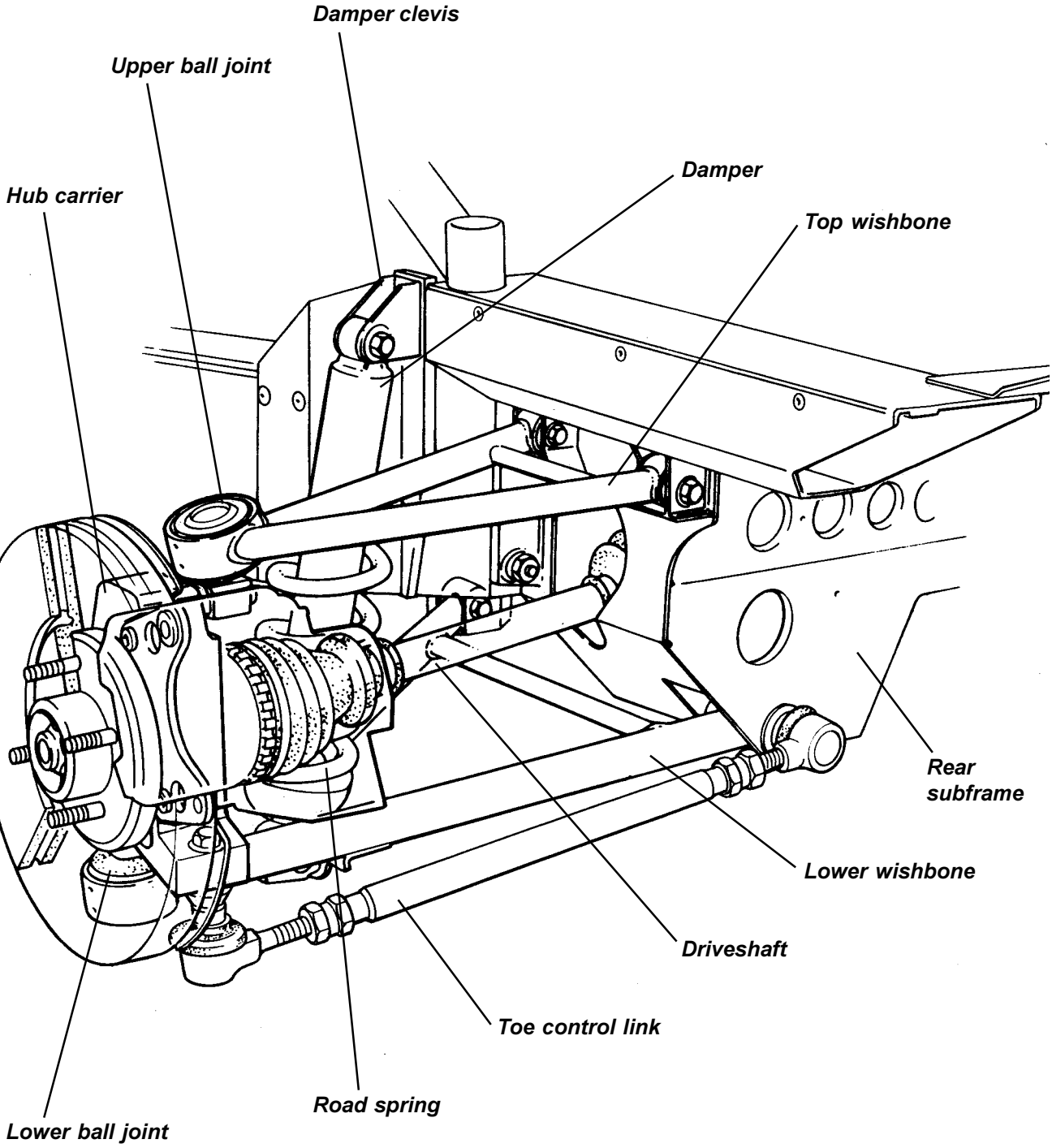
REAR SUSPENSION

SECTION DE - M111 ELISE


Damper clevis
Upper ball joint
Hub carrier
Damper
Top wishbone
Rear subframe
Lower wishbone
Driveshaft
Toe control link
Road spring
Lower ball joint

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DE.1 - GENERAL DESCRIPTION

The fully independent rear suspension comprises, on each side of the car, upper and lower tubular steel wishbones, a toe control link, and a concentric coil spring/telescopic damper unit picking up on the outboard end of the lower wishbone. An extruded aluminium alloy (prior to Nov. '99) or forged steel (Nov. '99 onwards) hub carrier, houses a dual taper roller bearing which supports the outboard driveshaft and a steel hub equipped with 4 wheel studs. Onto the LH hub carrier is mounted a wheel speed sensor which operates in conjunction with a sensor ring on the outboard driveshaft, in order to supply a vehicle speed signal to the speedometer.

