Chapter 10
Suspension and steering systems

Contents

Degrees of difficulty

Easy, suitable for novice with little experience 

Fairly easy, suitable for beginner with some experience 

Fairly difficult, suitable for competent DIY mechanic 

Difficult, suitable for experienced DIY mechanic 

Very difficult, suitable for expert DIY or professional 

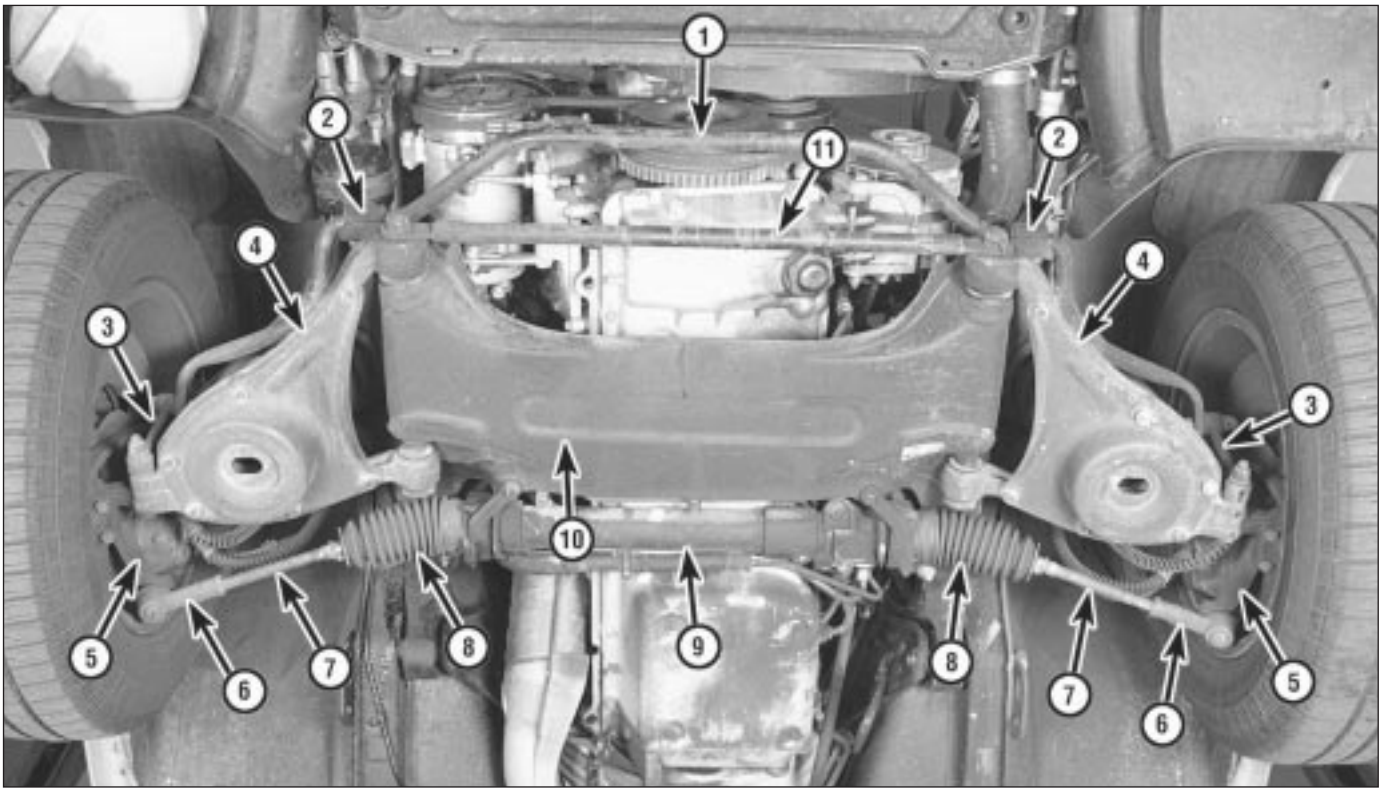
Specifications

General

Power steering fluid type	See Chapter 1

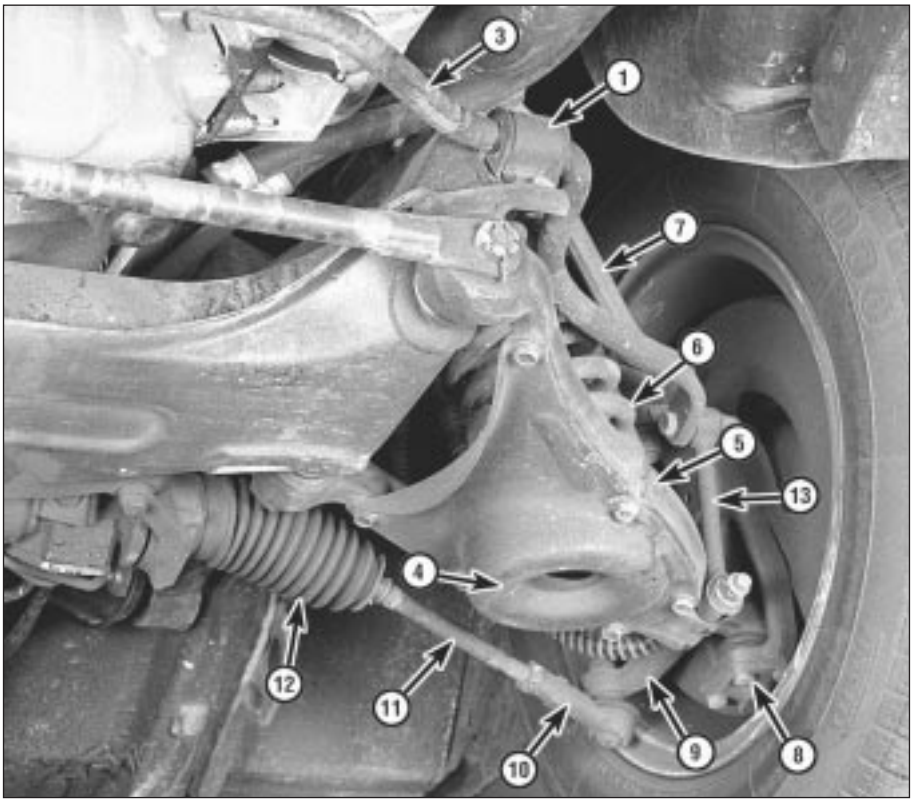
Torque wrench settings

	Nm	lbf ft
Front suspension		
Balljoints		
Retaining bolts	55 to 62	41 to 45
Ball stud nuts	47 to 68	35 to 50
Lower control arm		
Spring pan bolts	26 to 34	19 to 25
Pivot nuts/bolts	43 to 68	32 to 50
Shock absorber		
Lower nut	61 to 68	45 to 50
Upper nut	35 to 43	26 to 31
Anti-roll bar		
Bushing bracket bolts		
Upper	22 to 28	16 to 20
Lower	24 to 30	18 to 22
Link nuts	55 to 60	41 to 44
Upper control arm pivot nuts/bolts	61 to 75	45 to 55
Rear suspension		
Carrier-to-control arm bolt/nut	70 to 80	51 to 59
Rear control arm-to-crossmember bolt/nut	85 to 105	62 to 77
Shock absorber/coil spring assembly		
Lower shock-to-control arm bolt/nut	160 to 200	118 to 147
Upper shock-to-body bolts	22 to 28	16 to 20
Steering		
Steering wheel-to-steering shaft nut	35 to 45	26 to 33
Steering shaft-to-steering gear pinion shaft U-joint pinch bolt	19 to 24	14 to 17
Steering gear mounting bracket bolts/nuts	26 to 29	19 to 21
Tie-rod end-to-steering knuckle nut	61 to 68	45 to 50



