paintwork whilst locating the spare wheel.

7 Assemble the spare wheel bolt (4), fibre washer (3) (located in polythene bag marked 'miscellaneous') and spacer (polythene bag marked 'spare wheel') (5). Secure the spare wheel to the car using the assembled spare wheel bolt through the centre of the mounting wishbone. Ensure wheel nuts and spare wheel mounting bolt are tight.

8 Fit the wheel centre cap as detailed in Para 4.



- 1 Mounting wishbone
- 2 Wheel nuts
- 3 Fibre washer
- 4 Spare wheel bolt
- 5 Spacer

Fig 1 Spare wheel mounting items

#### NOTE

*13" wheels fitted with low profile tyres are secured to the spare wheel boss using a single bolt and spacer located through one of the wheel stud holes.*

## SECTION 14 - START UP PROCEDURE AND FINAL CHECKS

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## SECTION 14 - START UP PROCEDURE AND FINAL CHECKS

### GENERAL

1 This section details the operations, adjustments checks that should be carried out prior to starting the car for the first time. **Refer to your Owner's Handbook for recommended lubricants and capacities.**

### BRAKE SYSTEM - FILLING AND BLEEDING

2 Prior to filling the brake master cylinder recheck all brake connections, including factory fitted connections, from the brake master cylinder to each calliper and ensure that they are properly tightened.

#### WARNINGS

**(1) Brake fluid is poisonous; wash affected areas immediately in case of skin contact and seek medical assistance if fluid is swallowed or enters the eyes.**

**(2) Brake fluid is hygroscopic. Ensure that fluid comes from freshly opened container.**

**(3) Brake fluid is corrosive to paintwork, powder coat and plastic components. Care should be taken to avoid spillage at all times.**

3 Remove the brake master cylinder cap and protect the surrounding scuttle paintwork with clean cloths to prevent possible fluid leakage from causing damage to the paintwork.

4 Ensure all bleed nipples on the callipers are closed then fill the brake master cylinder with fresh brake fluid that complies with SA3J 1703F DOT 4 specification. Replace the master cylinder cap.

#### Standard brakes

5 Remove and retain the dust cap from the LH rear brake calliper bleed screw. Place a length of flexible hose over the bleed screw and place the other end of the tube into a clean glass container and pour in sufficient brake fluid to cover the end of the tube.

6 Depress the brake pedal several times to build up pressure and maintain pressure on the brake pedal.

7 With pressure maintained on the brake pedal unscrew the bleed screw and allow the compressed air and brake fluid to flow into the container. Tighten the bleed screw before the brake pedal is released.

8 Repeat Paras 6 and 7 until no more air bubbles can be seen in the brake fluid.

#### NOTE

*Ensure brake fluid level remains above half full level in the brake master cylinder.*

9 Tighten bleed screw and remove flexible hose. Replace dust cap. Carry out Paras 5 to 7 in the following sequence. RH rear calliper, LH front calliper and finally RH front calliper.

10 As the rear callipers can be difficult to bleed, it may help to gently tap the calliper body during the bleed process to release trapped air pockets.

11 It may be necessary to repeat the brake bleed procedure several times before a firm high brake pedal is achieved.

#### Uprated front brakes

12 The uprated front callipers are usually supplied without the brake pads fitted. Before bleeding the system fit the brake pads into the calliper such that when viewed from the rear of the calliper the curve of the brake pad follows the shape of the disc.

#### NOTE

*The front wingstays obstruct access to the uprated callipers. Ensure that the brake pads are installed before fitting the wingstays.*

13 Fit the anti-rattle clips behind the retaining pin (between the pin and the pads/disc). Rotate the disc and ensure that the anti-rattle clip does not contact the disc at any time.

#### NOTE

*Ensure that the arrow on anti-rattle clip points in the direction of wheel rotation.*

14 Bleed the brake system observing the same order as for the standard brakes.



## SECTION 14 - START UP PROCEDURE AND FINAL CHECKS

15 The uprated front brakes have two bleed screws on each calliper. Remove the dust cover from the inboard bleed screw on the front LH calliper. Connect the flexible tube to the bleed screw and operate the brake pedal several times. Whilst mounting pressure on the brake pedal open the bleed screw and allow compressed air and brake fluid to flow into the container. Tighten the bleed screw before the pedal is released. Repeat the procedure until no air bubbles are visible in the released brake fluid. Remove the flexible tube and replace the dust cap. Carry out the procedure for the outboard bleed screw.

16 As a final check on system integrity, apply pressure to the brake pedal and check all connections and bleed screws for any sign of leakage.

17 Initially brake pedal travel may seem excessive despite the system being fully bled. However, the system will improve as the pads bed to the discs during the first 500-1000 miles.

### CLUTCH SYSTEM - FILLING AND BLEEDING

18 Prior to filling the clutch master cylinder, check all connections to ensure that they are properly tightened.

#### WARNINGS

**(1) Brake fluid is poisonous; wash affected areas immediately in case of skin contact and seek medical assistance if fluid is swallowed or enters the eyes.**

**(2) Brake fluid is hygroscopic. Ensure that fluid comes from a freshly opened container.**

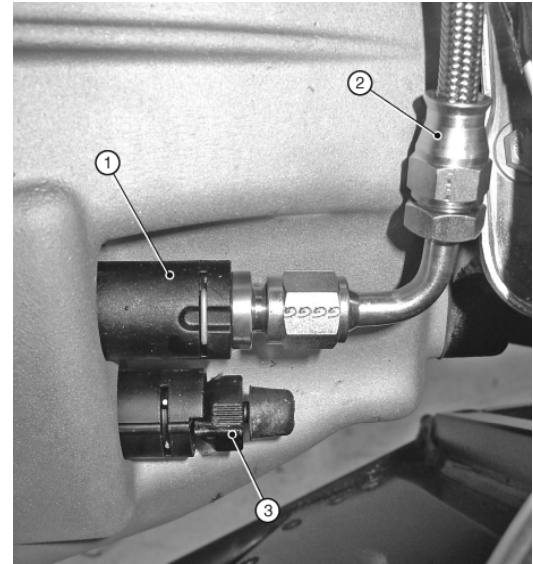
**(3) Brake fluid is corrosive to paintwork, powder coat and plastic components. Care should be taken to avoid spillage at all times.**

19 Remove the clutch master cylinder cap and protect the surrounding scuttle paintwork with clean cloths to prevent possible fluid leakage from causing damage to the paintwork.

20 Locate the bleed nipple/key on the gearbox bell-housing (refer to Fig 1) and remove the bleed nipple cover. Ensure that the bleed key is in the position shown in Fig 1 (rotated fully clockwise) and fill the clutch master cylinder reservoir with fresh brake fluid that complies with SA3J 1703F DOT 4 specification. Replace the master cylinder cap.

21 Rotate the bleed key counter-clockwise until it stops and place a length of flexible hose over the bleed screw and place the other end of the tube into a clean glass container and pour in sufficient brake fluid to cover the end of the tube.

22 Pump the clutch pedal until good pressure is felt and clear fluid, free of air bubbles, flows from the bleed nipple. Rotate the bleed key fully clockwise, remove the pipe and replace the bleed nipple cover.



- 1 Pipe to master cylinder
- 2 Push-fit connector
- 3 Bleed key

Fig 1 Clutch hydraulic connections

23 Mop up any spilled fluid, check for clutch 'feel' and correct operation (repeat the bleeding procedure if necessary); finally, hold down the clutch pedal and check for leaks.

#### NOTE

*All sigma cars and R400 are fitted with throttle and clutch pedal stop.*

- 1) **Throttle stop:** *The adjustment of the stop is critical in order to obtain full throttle at the throttle body end. Reaching down into the footbox, press the throttle pedal until the butterfly is fully open then adjust the throttle stop up to the back of the pedal ball. This may take some time to get the correct adjustment. It is desired not to have any*

## SECTION 14 - START UP PROCEDURE AND FINAL CHECKS

*cable stretching at full throttle (when butterfly is fully open and pedal touches stop).*

- 2) **Clutch pedal stop:** the adjustment of the Clutch stop is critical in order to obtain full clutch operation. The clutch pedal is adjusted to the require length but it might require fine tuning considering slight variation on different cars. This may take some time to get the correct adjustment.

### COOLANT

24 Check all coolant hose securing clips are tight and that the coolant level is visible in the coolant expansion bottle.

### FUEL

#### WARNING

**Due consideration should be given to the highly flammable nature of petroleum or alcohol-based products and their vapours. Serious burns can result from incorrect use.**

25 Check the security of the push-fit fuel pipe connection at the fuel rail.

26 Remove the fuel filler cap and add 15 litres of unleaded petrol to the fuel tank.

### ENGINE/GEARBOX FASTENERS

27 Check that all engine and gearbox mounts and fasteners are tight.

### GEARBOX OIL

#### WARNING

**Oils - prolonged and repeated contact may cause serious skin disorders:**

- (a) **Avoid contact with the skin as far as possible and wash thoroughly after any contact.**
- (b) **Keep out of reach of children.**
- (c) **First aid treatment should be obtained for open cuts and wounds.**
- (d) **Use appropriate barrier creams.**

28 Remove the gearbox oil filler plug (if not removed earlier) using the cut down 3/8" Allen key.

29 Add approximately 2 litres of gearbox oil to the gearbox until it dribbles out of the filler hole. Replace the filler plug.

30 Due to the restricted access it may help to make a filling tube using a small funnel and hose.

### ENGINE OIL

31 The capacity of the engine oil system will vary dependant upon the specification of the vehicle. Refer to Table 1 for an initial fill quantity which is sufficient to start and run the engine at idle before checking and topping up as detailed in your Owner's Handbook (refer to Section 2 for recommended lubricants).

**TABLE 1 ENGINE OIL INITIAL FILL**

Engine Type	Initial fill Qty
Wet sump	3.5 litre
Wet sump and oil/air separator	6 litre

32 With all variants the engine oil should be filled via the screw cap on the top of the engine. Remove the cap from the cam cover and slowly pour in the oil allowing time for the oil to run to the bottom of the engine. Replace the cap and tighten by hand only.

33 Check around the engine area both under the vehicle and within the engine compartment for any visible leaks (oil or coolant). Check all wiring and hoses to ensure that they are correctly located particularly near any moving parts, for example, alternator or cooling fan.

### CRANKING FOR OIL PRESSURE

34 Before running the engine for the first time it is recommended that the following sequence is carried out. This will ensure that the oil system is capable of delivering lubricant throughout the engine.

- Apply handbrake and check that the gear lever is in the Neutral position.
- Disconnect the wires from the inertia switch, located on the bulkhead above the ECU.
- Operate the ignition switch to crank the engine over until oil pressure registers

## SECTION 14 - START UP PROCEDURE AND FINAL CHECKS

on the gauge (oil pressure will be low due to the speed of the engine when turned by the starter motor).

### NOTE

*It may be necessary to turn the engine over for 30-40 seconds to achieve oil pressure. Once oil pressure has been achieved, switch OFF ignition and reconnect the inertia switch. Press down on the rubber button on top of the inertia switch to ensure that it has been de-activated.*

### START-UP

35 Apply handbrake and check that the gear lever is in the Neutral position.

### WARNINGS

**(1) The electric radiator fan is controlled by a thermostatic switch which operates when the ignition is in the on position. whilst working on a hot engine ensure that the ignition is switched off.**

**(2) Do not remove coolant expansion bottle cap whilst coolant is hot. Take precautions to prevent scalds.**

36 Check under the car to ensure that there are no visible leaks. De-activate the immobiliser by pressing the smooth button on the immobiliser handset.

### NOTE

*It may be necessary to press the button several times for initial operation.*

37 Turn the ignition key to position II and listen for the fuel pump to prime. If no sound is heard, switch OFF the ignition and reset the inertia switch by pressing the rubber button on top until it clicks. Turn ignition key to position II again and the pump should now prime.

38 Turn the ignition switch to position III so that the engine turns over until the engine starts. Some models are fitted with a pushbutton starter switch. If this is the case on your vehicle turn the ignition switch to position II (red ignition light ON) and depress the button to operate the starter motor.