The inboard ends of the upper and lower wishbones use replaceable bonded rubber pivot bushes to provide maintenance free articulation and suppression of noise and vibration. The two legs of the rearward biased top wishbone, pick up on the chassis rear subframe, and converge outboard to a ball joint housing into which is pressed a ball swivel joint. The ball pin of this joint locates in a forged steel plinth which is itself secured to the hub carrier using two horizontally disposed M10 bolts. The braced, wide based, forward biased lower wishbone, is anchored at its front inboard end to the chassis rear crossmember via a steel bracket, and at its rear inboard end to the chassis rear subframe. The outboard end of the wishbone houses another swivel ball joint, the ball pin of which is secured either in a forged steel plinth (similar to that used on the front suspension), itself fixed to the bottom of the extruded alloy hub carrier by four bolts, or, on later cars, directly into a tapered hole in the forged steel hub carrier.

The adjustable length, double ball jointed toe control link, shares a chassis anchorage with the rear of the lower wishbone, and picks up on a rearward extension of the hub carrier.

The spring/damper unit is fitted with the damper rod lowermost to minimise unsprung weight, and acts between the outer end of the lower wishbone and a steel clevis bracket bolted to the rear end of the chassis main side rail.

Certain components are common with the front suspension, and include: top and bottom swivel joints, hubs and hub bearings, and some wishbone pivot bushes.

DE.2 - GEOMETRY & ADJUSTMENTS

Provision is made for the adjustment of wheel alignment and camber. Under normal service conditions, no periodic scheduled check of the geometry is necessary, with a full geometry check required only after suspension repair, or if excessive tyre wear is evident, or handling deficiencies encountered. Before any measurements or adjustments are made, it is essential first to set the vehicle to its ‘mid-laden’ ride height, approximating to driver and passenger and a half tank of fuel. The following data refers to standard cars with non-adjustable spring/damper units. For cars fitted with Sport suspension, a lower ride height and revised geometry is used - refer to Section XA:

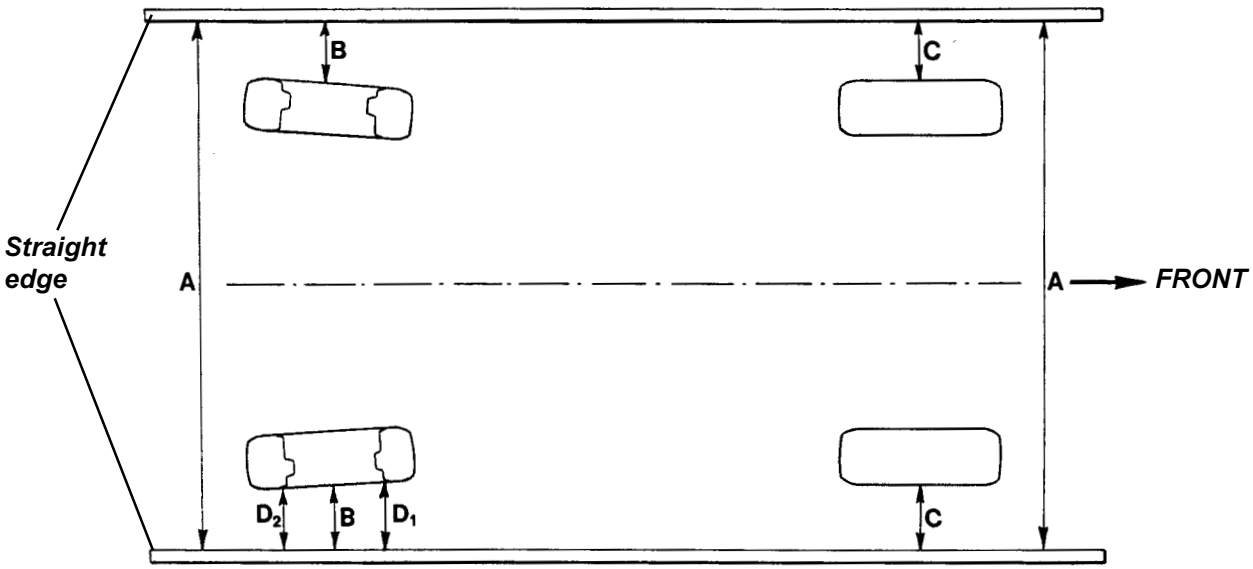
Ride height (for geometry check);	- front	140 mm below front end of chassis siderail
	- rear	140 mm below rear end of chassis siderail
Alignment;		1.2 mm toe-in each side; + 0.2 mm, - 0.
		(0.18° toe-in each side; + 0.03°, - 0)
		Max. difference side/side; 0.2 mm (0.03°)
Camber;		- 1.8°; ± 0.2°. Max. difference side/side; 0.2°