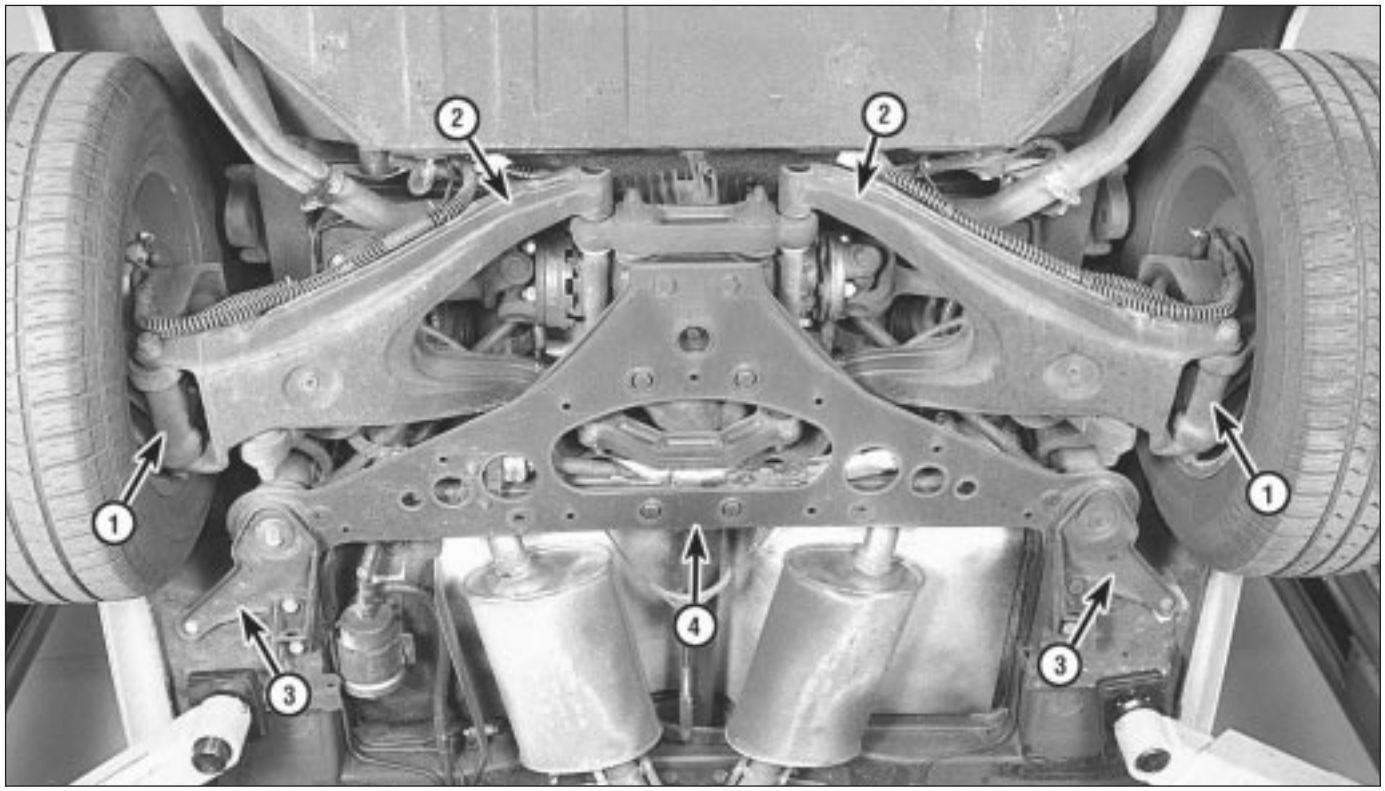
1.1 Front suspension and steering systems

1 Anti-roll bar
2 Anti-roll bar bushing brackets
3 Anti-roll bar links
4 Lower control arms
5 Steering knuckles
6 Tie-rod ends
7 Tie-rods
8 Steering gear boots
9 Steering gear
10 Suspension crossmember
11 Lower control arm crossbrace



1.2 Front suspension (left corner)

1 Anti-roll bar bushing bracket
2 Anti-roll bar link
3 Anti-roll bar
4 Coil spring pan
5 Lower control arm
6 Coil spring
7 Upper control arm
8 Lower balljoint
9 Steering knuckle
10 Tie-rod end
11 Tie-rod
12 Steering gear boot



1.3 Rear suspension

1 Hub carrier 2 Control arms 3 Crossmember mounting brackets 4 Crossmember

1 General information

Warning: Whenever any of the suspension or steering fasteners are loosened or removed, they must be inspected and if necessary, replaced with new ones of the same part number or of original equipment quality and design. Torque wrench settings must be followed for proper reassembly and component retention. Never attempt to heat, straighten or weld any suspension or steering component. Instead, renew any bent or damaged part.