39 Do not allow the engine to run for more than one minute without checking the oil level. Using the dipstick as a level, top up the oil system until oil is visible between the 'Min' and

'Max' marks. This will ensure enough oil is in the engine to perform the initial run and warm up. The final check for the engine oil level will be performed later in this Section. Check around and under the engine for any visible signs of leaks.

40 Once you have checked and topped up the oil level as required, restart the engine and leave running until it is warm. Ensure that the oil pressure gauge continues to indicate 2 bar (29 psi) or above at idle.

41 As the engine temperature rises slacken off the bleed screw in the top of the radiator. It may be necessary to remove the bleed screw and partially cover the hole until the coolant appears. Replace the bleed screw and tighten. This will allow any air trapped in the system to escape.

42 Allow the engine to run until the cooling fan cuts in (this should be at approximately 92°C). Switch off the engine.

### NOTE

*Should the temperature exceed 92°C without the cooling fan cutting in, switch OFF the engine immediately to avoid damage. Contact the Caterham technical helpline, as it is possible that there is an air lock in the cooling system.*

43 Check the car for visible leaks. Re-check the hose clips for tightness as the rubber hoses become softer when warm.

44 Finally check the engine oil as detailed in the Owner's Handbook ensuring the instructions for the correct engine specification are followed. If in any doubt please contact Caterham cars.

### FRONT SUSPENSION AND STEERING ALIGNMENT

45 The front suspension is adjustable for both camber and castor angles. The top wishbones normally come from the factory pre-adjusted although you may wish to reset or change the basic settings. Factory recommended settings are shown in Table 2.

## SECTION 14 - START UP PROCEDURE AND FINAL CHECKS

**TABLE 2 RECOMMENDED SUSPENSION ALIGNMENT - ROAD USE STANDARD AND WIDE TRACK**

	Front	Rear
Tracking	0° 20' ± 0° 10' Toe-In	N/A
Camber	1° 20' ± 0° 15' (Negative)	1° 30' ± 0° 15' (Negative)
Castor	4° 00' ± 1° 00' (0° 20' variation left to right, front)	

46 Increased negative camber will tend to improve the car's turn in characteristics in fast corners but at the expense of possible tramlining on uneven surfaces and uneven tyre wear under normal conditions. The factory settings should therefore be adhered to except where the car is being prepared for motor sport.

47 The adjustment of castor is achieved by moving the lower front wishbone backwards or forwards in the chassis using spacing washers, therefore altering the effective kingpin angle in side elevation. Increasing the angle away from vertical will produce more pronounced self centring of the steering and hence a greater feeling of stability, but at the expense of heavier steering.

48 Initial toe-in settings 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 ~ 50 mm 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. Initial tracking of wide track cars can be set by visually aligning the outside edges of the front and rear wheels.

49 It is recommended that distinctly different settings are used for race, hill climb or sprint applications. Caterham can provide a range of anti-roll bars and a competition parts brochure is available from the Parts Department at the factory.

### FINAL CHECKS

#### WARNING

#### Re-tighten wheel nuts after 200 miles.

50 The wheel/tyre combinations supplied by Caterham, are pre-inflated to approximately 40 psi (2.8 bar) to ensure that the tyre is correctly seated on the wheel rim and must be reduced prior to driving. Tyre pressures should be checked in accordance with Table 3.

**TABLE 3 TYRE PRESSURES**

Wheel type	Tyre type/ size	Front (psi)	Rear (psi)
6J x 13	ACB10 6 x 20 x 13	18	18
	CR500 175/55 x 13	18	18
6J x 14	AVON 185/60 x 14	20	20
6 1/2J x 13	CR500 175/55 x 13	18	-
8 1/2J x 13	CR500 205/55 x 13	-	20
6 1/2J x 15	CR500 195/45 x 15	18	18
7J x 16	AVON 205/45 x 16	16	16

51 Some tyres supplied by Caterham are directional. As a result any spare tyre supplied will only be treaded in the correct direction for one side of the car. If the spare tyre needs to be fitted to the side where the rotation is incorrect this should be done only as a means to get you home and must be rectified before any further use of the vehicle. Ensure that the tyres are fitted with the correct orientation.

52 Ensure that no wires or brake hoses are in such a position to chafe or to contact moving or hot components. Particular care should be taken with wires close to the exhaust manifold.

53 Before the car is used, ensure that all bolts securing suspension, steering and brakes are properly tightened, refer to Table 4.

## SECTION 14 - START UP PROCEDURE AND FINAL CHECKS

**TABLE 4 TORQUE FIGURES**

Location	Washers	Torque Nm
Front lower wishbone front	Spring and plain	81
Front lower wishbone rear	Plain spacers	81
Front upper wishbone front	N/A	34
Front upper wishbone rear	N/A	34
Front spring damper top	Spring and plain	20
Front spring damper bottom	Loctite	20
Upright top ball joint	N/A	54
Upright bottom fixing	Spacer (widetrack only)	54
Front anti-roll bar clamps	N/A	20
Steering rack clamps	Plain under bolt head	11
Steering column universal joint	N/A	20
Steering column clamp plate	Spring and plain under bolt head	14
Track rod end to upright	N/A	34
Upper differential mounting	Plain under bolt head and nut	54
Lower differential mounting	Plain under bolt head	54
Propshaft	N/A	74
Rear spring damper top	N/A	54
Rear spring damper bottom	Spring and plain	54
Watts link locknut	N/A	20
Bellcrank to link	N/A	14
Watts link rear mount		34
Watts link front mount		34
Bellcrank to De Dion		34
Radius arm		34
'A' frame	N/A	81
Hub nuts	Thrust	270
Hub mountings	N/A	47
Brake calliper	Plain and spring	47
Rear anti-roll bar clamp	Plain under bolt head and spring under nut	14
De Dion ears	Plain and spring	47

(continued)

**SECTION 14 - START UP PROCEDURE AND FINAL CHECKS**

**TABLE 4 TORQUE FIGURES (continued)**

Location	Washers	Torque Nm
Gearbox to bell-housing	Spring under bolt head	47
Gearbox mount	Spring under bolt head	61
Engine to bell-housing	Spring under bolt head	47
Bell-housing to sump	N/A	20
Starter motor	Spring under bolt head	34
LH engine mounting bracket	Spring under bolt head	34
RH engine mounting bracket	Spring under bolt head	34
Engine mounting rubbers	Plain between chassis and nut	20
Engine mounting to rubbers	Spring under bolt head	41
Gearbox mount to chassis	Plain between chassis and nut	20
Exhaust manifold	N/A	34
Expansion tank bracket	Plain under bolt head and nut	10
Gearlever to tail-housing	N/A	20
Brake banjo bolt	Copper washer each side of banjo	10
Brake unions	N/A	10
Seat belt / harness bolts	See assembly instructions	47
All roll over bar fixings	See assembly instructions	20
Petty bar	See assembly instructions	47
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## SECTION 15 - SINGLE VEHICLE APPROVAL AND REGISTRATION

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## SECTION 15 - SINGLE VEHICLE APPROVAL AND REGISTRATION

### GENERAL

1 All Caterham cars will have to be inspected under the SVA regulations in order to be registered for road use.

2 The inspectors have all been trained to the same standard but may interpret certain regulations differently. Each test station will have received a detailed explanation of what a Caterham is and what European regulations it complies with. The inspectors therefore should have reasonable product knowledge and have a contact number at Caterham if required.

3 It is recommended that the car is presented in a clean condition as this will greatly improve the inspector's demeanour.

4 It is also advisable to take an emergency kit with you to the test station. This should consist of a basic toolkit, cable ties, push on trim and a length of rubber hose. In the event of components needing tightening for adjustment or a non-compliance, the emergency kit may save you taking the car away and having to re-present it at a later date.

5 You should remember that any modification made to the car subsequent to passing the SVA inspection may prevent it from passing an MOT at a later date. For example if a competition exhaust is fitted the original catalyst equipped system would need to be retained in order to meet MOT emission standards. The MOT is an inspection of the vehicles condition and will be carried out in the same manner as for normal production cars. Items such as internal/external projections, noise and fields of visibility will not be inspected at an MOT.

### REQUIREMENTS

6 The following items are checked under the SVA inspection:

Anti-theft Devices  
Defrosting and Demister System  
Wiper and Washer System  
Seats and their Anchorages  
Seat Belts  
Seat Belt Anchorages  
Installation of Seat Belts  
Interior Projections

Radio Interference Suppression

Glass and Glazing

Lamp, Reflectors and Devices

Rear View Mirrors

Tyres

Exterior Projections

Protective Steering

Vehicle construction and design

Brakes

Noise

Exhaust Emissions

Speedometers

7 The examiner will conduct an engineering assessment rather than the more thorough test that full European Type Approval entails. In some cases (brakes, noise, emissions etc) there will be a physical test either on a rolling road or within the grounds of the test centre.

8 The inspection will not require any part of the car to be dismantled and will be carried out at Vehicle Inspectorate test stations. See Annex A for the current stations. The inspection is anticipated to take approximately four hours and can be booked between 0800-1700 Monday to Thursday or 0800-1630 on Friday. There is a fee payable for this service. An additional fee will be charged if an inspection is required outside these hours.

### HOW TO APPLY FOR THE INSPECTION

9 The inspection has to be formally booked in advance therefore you must:

- Obtain an application form from your local Vehicle Registration Office (VRO) or Vehicle Inspectorate Office (HGV Station).
- Complete the form and return it along with the test fee to:

SVA section  
The Vehicle and Operators  
Services Agency  
91/92 The Strand  
Swansea  
SA1 2DH

0870 6060 440  
<http://www.vosa.gov.uk>



## SECTION 15 - SINGLE VEHICLE APPROVAL AND REGISTRATION

10 You will then receive confirmation of the inspection which will give details of the time and location. Where possible the inspection will be carried out at the Vehicle Inspectorate test station you have selected.

### TRAVEL TO AND FROM THE TEST STATION

11 In order to attend the inspection you will be allowed to travel to and from the test station without the vehicle being registered or fitted with trade plates. Should any item require rectifying you will be permitted to drive to and from a place where rectification can be carried out. You are required to provide insurance cover for all such journeys.

#### NOTE

*You will be able to secure insurance cover by quoting the car chassis number to your chosen insurers.*

### INSPECTION REFUSAL

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

- You arrive at the test station later than your appointment time.
- You have not paid your fee.
- There is insufficient fuel or oil for the test. You will be required to have a **full** tank of fuel.
- The car is presented in a dangerous or such a dirty condition that the test is not feasible.
- A device designed to be readily opened cannot be opened (e.g. bonnet padlocked).
- The vehicle presenter does not remain with the car to operate controls etc as requested.

### INSPECTION DATA

#### Design weight

13 You will be asked to specify the maximum gross weights and maximum permitted axle weight during your application for a test date. This will then be checked by weighing the car without passengers and luggage (kerb weight) and then using a formula to calculate the theoretical gross weight. The following weights should be quoted for all models.

Maximum Gross Weight 860 Kgs  
Maximum Permitted Front Axle Weight 360 Kgs  
Maximum Permitted Rear Axle Weight 500 Kgs

### Design speeds and maximum engine speed

14 The design speeds and maximum power engine speed for each model is detailed in Table 1.

**TABLE 1 DESIGN SPEEDS AND MAXIMUM POWER ENGINE SPEED**

Model	Engine	Max RPM	Max MPH
Roadsport 125	1.6	6800	112
Roadsport 150	1.6	6850	122

### Towing

15 It is not recommended that the Seven is used for towing, therefore, when asked the question; the answer is 'Not Applicable'.

### Speedometer

16 The speedometer is compatible with this vehicle.

### CHECKING AND PREPARING THE CAR PRIOR TO INSPECTION

17 It is recommended that the checks and operations detailed in the following paragraphs are completed prior to taking the car for the inspection.

#### Wiper and washer system

18 Carry out a full system check prior to the inspection. Ensure the screen washer bottle is full, the wiper blades contact the windscreen and the washer jets are correctly adjusted. Ensure all hoses are secure as the system will be checked under pressure.