Alignment

Wheel alignment refers to the parallelism of the wheels when viewed from above and is crucial to vehicle stability, handling and tyre wear. It is measured either by the angle a wheel makes with the vehicle centre line, or the difference in dimension between the wheel rim to wheel rim measurement at the front and rear of the wheel at hub centre height. The wheels are said to 'toe-in' when the wheel paths converge ahead of the vehicle, and 'toe-out' when they diverge. Rear wheel alignment should be measured only using equipment which measures **individual** rear wheel alignment reletive to the car centreline. Wheel alignment is designed to vary with suspension travel ('bump steer') and the base setting should be measured only at the specified mid laden ride height.

It is possible to accurately measure individual wheel alignment using a pair of long straight bars or round section elastic in conjunction with 4 axle stands or similar. Any bars used must be longer than the length of the car, and be suitably stiff and straight.

Set up the bars or elastic on each side of the car at wheel centre height as shown an the diagram, so that A = A, B = B and C = C.



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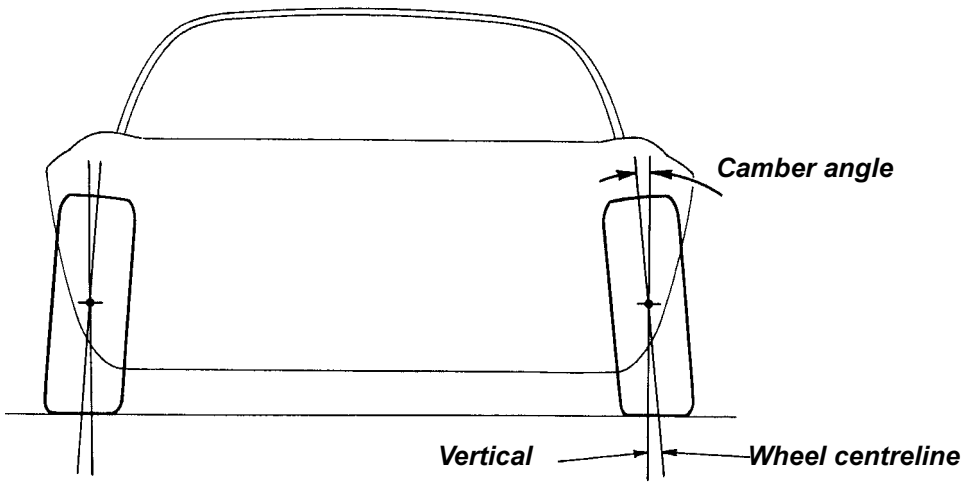
Measure the distance from the bar to the rim of the wheel concerned at the front and rear of the centre line of the wheel (D_1, D_2). If the front dimension, D_1, is greater than the rear dimension, D_2, the wheel has TOE-IN. If the rear dimension is greater than the front dimension, the wheel has TOE-OUT. The difference between the two measurements is the amount the wheel has toe-in or toe-out.

Wheel alignment is adjusted via the toe control link which is equipped with a left hand threaded ball joint at one end, and a right hand threaded ball joint at the other. Slacken both ball joint locknuts, and turn the link rod as necessary to increase or decrease the effective length of the link. As a guide, lengthening the link rod by a turn of one 'flat' (60°) will increase toe-in by just less than 1mm.

After adjustment, tighten the two locknuts to 77 Nm taking care to ensure that the ball joint sockets are aligned at 90° to each other.

Camber Adjustment

Camber is the angle from vertical of the wheel when viewed from the rear, and is said to be negative when the wheel leans inwards at the top (positive when leaning outwards).