The front suspension **(see illustrations)** consists of unequal-length upper and lower control arms, shock absorbers and coil springs. The upper ends of the shocks are attached to the body; the lower ends are attached to the lower control arms. The upper ends of the coil springs are seated against the suspension crossmember; the lower ends are seated against removable plates which are bolted to the lower control arms. The steering knuckles are attached to balljoints in the upper and lower control arms. An anti-roll bar is attached to the suspension crossmember with a pair of bushing brackets and to the lower control arms via a connecting link at each end.

The independent rear suspension **(see illustration)** uses control arms and integral shock absorber/coil spring units. The upper ends of the shocks are attached to the body; the lower ends are connected to the control arms.

The steering system consists of the steering wheel, a steering column, a universal joint on the lower end of the steering shaft, a rack-and-pinion power steering gear, a power steering pump and a pair of tie-rods which connects the steering gear to the steering knuckles **(see illustration)**.

2 Self-levelling rear suspension system

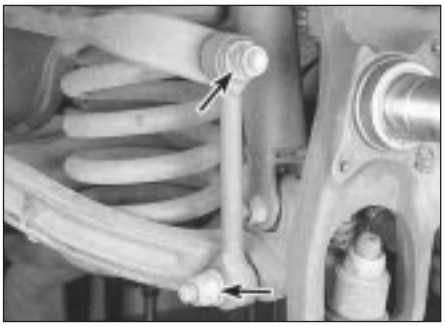
1988 to 1992 models were equipped with a system that provided hydraulic power for the rear suspension and for the power brakes. As the vehicle is loaded or unloaded, the rear suspension is automatically adjusted to maintain a constant ride height.

The system was discontinued on 1993 and later models, which are equipped with conventional shock absorber/coil spring units. A kit is available from your Jaguar dealer should you decide to retrofit the later, conventional shocks to a pre-1993 vehicle. Complete instructions for refitting the kit are included in Section 10.

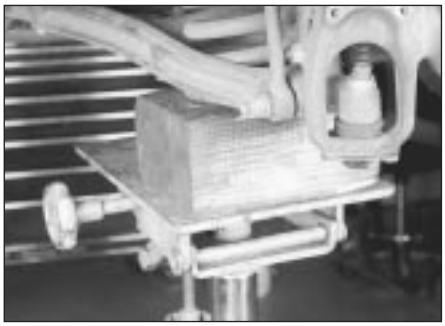
3 Anti-roll bar (front) - removal and refitting

1 Raise the front of the vehicle and support it securely on axle stands.
2 Remove the bolts from the anti-roll bar brackets that attach the anti-roll bar to the suspension crossmember **(see illustration)**.
3 Remove the nuts that attach the anti-roll bar to the links **(see illustration)**. If you're replacing the links themselves, or removing the control arm, remove the nuts attaching the links to the lower control arms.

3.2 To detach the anti-roll bar from the suspension crossmember, remove these two bolts (arrowed) from each bushing bracket



3.3 To disconnect the anti-roll bar from the link, remove the upper nut (arrowed); to disconnect the link from the lower control arm, remove the lower nut (arrowed)



4.2 Support the lower control arm with a jack; put a block of wood between the jack head and the control arm to protect the arm and coil spring plate

4.3 To disconnect the lower end of the shock absorber from the lower control arm, remove this nut and bolt

4.4 To disconnect the upper end of the shock absorber from the body, remove this nut (arrowed)

4 Remove the anti-roll bar from the vehicle.
5 Refitting is the reverse of the removal procedure. Be sure to tighten all fasteners to the torque listed in this Chapter's Specifications.

4 Shock absorber (front) - removal and refitting

Note: *Always renew both left and right shocks at the same time to prevent handling peculiarities and abnormal ride quality.*
1 Loosen but do not remove the front wheel nuts. Raise the front of the vehicle and support it on axle stands. Remove the wheels.
2 Support the lower control arm with a trolley jack **(see illustration)**. Place a block of wood between the jack head and the control arm to protect the arm and spring plate.
3 Remove the nut and bolt that attach the lower end of the shock absorber to the lower control arm **(see illustration)**.
4 Remove the nut that attaches the upper end of the shock to the body **(see illustration)**.
5 Remove the shock absorber.
6 Refitting is the reverse of removal. Tighten the fasteners to the torque listed in this Chapter's Specifications.