#### Radio interference suppression

19 Caterham supplied ignition leads are suppressive. If you choose not to use the Caterham supplied ignition leads and have supplied your own leads, ensure they are clearly marked as suppressive.

## SECTION 15 - SINGLE VEHICLE APPROVAL AND REGISTRATION

### Lamps, reflectors and devices

20 If you have built your car using the components and information supplied, the car will comply with SVA lighting requirements. Ensure that repeater indicators are fitted to the front wings.

### Rear view mirrors

21 These should be set up for maximum visibility. Ensure that the windscreen mounted mirror and both screen stanchion mirrors are in place. It is also worth removing the hood, or arriving without it altogether, as this improves both visibility and access.

### Noise

22 Tailpipe noise will be tested. Though 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 centre. This will also allow a layer of soot to settle which will help deaden the 'ring' of the new silencer.

### Emissions

23 All Caterham cars are supplied with catalytic converters and will meet the test requirements.

### General construction

24 This should be checked at the Post Build Check stage, however if you are not using that service ensure that chafing of brake pipes and the wiring looms is not possible. If you have followed the procedures detailed in the Assembly Guide then you should not have any problems at this stage of the inspection.

### Protective steering

25 All standard Caterham steering wheel types have a removable pad fitted. This pad must be in place during the inspection.

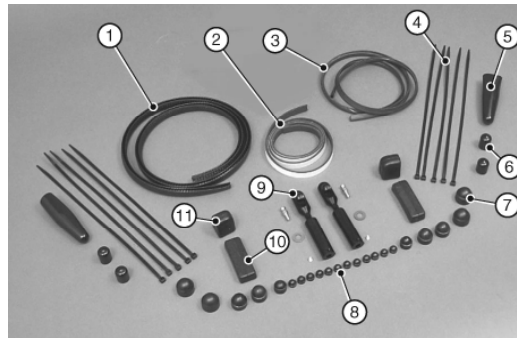
### Brakes

26 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 correctly. The performance of the brakes often improves dramatically after a small amount of use. Frequent application of the brakes on the way to the test centre will help the brakes bed in.

27 Ensure the handbrake is correctly adjusted and does actually lock the rear wheels.

### Interior and exterior projections

28 Supplied with the kit is a polythene bag marked 'SVA', refer to Fig 1. It is essential that these items are fitted prior to presentation at the SVA Testing station.

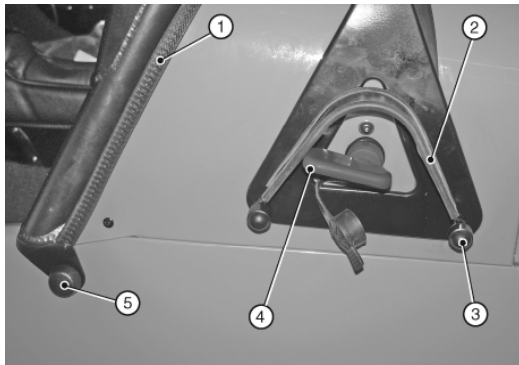


- 1 Scuttle trim
- 2 Foam tape
- 3 Edge trim
- 4 Cable ties
- 5 Track rod sleeve
- 6 Flexible covers
- 7 Bolt head covers
- 8 Nut covers
- 9 SVA mirror stalks and fixings
- 10 Rear bonnet catch cover
- 11 Front bonnet catch cover

Fig 1 SVA bag contents

**SECTION 15 - SINGLE VEHICLE APPROVAL AND REGISTRATION**

29 Ensure that the scuttle edge trim (Fig 2 Item 1) is fitted to the edges of the scuttle around the dashboard, refer to Section 9.



- 1 Scuttle edge trim
- 2 Eyebrow edge trim
- 3 SVA cover
- 4 Battery master switch sheath
- 5 SVA cover (optional roll cage)

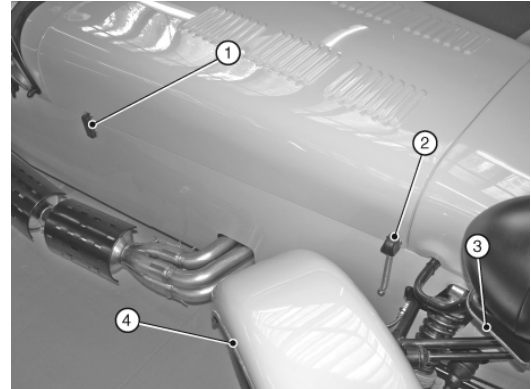
Fig 2 SVA Scuttle trim and battery master switch

30 Apply the self-adhesive Velcro strips around the sides and bottom of the fuse box cover. Attach the other half of the Velcro fastening to the Velcro already attached to the fuse box cover. Locate the cover over the fuse box sticking it in place. (R400 only)

31 The '7' in the nosecone grill is not SVA compliant and therefore should be fitted behind the mesh grill in order for your car to pass the SVA test.

32 The edge trim should also be secured to the edges of the front cycle wings (Fig 3 Item 4), the edge of the black plastic housing around the rear fog and reverse lights and the edges of the indicator cones. Cars fitted with the detachable wind deflector will also require edge trim along the top edge of the deflector and around the edges of the mirrors.

33 The caps (Fig 4 Item 3) should also be fitted to the nut and bolt head of the top wishbone front mounting.



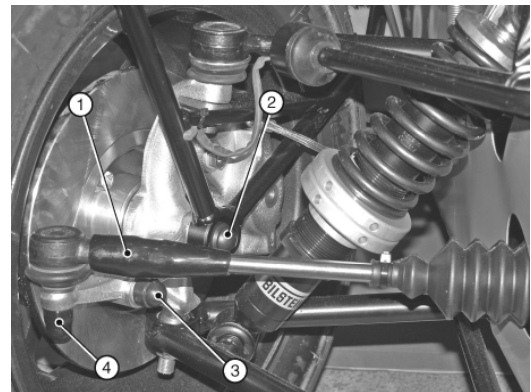
- 1 Rear bonnet catch cover
- 2 Front bonnet catch cover
- 3 Edge trim (indicator cone)
- 4 Edge trim (cycle wing)

Fig 3 Bonnet catches

34 The bonnet catch covers (Fig 3 Items 1 and 2) should be pushed over the respective bonnet catch.

35 The covers (Fig 1 Item 7) should be fitted to the shoulder strap mounting bolts (Only required if this 4 or 6-point harness option is specified).

36 The sleeves (Fig 4 Item 1) should have been fitted over the track rod locknuts during the front suspension build.



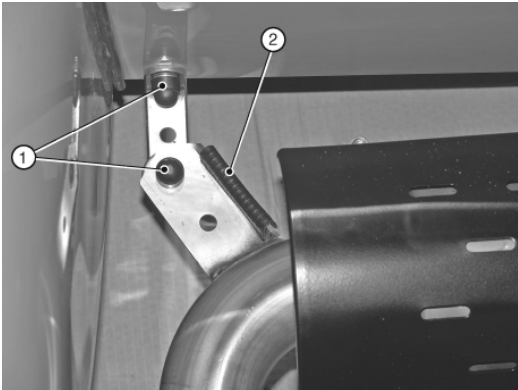
- 1 Track rod sleeve
- 2 Stub axle cover
- 3 Steering arm nut cover
- 4 Track rod end nut cover

Fig 4 Front suspension

## SECTION 15 - SINGLE VEHICLE APPROVAL AND REGISTRATION

37 Covers (Fig 4 Items 2, 3 and 4), should be fitted over the inner stub axle nuts, the steering arm nuts, the track rod end nuts and the two wheel nuts that hold the spare wheel to the spacer wishbone (if fitted).

38 Covers (Fig 5 Item 1) should be fitted to the exposed nuts securing the exhaust bobbin and the exhaust bracket and an off-cut of scuttle edge trim should be fitted to the upper edge of the exhaust silencer bracket.



- 1 Nut covers
- 2 Scuttle trim off-cut

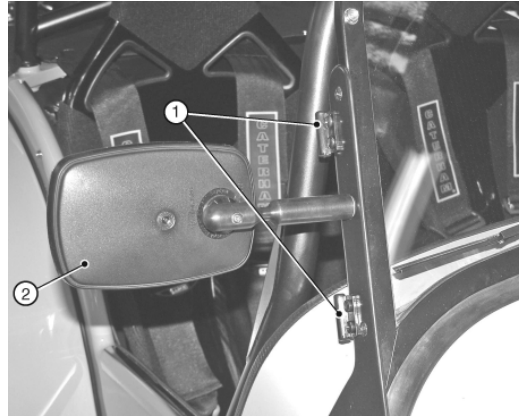
Fig 5 Exhaust mounting

39 The sharp edge of each side screen hinges should be protected as shown in Fig 6. The protectors are made by cutting grommets in half and fixing them in place with superglue.

**NOTE**

*If the side screens are fitted for the SVA test then the hinge halves fitted to the side screens must be protected in a similar manner.*

40 Road wheels are exempt from external projections with the exception of the spare wheel. Ensure the wheel is positioned such that any balance weights are behind the spare wheel carrier.



- 1 Grommets
- 2 Rear view mirrors (SVA position)

Fig 6 Side screen hinges

### Race Cars and SVA

41 There are several parts that are mandatory on race cars which are not SVA friendly. Ideally these parts should be fitted after the car has been submitted for its SVA test but if this is not possible then these parts will need to comply with the SVA criteria.

42 Fire Extinguisher. The 'T' handle that operates the fire extinguisher will need to be removed and the boss in the dash covered.

43 Track day roll over bar/roll cage. All fixings will need to be covered. If the track day roll over bar petty strut is supplied this will need to be removed and the hole in the side panel must be covered.

44 Battery Master Switch. The edges of the master switch key will not pass SVA; a rubber sheath for the key is included in the SVA kit and this must be fitted for the test. The eyebrow must be fitted with edge trim and the fixing bolts will need protective caps, refer to Fig 2.

### REGISTRATION PROCEDURE AFTER SVA INSPECTION

45 If your vehicle fails the SVA inspection for any reason you will be allowed to take the car away to rectify it.

## **SECTION 15 - SINGLE VEHICLE APPROVAL AND REGISTRATION**

46 Upon successful completion of 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 Minister's 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), insurance certificate and your certificate of newness (with full CKD De Dion kits only) along with your Vehicle Excise Duty (VED) fee for either six months or twelve months to your local Vehicle Registration Office (VRO). In addition a registration fee will be levied by DVLA to cover administration costs throughout the vehicle's life (sending out VED reminders etc).