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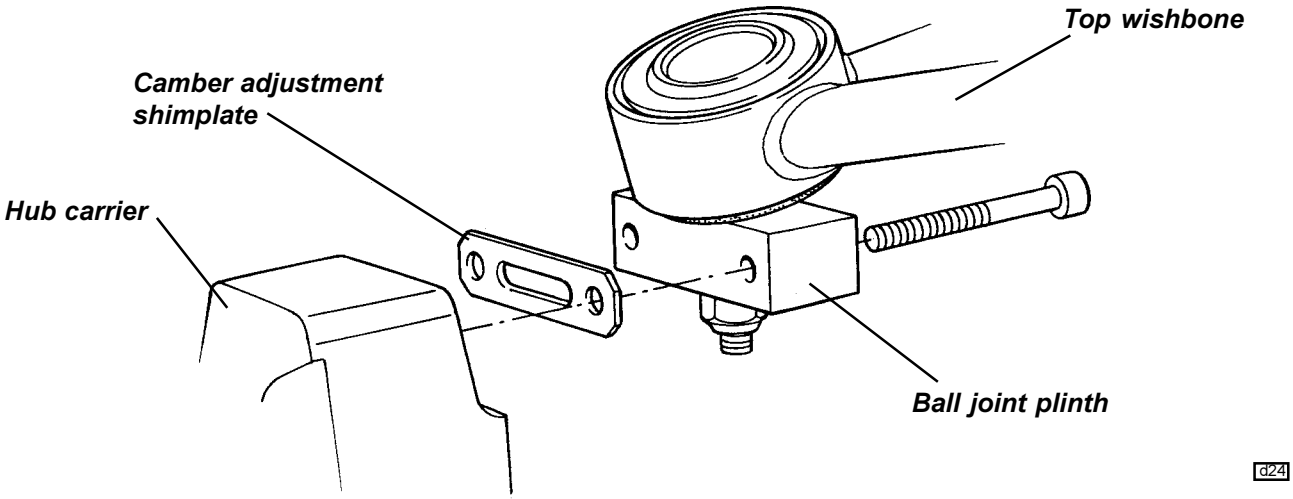
The primary purpose of camber is to achieve the maximum efficiency of the tyre under cornering loads and body roll, with the specification closely allied to a particular wheel/tyre combination. The camber angle changes with suspension travel, becoming more negative on bump, and should be measured only at the specified ride height. Incorrect camber can result in handling deficiencies and excessive tyre wear.



- Camber adjustment shim plates are fitted between the top wishbone ball joint plinth and the hub carrier.
- Shims are available in 1 mm thickness.
- Reducing the shim pack thickness will increase negative camber. Adding shims will reduce negative camber.
- A 1mm shim plate will alter camber by approximately 0.3°.
- Before final assembly, coat the joint face between the steel shim plate and the alloy hub carrier with Duralac MSDS anti-corrosive jointing compound (A111C6017), and assemble whilst the compound is still tacky.
- Apply Permabond A131 (A912E7034) to the threads of the two ball joint plinth fixing bolts, and torque tighten to 45 Nm.

DE.3 - SUSPENSION DISASSEMBLY/ASSEMBLY

The suspension may be disassembled without the use of any special tools other than a spring compressor required if the spring is to be removed from the damper unit. Removal of the driveshaft from the hub will usually result in separation of the hub bearing two part inner race, with likely damage to the integral seal. If the hub or hub carrier is being removed for reasons other than for hub bearing replacement, the inboard driveshaft should be removed from the transmission, and the complete driveshaft assembly retained with the hub carrier and hub. With the car on a wheel free lift and with the rear wheels removed:

1. If fitted, remove the engine bay undertray to provide access to the lower wishbone front pivot.

2. Remove the two bolts securing the brake caliper to the mounting plate, release the routing clips securing the flexible hose and parking brake cable, and support the caliper aside without straining the brake hose. Release the single retaining screw, and remove the brake disc from the hub.

3. Release the bolt securing the outer end of the toe link to the hub carrier, noting and retaining the shim washers fitted between the ball pin and conical spacer.

4. Remove the two bolts securing the top swivel joint plinth to the hub carrier, noting and retaining the camber adjustment shim pack.

5. The inboard C.V. joint is retained in the transmission by a rounded section circlip, and may be removed using a special wedge tool T000T1276, or by applying a shock pull to the C.V. joint body using a slide hammer with a forked end.

CAUTION: Do NOT attempt to remove the inboard C.V. joint from the transmission by pulling on the driveshaft. This action will cause the joint to become disassembled and may entail replacement of the joint. The components of the inboard plunging joint are held in position, for transit purposes only, by a collar within the boot which will be overidden if excessive axial force is used. Apply pressure only to the 'tulip' or outer body of the joint.

Withdraw the inboard C.V. joint from the transmission, and fit blanking plug T000T1385 into the transmission to limit the amount of transmission oil loss.