47 The car will be subjected to an MOT inspection three years after it was first registered.

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## SECTION 15 ANNEX A - VEHICLE INSPECTORATE TEST STATIONS WHERE THE SVA TEST CAN BE CARRIED OUT

### **Aberdeen**

Cloverhill  
Bridge of Don Industrial Estate  
Aberdeen AB23 8EE  
01224 702357

### **Beverley**

Oldbeck Road  
Off Grovehill Road  
Beverley  
East Yorkshire HU17 0JG  
01482 881522

### **Birmingham**

Garretts Green Industrial Estate  
Birmingham B33 0SS  
0121 783 6560

### **Bristol (Avonmouth)**

Unit 10, I.O. Centre  
Poplar Way West  
Avonmouth  
Bristol BS11 0QL  
01179 381157

### **Cardiff (Llantrisant)**

School Road  
Miskin  
Pontyclun  
Mid Glamorgan CF72 8YR  
01443 224701

### **Carlisle**

Brunthill Road  
Kingstown Industrial Estate  
Carlisle CA3 0EH  
01228 528106

### **Chelmsford**

Widford Industrial Estate  
Chelmsford  
Essex CM1 3DR  
01245 259341

### **Derby:**

Curzon Lane  
Alvaston  
Derby DE21 7AY  
01332 571961

### **Exeter**

Grace Road  
March Barton Trading Estate  
Exeter  
Devon EX2 8PU  
01392 278267

### **Gillingham**

Ambley Road  
Gillingham  
Kent ME8 0SJ  
01634 232541

### **Glasgow (Bishopbriggs)**

Crosshill Road  
Bishopbriggs  
Glasgow G64 10A  
0141 772 6321

### **Leighton Buzzard:**

Stanbridge Road  
Leighton Buzzard  
Bedfordshire LU7 4QG  
01525 373074

### **Liverpool (Speke):**

C/O South Liverpool Commercials  
Woodend Avenue  
Speke  
Liverpool L24 9NB  
0151 4860050 or 0151 5474445

### **London–North (Edmonton)**

Anthony Wharf  
Lea Valley Trading Estate  
Edmonton N18 3JR  
020 8803 7733

### **London–South (Mitcham)**

Redhouse Road  
Croydon  
Surrey CR0 3AQ  
020 8684 1499

### **London–West (Yeading)**

Cygnat Way  
Willow Tree Lane  
Yeading  
Hayes  
Middlesex UB4 9BS  
020 8841 9205

### **Manchester–North (Chadderton)**

Broadgate  
Broadway Business Park  
Chadderton  
Oldham OL9 9XA  
0161 947 1000

### **Newcastle-upon-Tyne**

Sandy Lane  
Gosforth  
Newcastle-upon-Tyne NE3 5HB  
0191 236 5011

### **Norwich**

Jupiter Road  
Hellesden  
Norwich NR16 6SS  
01603 408128

### **Nottingham**

Main Road  
Watnall  
Nottingham NG16  
0115 938 2591

### **Shrewsbury**

Unit 6 Levens Drive  
Harlescott  
Shrewsbury SY3 7EG  
01743 462621

### **Southampton (Northam):**

Unit R, Centurian Industrial Estate  
Bitterne Road West  
Southampton SO18 1UB  
02380 837397

**SECTION 15 ANNEX A - VEHICLE INSPECTORATE TEST STATIONS WHERE  
THE SVA TEST CAN BE CARRIED OUT**

**Taunton**  
Taunton Trading Estate  
Norton Fitzwarren  
Taunton  
Somerset TA2 6RX  
01823 282525



**SECTION 16 - OPTIONS**

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10	Fire extinguisher pull handle .....	8
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14	Drill out the six rivets.....	9
15	Old filler boss removed .....	9
16	Gasket positioned on back panel .....	10
17	Carefully drill new holes .....	10
18	Spacer filled to filler neck .....	10
19	Fit flange .....	10
20	Job complete.....	10
21	Kit contents .....	11
22	Drilling central popper on SV .....	11
23	Alignment of bracket .....	11
24	Wire routing through light unit .....	12
25	Drilled hole above spare wheel boss.....	12
26	View from under RHS rear corner.....	12
27	Exploded view of assembly.....	12
28	Wires from support tube entering boot.....	13
29	Completed assembly.....	13

## SECTION 16 - OPTIONS

### INTRODUCTION

1 These fitting instructions are supplied in addition to the normal assembly guide delivered with your kit. They are specific to the additional equipment required when using your car for competition purposes. This document is supplied with new kits and as instructions to customers purchasing upgrades for an older car. SVA notes have been included for customers needing to register a new vehicle.

2 It is important that these instructions are read in conjunction with your assembly guide in particular with regard to the preliminary information that can be found at the front of the guide.

### OIL/AIR SEPARATOR/ANTI-CAVITATION SYSTEM

#### General

3 The oil/air separator has been designed to help separate oil and air in the engine. At sustained high revs the engine can have a tendency to draw air up into the oil galleries and thus decrease the lubrication efficiency. The tangential spin created by the separator tank draws the air from the oil before directing it through a restrictor and back into the engine cam cover.

#### Fitting instructions

#### WARNING

**Use appropriate eye protection whilst carrying out drilling operations.**

4 Fix self-adhesive foam padding strips (polythene bag marked 'oil/air separator') on the lower chassis cross members, refer to Fig 1.



- 1 Upper mountings
- 2 Standard header tank mounting point
- 3 Lower mounting
- 4 Foam padding

Fig 1 Oil/air separator mountings

5 To locate the correct position for the top mountings, stand the tank on the foam padding ensuring that it is vertical. Where the tank touches the upper chassis diagonals, mark a small line (this should be at the centre of the width of the separator tank). Position an upper mounting bracket (polythene bag marked 'oil/air separator') against the side of the tank with the two fixing holes either side of the line. Now mark the two fixing holes. Remove the tank and drill two 5/32" holes in the chassis cross member. Repeat the marking and drilling procedure for the second bracket. Secure the upper mounting brackets using the rivets provided.

6 The lower mounting must be riveted on the centre line of steering rack platform (long end upwards), with the bend level with and pointing away from the top surface of the rack platform.

7 To prevent contact with tank, attach a small piece of self adhesive foam to the rear facing surface of all three mountings.

8 Fitting the optional oil/air separator tank means that the standard header tank mounting point cannot be used. To provide an alternate location for the header tank a location plate must be riveted to the upper RH chassis tubes approximately 110 mm from the centre of the standard header tank mounting point (the pre-drilled rivet holes in the location plate should be central on the chassis tubes), refer to Fig 2.

**SECTION 16 - OPTIONS**

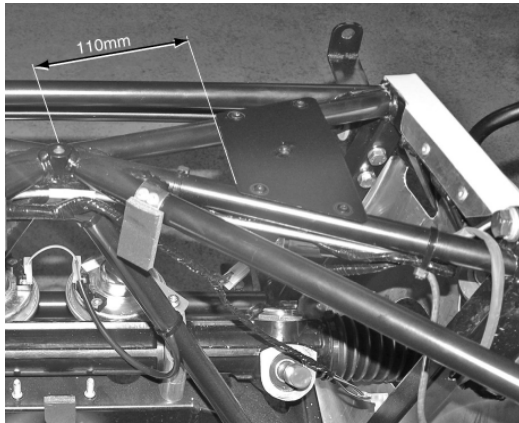


Fig 2 Header tank location plate

9 Fitting the optional oil/air separator tank obstructs the area normally used for the horns. Relocate the horns by bending the brackets and securing them to the underside of the header tank location plate using a 7 mm spacer on the M8 x 65 mm cap-head screw and locknut used to secure the header tank mounting to the location plate, refer to Fig 3.



Fig 3 Relocated horns

10 Fit and tighten the magnetic drain plug (polythene bag marked 'oil/air separator') to the base of the tank. Lubricate the thread and fit the temperature sender into the side of the oil/air separator tank.

**NOTE**

*The temperature sender has a tapered thread to enable it to seal without the need for a washer. For this reason it will go tight before it has screwed fully home. Care should be taken not to over tighten.*

11 Fit a dowty seal over one end of each the two large 5/8" male/male adapters and fit them into the large threaded bosses in the side of the air separator tank. Screw in the adapters until the dowty seals just begin to grip, then carefully tighten using two spanners so as to avoid damaging the soft aluminium tank.

12 Connect the two oil pipes from the engine to the tank ensuring that the longer oil pipe from the rear connection on the oil filter housing is connected to the upper union on the tank, refer to Fig 4. When tightening the oil pipes care should be taken not to damage the soft aluminium tank. Note that a large hexagon is provided where the union attaches in order to facilitate the use of an additional spanner. Place the oil/air separator tank on the lower mounting bracket and secure to the upper securing bracket using the hose clip provided.



- |                      |                          |
|----------------------|--------------------------|
| 1 Braided hose       | 6 Upper oil pipe         |
| 2 Right-angled union | 7 Oil temperature sender |
| 3 Separator tank     | 8 Lower oil pipe         |
| 4 Upper union        |                          |
| 5 Hose clip          |                          |

Fig 4 Oil/air separator tank position

**NOTES**

(1) *The black/yellow wire that exits the loom in the front LH corner of the chassis can be used to provide an oil temperature reading by attaching it to the temperature sender.*

## SECTION 16 - OPTIONS

(2) An additional switch and wiring to the temperature gauge will also be required but this cannot be fitted prior to SVA test. For further information please contact Aftersales who will be happy to carry out this work for you.

(3) Cars fitted with Stack instrumentation also require an additional black earth lead.

13 Secure the upper and lower oil pipes using the cable ties provided to ensure that they cannot come into contact with moving parts of the engine or suffer abrasion.

14 Attach the small braided hose from the top of the tank to the front RH corner of the cam cover via the right-angled union using the copper washer provided.

### BATTERY MASTER SWITCH

15 If specified the battery master switch will have been fitted at the factory.

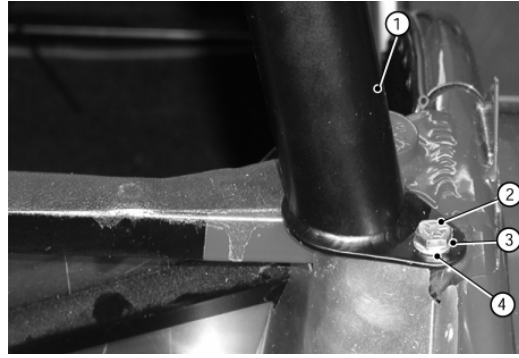
16 Locate the two thick red leads exiting the transmission tunnel. Connect the lead marked 'starter' to the starter solenoid along with the large brown lead (with black sleeve) from the alternator. Route the lead marked 'battery' to the battery positive terminal. Do not connect.

17 Check that the lead to the battery is attached to the single connection of the master switch and the lead to the starter is attached to the master switch connection along with a double brown wire.

### STANDARD ROLL OVER BAR

18 Insert the bosses; on the underside of the roll over bar main hoop into the bucket bushes located at each end of the seat belt header rail towards the rear of the cockpit, refer to Fig 5. Locate the rear diagonals of the roll over bar into the mounting brackets at the rear of the boot compartment. Secure the roll over bar to the chassis using set screws (fastener pack 30P010A Item 2), spring washers (6) and washer (5).

19 The rear diagonals are secured to the brackets by bolt (1) and nyloc nuts (4) with a plain washer (5) under the bolt head and nyloc nut. Tighten all fastenings to 20 Nm.



- |   |                        |   |               |
|---|------------------------|---|---------------|
| 1 | Standard roll over bar | 3 | Spring washer |
| 2 | Set screw              | 4 | Plain washer  |

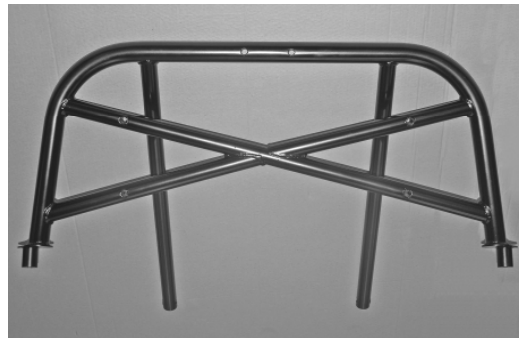
Fig 5 Standard roll over bar

### TRACK DAY ROLL OVER BAR

20 Before fitting the Track day roll over bar it will be necessary to remove the rear spring damper units in order to gain access to the lower mounting points, refer to Section 8.

21 The Track day roll over bar is fitted in the same manner as the standard roll over bar with the exception of additional fixings located in the ends of the main hoop.

22 Having placed the roll over bar into position, but before finally tightening the fixings, pass from underneath the reduced head set screws supplied with the roll over bar, into the threaded holes in the ends the main hoop of the Track day roll over bar. Leave these fasteners loose until all fixings are in place.



- |   |                         |
|---|-------------------------|
| 1 | Rear diagonal           |
| 2 | Track day roll over bar |

Fig 6 Track roll over bar

## SECTION 16 - OPTIONS

23 An additional, optional Petty strut can be added to the Track day bar to upgrade it to FIA specification.

### NOTES

(1) *The Track day bar as supplied without the additional Petty strut is not FIA approved.*

(2) *The Petty strut is not SVA compliant and therefore should be removed for normal road usage.*

24 The forward end of the Petty strut is secured to a mounting boss located within the chassis that is normally hidden behind the interior trim panel. It can be found in the passenger side of the cockpit approximately one inch below the point at which the dashboard tube is welded to the top of the chassis rail.

25 If a 7/16" hole is not visible, drill out the six 5/32" rivets holding the top edge of the trim panel surrounding this point and ease the trim panel away from the chassis until the exact location of the mounting boss is identified.

### WARNING

**Use appropriate eye protection whilst carrying out drilling operations.**

26 Drill a small pilot hole through the trim panel taking great care not to touch the outer side skin and enlarge such that a 7/16" bolt can be fitted through. Ensure that the inner thread in the mounting boss is not damaged during this process. Loosely fit bolt (fastener pack ZPS01 Item 2) and secure the trim panel with rivets.

27 Remove bolt (2). Secure the Petty strut to the roll over bar, using bolts (1), with plain washers (4), under the head of the bolts. Pass the bolts through the plate on the Petty bar then rearwards through the fixing holes in the centre of the main hoop, secure with plain washers (4) and nyloc nuts (3).

28 Attach the forward end of the Petty strut to the previously uncovered boss using bolt (2) passed through spring washer (6), plain washer (5) then the fixing plate at the forward end of the bar. It may be necessary to use the additional plain washer(s) (5) between the front fixing plate and the side of the chassis to achieve the best fit.

29 Tighten additional roll over bar mounting bolts in accordance with Table 1.

**TABLE 1 TRACK DAY ROLL OVER BAR MOUNTING BOLT TORQUE FIGURES**

Location	Torque
Base of the bucket bushes	20 Nm
Mounting flange 5/16" UNF	20 Nm
Rear diagonals 5/16" UNF	20 Nm
Petty bar (all fixings)	47 Nm

30 It is recommended that all parts of the roll over bar likely to be contacted by either the driver's or passenger's head to be protected with approved roll bar padding. Suitable FIA approved padding is available from the Caterham parts counter.

### ROLL CAGE

#### WARNING

**Never work underneath a car without supporting it on axle stands or equivalent. Do not rely on a jack alone.**

#### Preparation

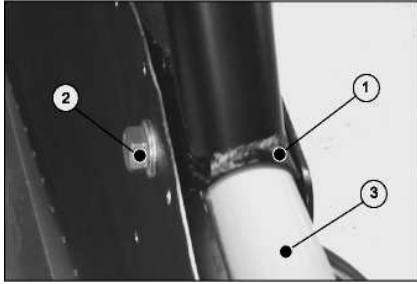
31 Before fitting the roll cage it will be necessary to remove the rear spring damper units in order to gain access to the roll cage lower mounting points, refer to Section 8.

#### NOTE

*This roll cage is SVA-compliant however protective covers will be required on the four bolt heads that attach the front hoop to the chassis. You will also be required to have SVA compliant mirrors fitted to both the driver and passenger sides of the car to ensure rear visibility is maintained.*

32 The lower ends of the hoop that forms the front of the cage, attaches to two pre-fitted threaded bushes. These bushes are located, behind the side panels; one on each side of the car and approximately one inch below the point at which the dashboard tube is welded to the top of the chassis rail, refer to Fig 7. Before attempting to fit the cage, these bushes will need to be uncovered.

## SECTION 16 - OPTIONS



- 1 Front hoop saddle bracket
- 2 Fixing bolt – in threaded bush
- 3 Chassis top tube - sill

Fig 7 Front fixing boss location

### WARNING

**Use appropriate eye protection whilst carrying out drilling operations.**

33 If a 7/16" hole is not visible in the side panel, drill out the 5/32" rivets holding the top edge of the trim panel surrounding this point and ease the trim panel away from the chassis until the exact location of the mounting boss is identified. Drill a 4 mm pilot hole through the trim panel then enlarge to give clearance for a 7/16" bolt. Ensure that the inner thread in the mounting boss is not damaged during this process.

34 Take a 10 mm drill bit and pass it through the threaded boss until the pointed end of the drill touches the inside of the outer side panel. Gently tap the end of the drill bit until a small witness mark is visible on the outside of the side panel along the centre line of the bush. Using a centre dot, dot the outside of the side panel on the witness mark and drill a 4 mm pilot hole, then enlarge such to give clearance for a 7/16" bolt. Ensure that the inner thread in the mounting boss is not damaged during this process.

35 Repeat this process on the other side of the car then run a 7/16" UNF bolt into both bosses to ensure the threads are clean and undamaged.

### NOTES

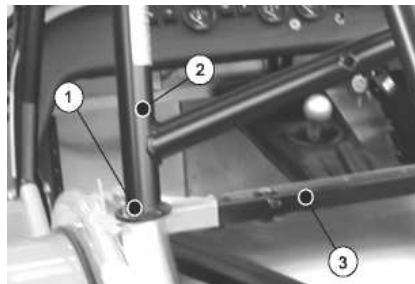
(1) Do not re-rivet the interior side panels at this stage.

(2) If you intend to run sill protectors, you will need to remove these prior to fitting the cage. They will also require trimming at the forward end to enable them to be refitted around the cage.

(3) You are now ready to attach the roll cage to the chassis however due to the size and weight of this part it is strongly recommended that you obtain further assistance as an extra pair of hands to help guide the cage into position could prevent damage.

### Roll cage fitment

36 Offer the cage up to the car and gently rest in place. Insert the bosses at the bottom of the rear hoop into the bucket bushes located at each end of the seat back harness rail at the rear of the cockpit, refer to Fig 8.



- 1 Bucket bush location
- 2 Roll cage rear hoop
- 3 Seat back harness rail

Fig 8 Rear hoop bucket bushes

37 Carefully lower the front of the cage until the saddle brackets at the ends of the front hoop rest over the chassis top tube (sill). When fitted, the inner leg of the saddle should be between the fixing boss and the interior side panel, refer to Fig 7.

38 As the front of the cage is lowered into place the rear legs will rise and locate themselves between the mounting plates at the rear of the boot compartment. The bosses on the ends of the rear hoop will drop into the bucket bushes.

39 The cage can now be bolted into place using the fixings provided. Align the holes one by one and loosely fit all the fixings as detailed below. Do not finally tighten any of the fixings until they are all in place.

## SECTION 16 - OPTIONS

40 Locate the underside of the bucket bushes and pass the reduced head bolts (fastener pack 30P017A Item 3) up through the bottom of the bush and into the threaded boss on the roll cage. No washers should be used on these bolts as this will restrict damper clearance. Do not tighten at this stage.

41 Loosely fit bolt (2) through the interior side panel, the roll cage and into the threaded chassis boss. This will hold the side panel in place whilst it is riveted back into place. If you intend to run sill protectors then these will need to be trimmed and re-fitted at this stage. Run the piping between the interior side panel and the chassis side rivet into place through the pre drilled holes using rivets (fastener pack ZCH 01 Item 5).

*NOTE*

*If you are building a new kit, refer to the assembly guide regarding fitment of knee trim panels as these are also best fitted at this time.*

42 Remove the loosely fitted bolt (fastener pack 30P017A Item 2) and adding a plain washer (5) pass through the interior side panel, roll cage saddle bracket and into the threaded boss. Do not tighten at this stage.

43 Repeat the above using bolts (2) and plain washers (5) passed through the outer legs of the saddle bracket and into the threaded bush in the chassis. Ensure that this bolt does not 'bottom out' on the bolt inserted from inside the cockpit.

*NOTES*

*(1) If you intend to fit a rear wheel protection bar then the outer fixing bolt on the driver's side of the car will need to be removed again to allow fitment of this part.*

*(2) The rear wheel protection bar is not SVA-compliant and should not be fitted prior to the SVA test.*

44 The rear legs of the cage are secured to the mounting plates at the rear of the boot compartment using bolts (1) and nuts (4) passed through the plates and the holes in the end of the legs. Plain washers (6) must be fitted under both the head of the bolt and the nut (these bolts may appear to be undersize but they are intended to be only a loose fit in the respective holes).

45 With all the fixings in place they can be finally tightened in accordance with Table 2. See also note above.

**TABLE 2 ROLL CAGE MOUNTING BOLT TORQUE FIGURES**

Location	Torque
Base of the bucket bushes	34 Nm
Rear legs	20 Nm
Forward hoop saddle brackets	47 Nm

**HEAD RESTRAINT  
(Roll cage and roll over bar)**

*NOTE*

*The head restraint is not SVA-compliant and should not be fitted prior to the SVA test.*

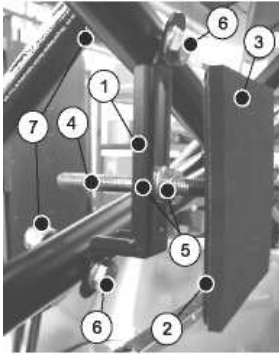
46 The head restraint is supplied as two parts, an adjusting bracket and a square head pad with a long adjusting stud.

47 Attach the self-adhesive foam pad (fastener pack 30P011A Item 5) to the front face of the square head pad.

48 Attach the bracket to the cross section of the roll cage/bar so that the adjusting slot is vertical to ground so that the longer fixing leg attaches to the lower cross tube, refer to Fig 9.

49 Bolt in place using bolts (1) and nyloc nuts (2) with plain washers (4) under both the head of the bolt and the nut.

**SECTION 16 - OPTIONS**



- 1 Adjusting bracket
- 2 Square head pad
- 3 Foam pad
- 4 Adjusting stud (head pad)
- 5 Plain nuts and washers (x 2)
- 6 Bolts and washers (x 2)
- 7 Nyloc nuts and washers (x 2)

Fig 9 Head restraint assembly

50 Screw one of the plain nuts (3) onto the head pad stud followed by one plain washer (4), pass the stud rearwards through the vertical slot in the adjusting bracket and fix into place with the remaining plain washer (4) and plain nut (3). Finally tighten all fixings in accordance with Table 3.

**TABLE 3 HEAD RESTRAINT FIXINGS TORQUE FIGURES**

Location	Torque
Bracket to roll cage/bar	34 Nm
Adjusting nuts (once adjusted)	34 Nm

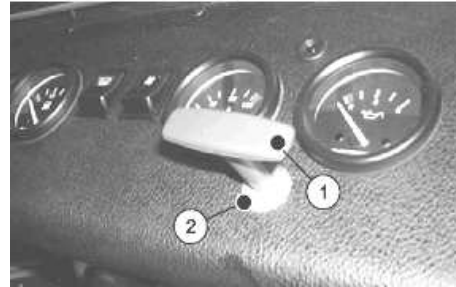
51 When the car is complete and you have obtained a comfortable driving position this assembly can be adjusted up, down, forwards and backwards to give the optimum position in relation to your crash helmet. Once this position has been set, it is advisable to trim off any of the excess studding.

**FIRE EXTINGUISHER PULL HANDLE**

*NOTE*

*The fire extinguisher handle is not SVA-compliant and therefore will not have been fitted at the factory, even though the rest of the extinguisher system may have been. The fire extinguisher system is intended for track use. Do not fit prior to SVA test.*

52 Insert the inner cable through the hole in the centre of the boss that has been pre fitted to your dashboard. Ensure that the handle is pushed fully home, refer to Fig 10.



- 1 Pull handle
- 2 Dash mounting boss

Fig 10 Fire extinguisher pull handle

53 Pass the inner cable through the hole in the cable locator fitted to the extinguisher lower handle, then through the opposing hole in the top handle.

54 Secure the inner cable in place using the solder-less nipple supplied, refer to Fig 11.

55 Trim off excess cable to approximately 30 mm.

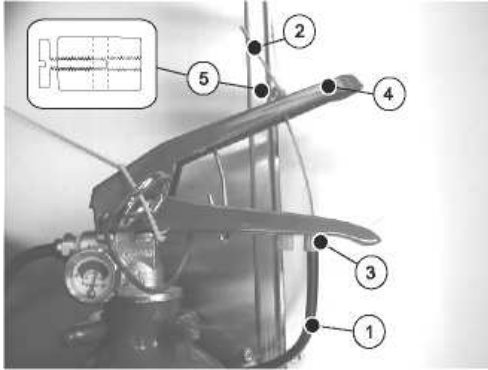
56 Apply a small piece of tape or heat shrink to the trimmed inner cable to prevent fraying.