6. Remove the four M10 setscrews securing the lower swivel joint plinth to the hub carrier, disconnect the speed sensor harness (LH hub) and withdraw the hub carrier, hub and driveshaft assembly.

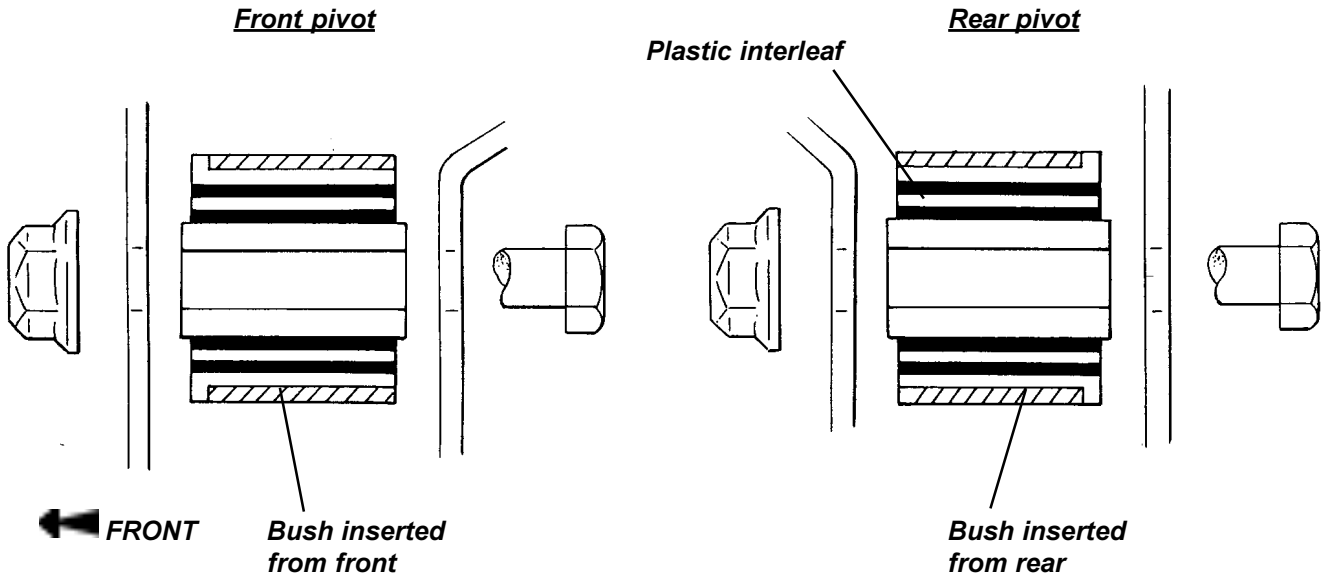
7. Remove the top wishbone pivot bolts, and withdraw the wishbone from the rear subframe.

8. Remove the top and bottom mounting bolts for the spring/damper unit, and withdraw.

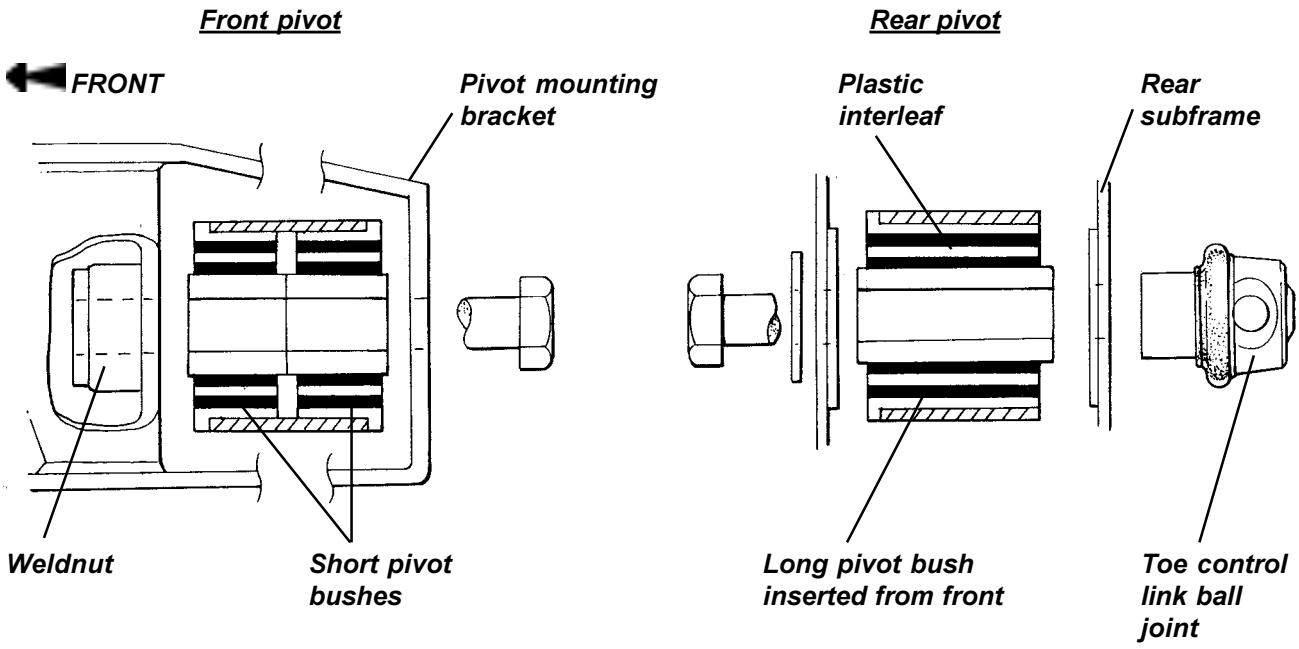
9. Remove the lower wishbone pivot bolts and withdraw the lower wishbone and toe link.