*NOTE*

*It is advisable to allow approximately 5 mm of free play, as the scrutineer may want to ensure that the cable is free whilst scrutineering your car.*



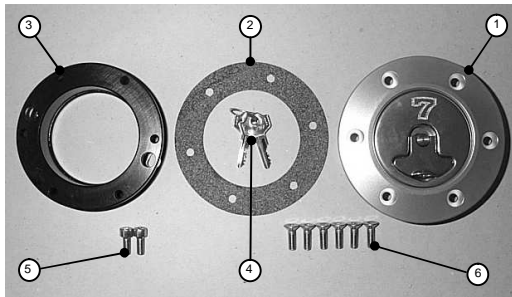
**SECTION 16 - OPTIONS**



- |   |               |   |                    |
|---|---------------|---|--------------------|
| 1 | Outer cable   | 4 | Top handle         |
| 2 | Inner cable   | 5 | Solder-less nipple |
| 3 | Cable locator |   |                    |

Fig 11 Fire extinguisher inner cable location

**AERO FUEL FILLER CAP**



- |   |              |   |                              |
|---|--------------|---|------------------------------|
| 1 | Filler cap   | 5 | M5 x 12 cap head screws (x2) |
| 2 | Gasket       | 6 | M5 x 16 CSK head screws (x6) |
| 3 | Neck adaptor |   |                              |
| 4 | Keys         |   |                              |

Fig 12 Kit contents

**WARNING**

**There is always a risk of fire or explosion when working on fuel tanks. Take the utmost care with preparations.**

57 If the Aero filler cap is to be retro fitted, the original cap must first be removed as follows. Undo the two self-tapping screws and remove the black filler neck cover inside the boot. Remove the boot carpet to prevent it getting dirty.



Fig 13 Filler cover and boot carpet removed

**WARNING**

**Wear appropriate eye protection whilst carrying out drilling operations.**

58 Remove the old cap with the the key and block the filler hole with tape or cloth. Remove the two self-tapping screws that retain the top of the filler neck to the filler boss, the rubber hoses will then allow the filler neck to be pulled out of the way.

59 Drill out the six rivets that retain the old filler boss. This must be done very carefully to avoid damage to the back panel. It is recommended this is done with a hand or air drill to eliminate the sparks caused by an electric drill.



Fig 14 Drill out the six rivets

60 The old filler boss can then be carefully pulled away from the back panel.



Fig 15 Old filler boss removed

**SECTION 16 - OPTIONS**

61 Take the gasket supplied with the kit and carefully align the hole in the gasket with the hole in the back panel. Ensure two of the fixing holes are positioned at 3 o'clock and 9 o'clock.

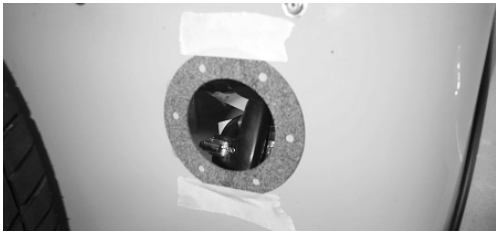


Fig 16 Gasket positioned on back panel

62 Mark the new hole positions and carefully centre punch the marks. Taking great care, drill the holes (6 mm diameter).



Fig 17 Carefully drill new holes

63 Fit the black spacer to the filler neck using the two M5 cap head screws supplied in the kit. The spacer will be a tight fit on the neck due to the O-ring and it must be pulled up evenly. The holes for the spacer are slotted to allow for correct alignment with the holes in the back panel. Tighten the screws fully after the alignment has been checked.



Fig 18 Spacer fitted to filler neck

64 Re-position the filler neck and gasket up against the back panel. Push the filler flange through the hole in the panel. Care must be taken to ensure correct orientation of the flange (One of the four 'scallops' has been enlarged to enable a petrol pump nozzle to pass further into the neck. It is important that this larger scallop is orientated towards the top), refer to Fig 19. Retain with the six M5 x 16 CSK head screws and pull these up evenly to ensure the flange locates correctly on the O-ring.



Fig 19 Fit flange

65 Remove all drillings from the inside of the boot and re-fit the boot carpet. Reposition the filler neck cover and retain it using the two self-tapping screws.

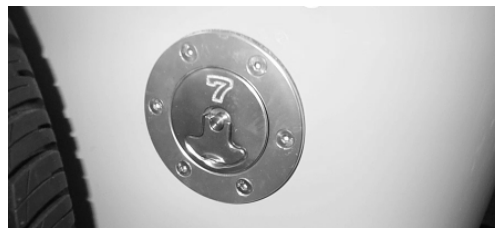


Fig 20 Job complete

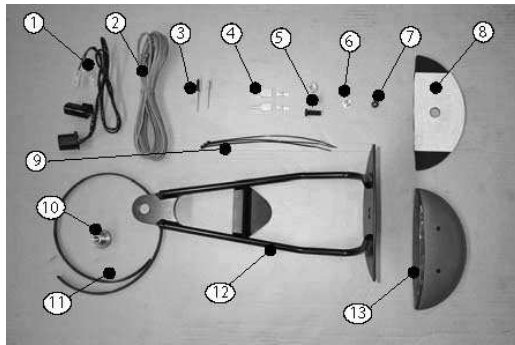
66 All that remains is to remove the tape or cloth from the neck and fit the new cap.

**NOTES**

- (1) Remember to fit the key to the new cap to your key ring.
- (2) On some older fuel filler necks it is possible that the restrictor flap inside the neck could prevent the fuel nozzle from entering the neck fully. If this is the case with your neck then a new neck will be required or the restrictor flap will need to be removed.

## SECTION 16 - OPTIONS

### HIGH LEVEL BRAKE LIGHT



- 1 Wiring sub-loom
- 2 Wiring to high-level brake light
- 3 Rivets (x2)
- 4 Male Lucar terminals and shrouds (x2)
- 5 Nut and plastic bolt from light kit
- 6 Replacement popper
- 7 Rubber grommet
- 8 Sticky pad
- 9 Cable ties
- 10 Larger spare wheel boss
- 11 Cable insulation
- 12 Light support bracket
- 13 High level brake light

Fig 21 Kit contents

#### Fitting the bracket

67 If retro-fitting, the spare wheel must first be removed from the car.

68 Working from inside the boot, unscrew the 5/8" nut which holds the spare wheel boss to the back panel, and remove the boss, taking care not to drop the large washers.

#### WARNING

**Wear eye protection when carrying out drilling operations.**

69 Centre mark a point 25 mm below the top of the back panel, on the vehicle centre line. Centre punch this, and drill a 5/32" hole, taking care not to damage the back panel. In the case of the SV, simply remove the central hood/boot cover popper using a 5/32" drill, as shown in Fig 22.



Fig 22 Drilling central popper on SV

70 Using masking tape to protect the paintwork from damage, position the bracket as shown in Fig 23, passing the new, larger spare wheel boss through the bracket and back panel, ensuring only one large washer is used in between the back panel and spare wheel support channel. Secure the boss using the 5/32" nut, finger tight only.



Fig 23 Alignment of bracket

71 Using a spirit level, refer to Fig 23, adjust the bracket until the light platform is exactly parallel to the top of the back panel, and mark from inside the boot through the previously drilled hole, onto the bracket.

72 Remove the bracket, centre punch and drill the hole using a 5/32" drill. Re-fit the bracket, and secure the upper mounting using the large black rivet, or for an SV the smaller countersunk rivet passed through the replacement popper. Apply threadlock, and tighten the 5/8" nut to 34 Nm.

#### Light and wiring connections

73 If painting of the light casing is required, follow the instructions supplied with the light.

## SECTION 16 - OPTIONS

74 Split the light and feed the terminated end of the supplied wires through both the hole in the base of the light unit, and the nut supplied with the light unit. Insert the plastic bolt from the underside, and tighten nut to secure in place as shown in Fig 24. Connect the terminals to the male connectors on the metal strips on the bulb holder.



Fig 24 Wire routing through light unit

75 Centre mark a point on the vehicle centre line, 35 mm above the edge of the spare wheel mounting boss. Centre punch, and carefully drill a 1/4" hole, as shown in Fig 25. Masking tape can be used to protect the paintwork. Push the supplied rubber grommet into the hole.

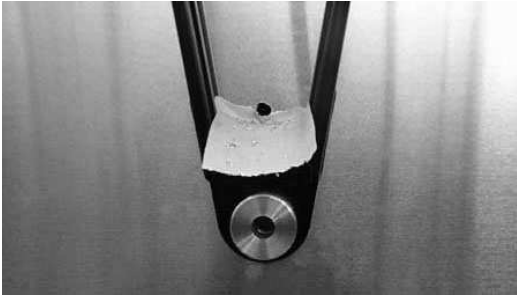


Fig 25 Drilled hole above spare wheel boss

### WARNING

**Disconnect the negative (-) terminal from the battery before carrying out electrical work.**

76 Working from inside the boot, unscrew the four retaining screws that secure the fuel filler neck cover, and remove it. From under the right and rear corner of the car, feed the terminated end of the supplied sub-loom up into the boot area, through the hole exposed by removing the filler neck cover. Disconnect the wiring plugs leading to the rear light cluster, and connect the plugs from the sub loom in between, as shown in Fig 26.

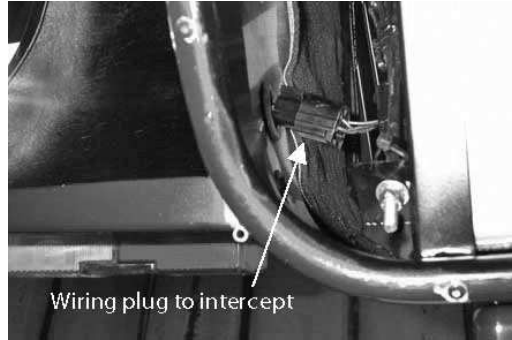


Fig 26 View from under RHS rear corner

77 Re-assemble the light unit, and feed the cable insulation over the wires. Push them through the hole in the sticky pad and the hole in the platform on the bracket, then use the sticky pad to fix the light in place, shown in Fig 27. Feed the wires down through the RH support tube of the bracket, then through the rubber grommet into the boot area, shown in Fig 28.

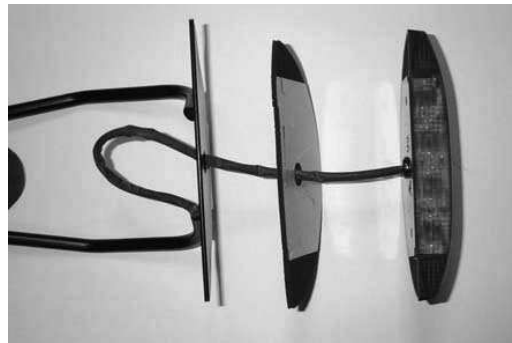


Fig 27 Exploded view of assembly

78 Cut the wires from the light unit to length so the connections can be concealed behind the filler neck cover, and terminate with the male Lucar terminals and shrouds. Connect these to the sub-loom; grey/red to the green/purple, and grey to the black wire. Use the cable ties provided to tidy and secure the wiring, and re-fit the filler neck cover.

**SECTION 16 - OPTIONS**

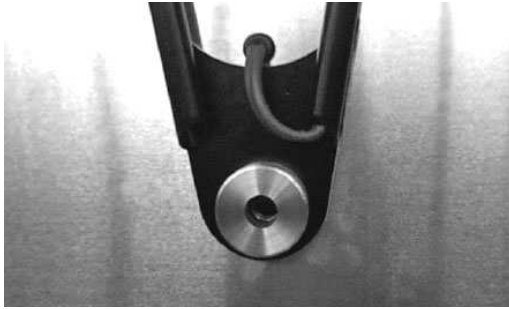


Fig 28 Wires from support tube entering boot

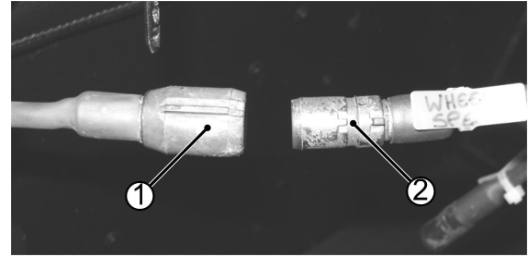
79 Reconnect the battery, and with the aid of an assistant, check to ensure that the high-level brake light operates in conjunction with the brake lights in the rear clusters, and re-fit the spare wheel. The completed assembly is shown in Fig 29.