10. If necessary, remove the top or bottom swivel joint ball pin nut, and use a ball joint splitter tool to separate the joint from its plinth. The swivel joint may be replaced using suitable press tool dollies.

11. The wishbone pivot bushes are bonded rubber type with a plastic flanged outer sleeve, a plain steel inner sleeve, and a plastic interleaf sleeve within the rubber bush to control the flexing characteristic. The bushes may be pressed out of the wishbone eyes, and new bushes fitted using suitable press tool dollies. Smear the outer surface of the new bush with rubber grease to ease fitment, and assemble as follows: Top wishbone - insert a single 30mm long bush into each pivot eye from the outside end (front of front eye, and rear of rear eye).



Lower wishbone rear pivot - insert a single 30mm long bush from the front end of the eye.
Lower wishbone front pivot - insert a 16mm long bush into each end of the front eye.



12. The road spring may be removed from the damper using a suitable spring compressor to allow the spring collar retaining circlip to be released from its damper body groove. Note that the springs were changed in June '98 from parallel (black) to barrel shaped (graphite) for improved spring stability. For parallel springs, the middle spring abutment circlip groove is used, whereas the barrel shaped springs use the top groove (lowest ride height).

13. Re-assemble the suspension in reverse order to disassembly with the following notes:
- **For assembly of the rear toe-link, refer to sub-section DE.4.**
- Smear the shank of each pivot bolt with PBC grease.
- Apply Permabond A131 (A912E7034) to the threads of any bolts tapping directly into the alloy hub carrier (except early type hub carriers with tapped holes for the brake caliper mounting plate fixings - see sub-section DE.5).
- Apply Permabond A130 (A912E7033) to the threads of the lower wishbone front pivot bolts (weldnuts).
- Coat the joint faces of the hub carrier with any steel component (e.g. swivel joint plinth, camber shim plates etc.) with Duralac MSDS anti-corrosive jointing compound (A111C6017), and assemble whilst the compound is still tacky.
- The lower ball joint pin must be tightened into the plinth before fitting the plinth to the hub carrier.
- Take care to refit the original camber adjustment shimpack.
- Lubricate the ends of the damper eye bushes with rubber grease.
- Before re-fitting the driveshaft, first renew the round section circlip (A100R6001F) on the end of the inboard joint spigot shaft. Also, check the condition of the transmission output seal, and renew if necessary. Lubricate the lip of the seal with transmission oil, and grease the corresponding shoulder on the driveshaft (C.V. joint) spigot, to reduce the danger of damaging the seal on assembly.
  Carefully insert the shaft assembly into the transmission with the (lubricated) circlip fitted on the end of the spigot shaft. Press the C.V. joint into the differential gear splines until a 'click' indicates that the circlip has engaged in its location. Pull on the body of the joint to check security.
- After refitting the brake caliper, press the brake pedal to reposition the pads before driving the car.

14. The Service Schedule specifies that the security of the front and rear suspension is checked at each service. This operation requires that all the principal suspension pivot bolts are torque checked, noting the following points:
  Where a bolt is tapped into a housing or weldnut, and relies on a thread locking compound for security, it