Fig 29 Completed assembly

**Stack dash speed sensor fitment**

80 Route the speed sensor loom through the hole on the tunnel top along with main wiring loom to the front of the chassis near LHS wheel. Use cable ties to route the loom where necessary. Connect the speed sensor plug to the plug on main wiring marked as wheel sensor refer fig. 30

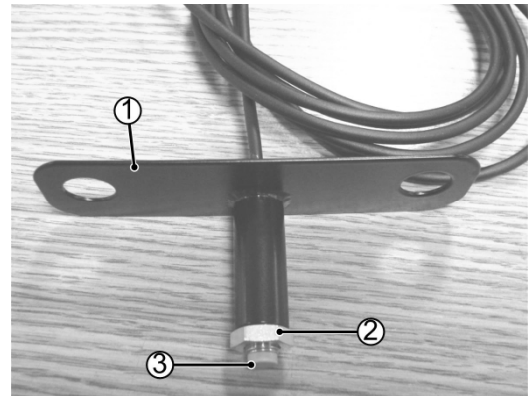


- 1 Plug on the wheel speed sensor loom
- 2 Plug on the main wiring loom

Fig 30 Wheel speed sensor plug

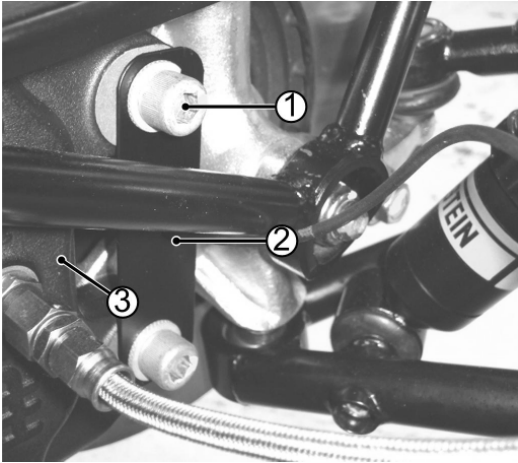
81 Insert the speed sensor in to the bracket and secure with locknut (do not tighten). Refer fig. 31. Remove 2 caphead bolts on the LHS brake caliper and fit the bracket with speed sensor to the caliper (do not tighten). There are four bolts on the brake disc

c, speed sensor should be adjusted by aligning with one of the four bolts. Select any of those bolt by rotating the disc and Adjust the speed sensor front edge so that the gap between the sensor and the bolt on the disk is 2-3 mm. tighten the lock nut on the sensor. Tighten the bolt on the caliper (50NM) and secured the bracket in place. Refer fig.32



- 1 Seed sensor Bracket
- 2 Lock Nut
- 3 Speed sensor

Fig 31 Wheel speed sensor Bracket



- 1 Caliper Caphead bolts
- 2 Speed sensor
- 3 Speed sensor Bracket

Fig 32 Wheel speed sensor

**SECTION 16 - OPTIONS**

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**SECTION 17 - ELECTRICAL**

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## **SECTION 17 - ELECTRICAL**

### **GENERAL**

#### *NOTE*

*Before carrying out any work on the vehicle electrical system disconnect the battery earth lead.*

1 It should be noted that 90% of electrical problems are caused by poor earth connections. If problems are experienced check the following vehicle earth points in the first instance.

- Battery to starter motor bolt.
- Engine mount to chassis.
- Instrumentation to chassis (at the wiper securing bolt under the dashboard).
- Rear lights to chassis.
- Headlamp earth and security of headlamp mounting bracket.
- Engine loom to scuttle.

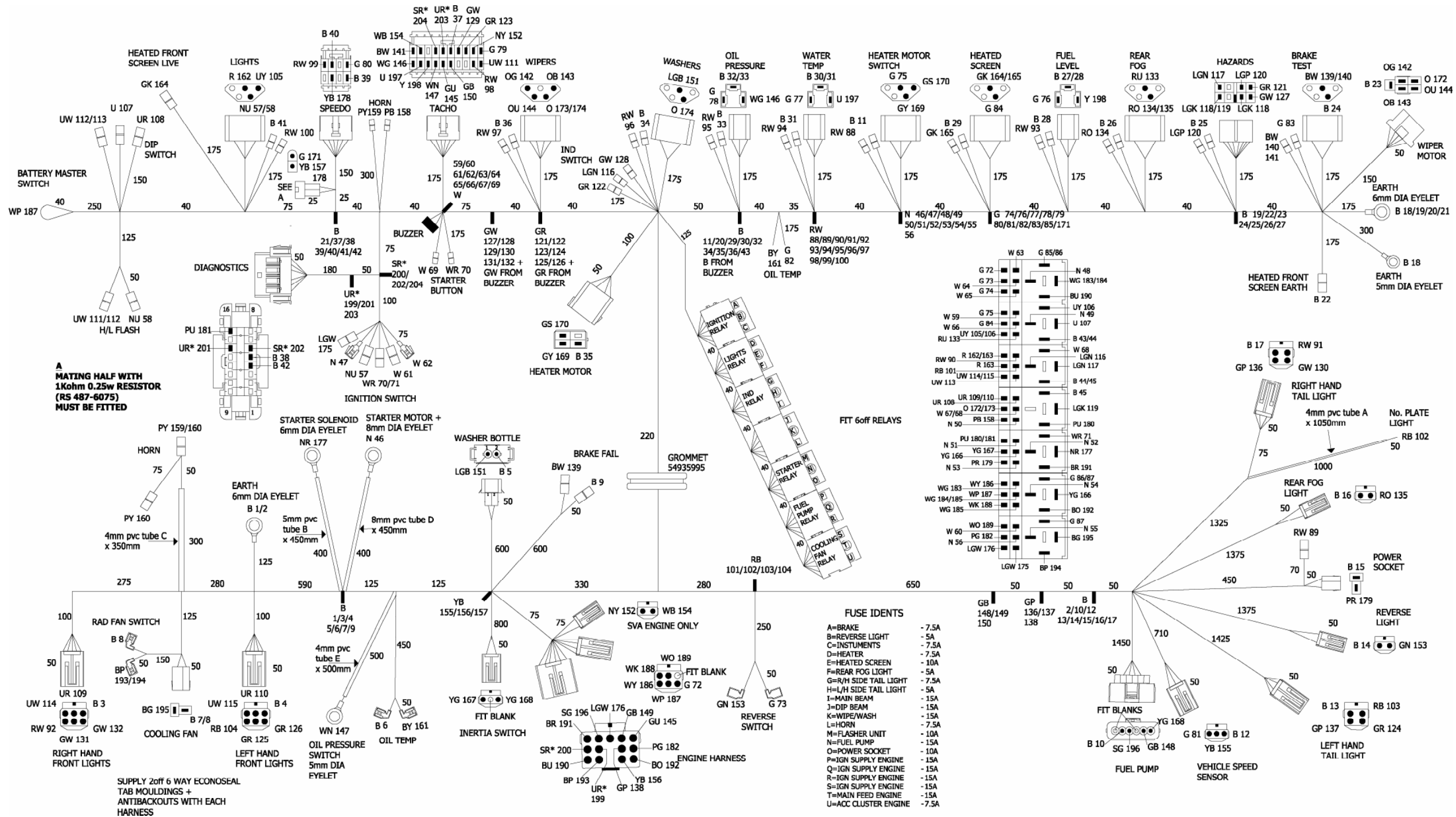
2 In the event of continuing problems contact the factory.

3 Wiring diagrams showing the vehicle loom layout including the fuse box and connectors for the car electrical system are shown at Fig 1. Details of the engine loom layout are shown at Fig 2.

#### *NOTE*

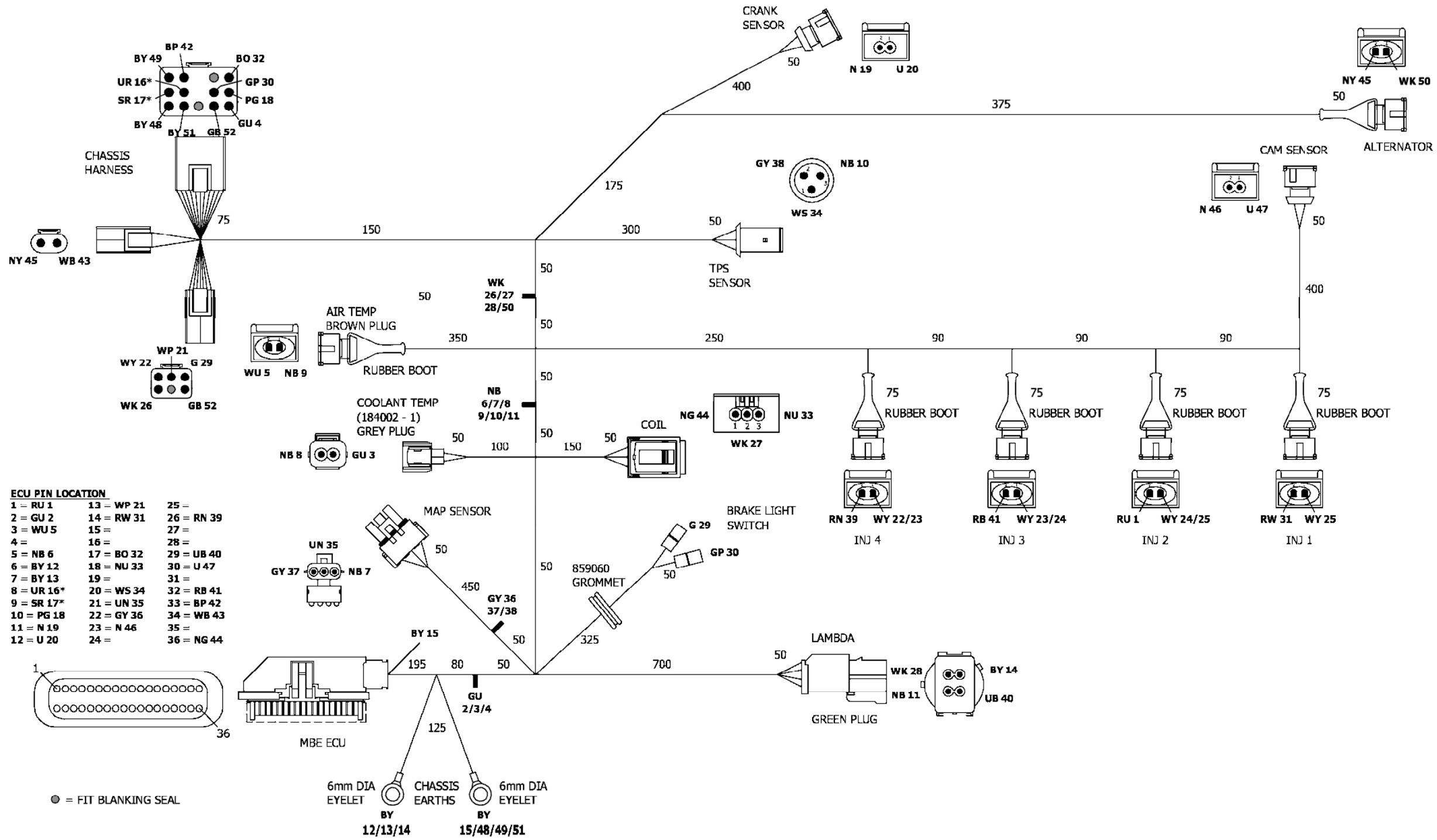
*In Fig 1 and Fig 2 all mouldings are shown as if viewed from the cable entry.*

**SECTION 17 - ELECTRICAL**



**Fig 1 Main wiring harness for all standard instrumentation, Ford Sigma variants**

**SECTION 17 - ELECTRICAL**



**Fig 2 Engine harness (Sigma)**

SECTION 17 - ELECTRICAL

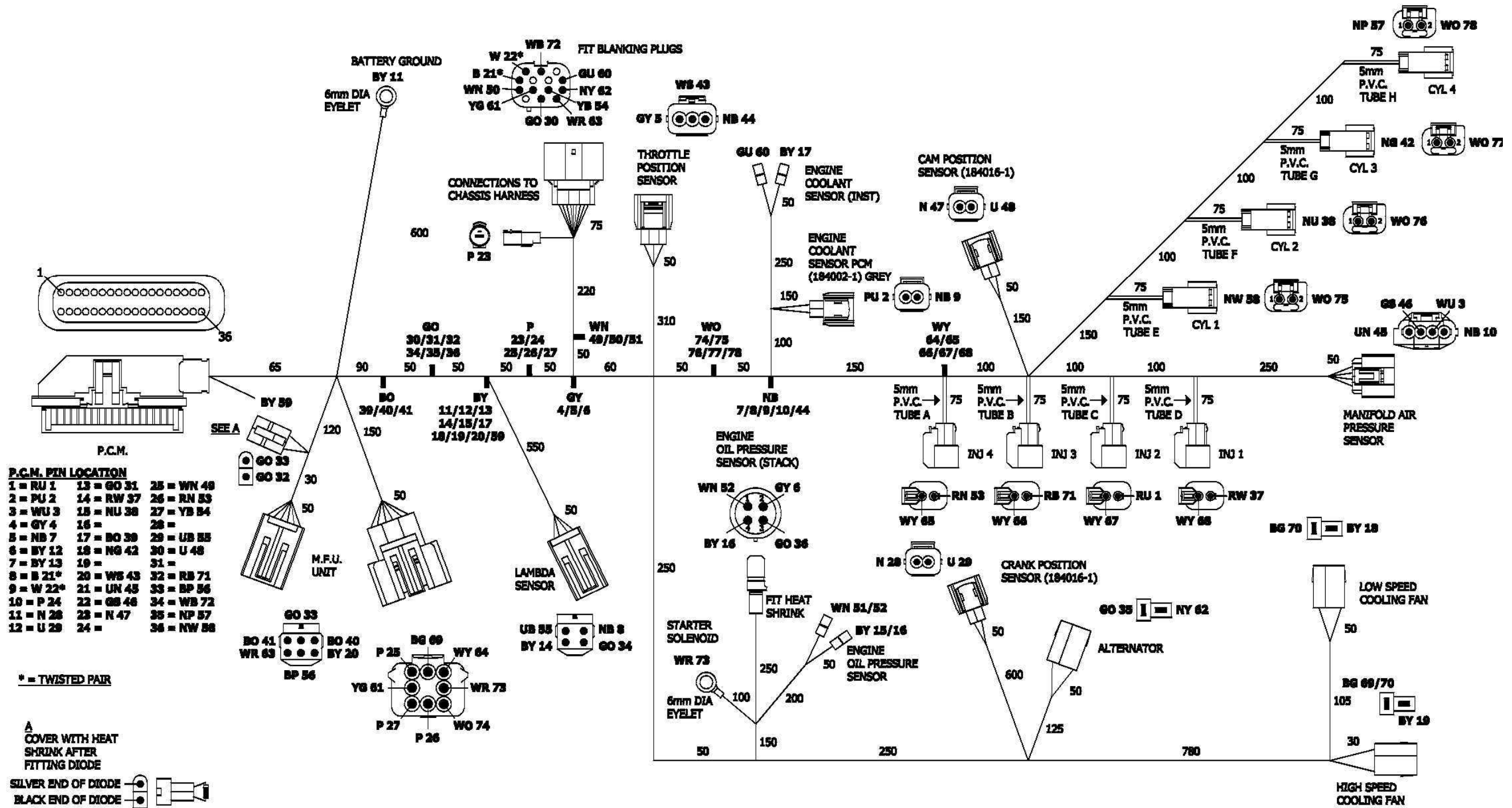
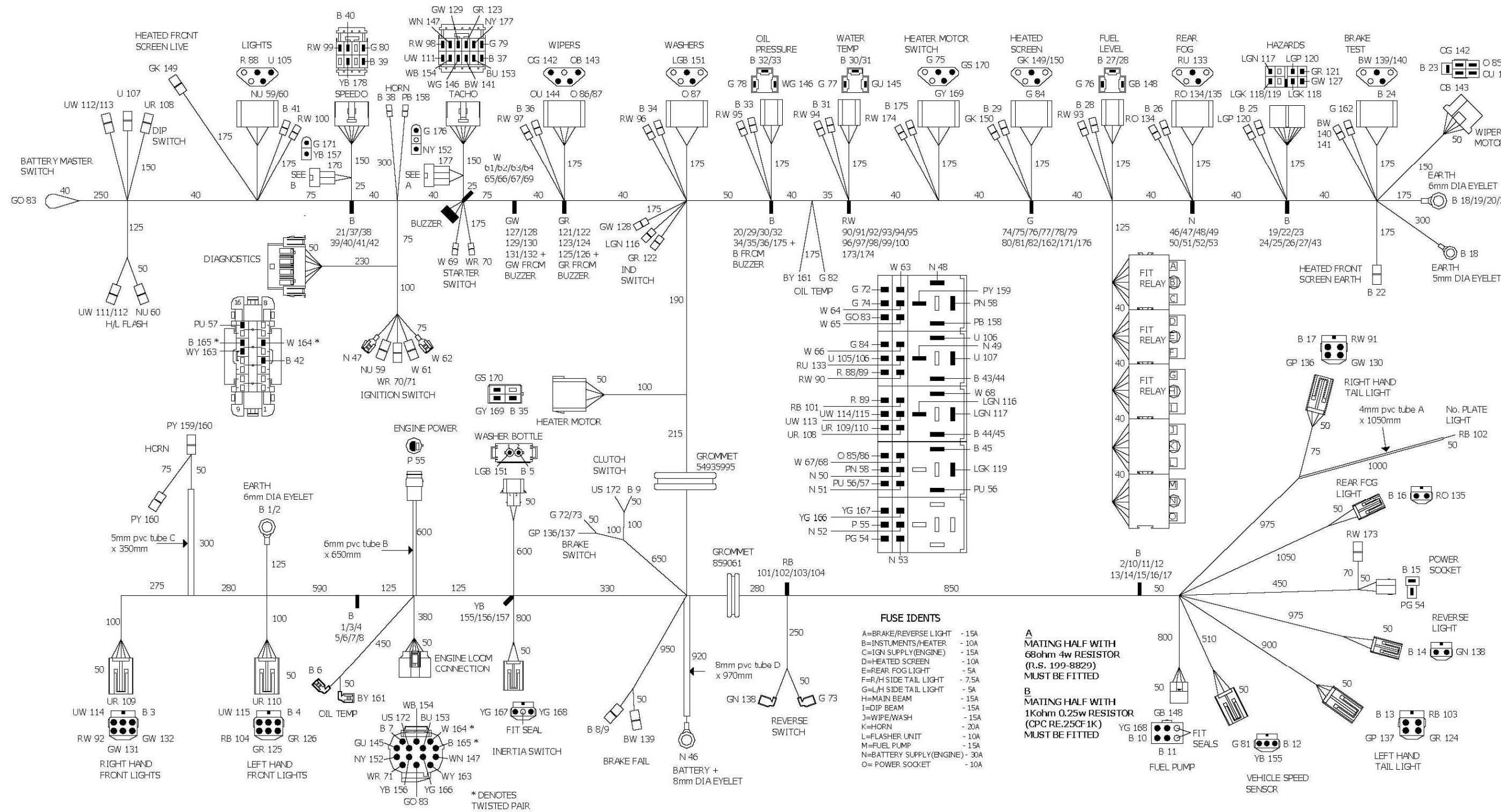


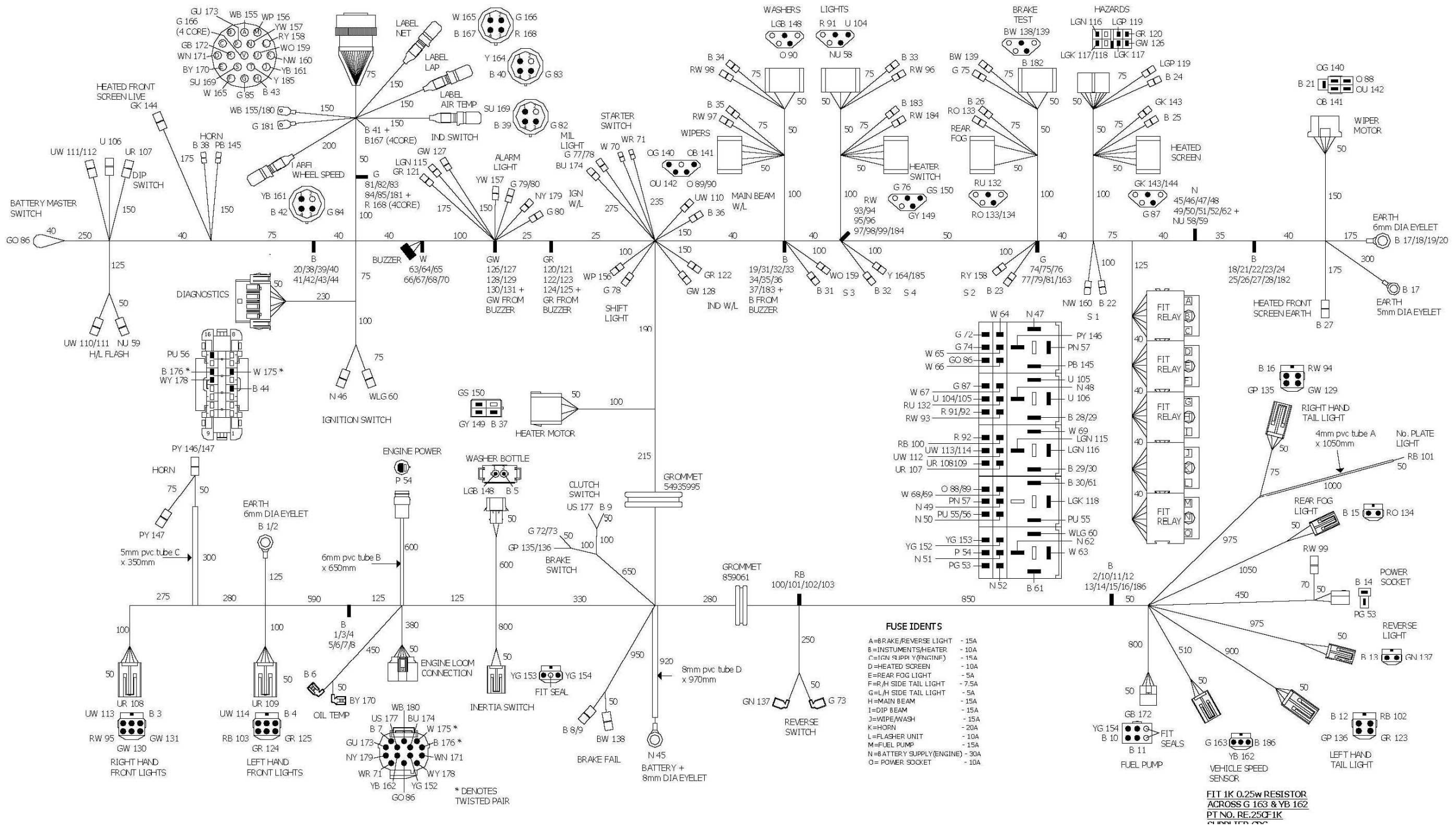
Fig 3 R400 Engine Harness

**SECTION 17 - ELECTRICAL**



**Fig 4 R400 Main Chassis Harness (standard dash)**

**SECTION 17 - ELECTRICAL**



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