5 Balljoints - check and renewal

Check

1 Raise the vehicle and support it securely on axle stands.
2 Visually inspect the rubber boot between the balljoints and the steering knuckle for cuts, tears or leaking grease. If you note any of these conditions, renew the balljoint.
3 Place a large crowbar between each control arm and the steering knuckle. If you can see or feel any movement during either check, a worn-out balljoint is indicated.
4 Have an assistant grasp the tyre at the top and bottom and shake the top of the tyre with an in-and-out motion. Touch the balljoint stud nut. If any looseness is felt, suspect a worn-out balljoint stud or a widened hole in the steering knuckle. If the latter problem exists, the steering knuckle should be replaced as well as the balljoint.

Renewal

5 Loosen the wheel nuts, raise the vehicle and support it securely on axle stands. Remove the wheel.
6 Support the lower control arm with a trolley jack **(see illustration 4.2)**. Place a block of wood between the jack head and the control arm as shown to protect the arm and spring plate.

Upper balljoint

7 Loosen - but don't remove - the ball stud nut, fit a small puller **(see illustration)** and pop the ball stud loose from the steering knuckle.
8 Remove the two bolts that attach the balljoint to the upper arm **(see illustration)**. Count the number of shims installed and set them aside.
9 Refitting is the reverse of removal. Don't forget to refit the same number of shims. Tighten the bolts to the torque listed in this Chapter's Specifications.
10 Remove the jack from under the control arm, refit the front wheel, lower the vehicle and tighten the wheel nuts to the torque listed in the Chapter 1 Specifications. Drive the vehicle to an alignment workshop to have the wheel alignment checked, and if necessary, adjusted.

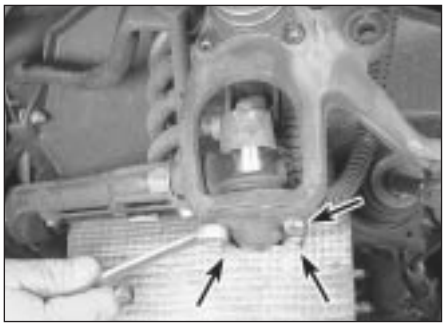
Lower balljoint

11 Loosen - but don't remove - the ball stud nut, then give the steering knuckle a few sharp raps with a hammer to pop the ball stud loose **(see illustration)**. Remove the ball stud nut.

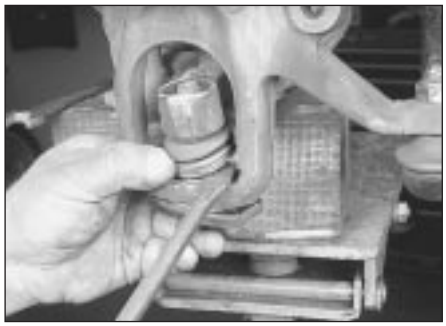
5.7 To detach the upper balljoint from the steering knuckle, loosen the ballstud nut, fit a small puller and break the ballstud loose from the knuckle

5.8 Remove the bolts and shims from the upper balljoint; be sure to put the shims back when refitting the new balljoint

5.11 Strike the steering knuckle in this area to pop the lower ball stud loose from the steering knuckle



5.12 To detach the lower balljoint from the lower control arm, remove these four bolts (arrowed)



5.13 To detach the dust boot from the steering knuckle, pry the lower lip of the boot out of its groove in the knuckle

12 Remove the four balljoint retaining bolts **(see illustration)**.
13 If the dust boot is damaged, pry it out **(see illustration)**.
14 Remove the balljoint.
15 Refitting is the reverse of removal. Tighten the balljoint bolts and the ball stud nut to the torque listed in this Chapter's Specifications.
16 Remove the jack from under the control arm, refit the front wheel. Lower the vehicle and tighten the wheel nuts to the torque listed in the Chapter 1 Specifications.

6 Steering knuckle - removal and refitting

1 Loosen the wheel nuts, raise the front of the vehicle and place it securely on axle stands. Remove the wheel.
2 Remove the front brake caliper and mounting bracket (see Chapter 9). Do not disconnect the brake hose. Hang the caliper out of the way with a piece of wire.
3 Remove the brake disc (see Chapter 9).
4 Remove the ABS sensor **(see illustration)**.
5 Remove the brake shield **(see illustration)**.
6 Disconnect the tie-rod end from the steering knuckle (see Section 15).
7 Disconnect the upper and lower balljoints from the steering knuckle (see Section 5).
8 Remove the steering knuckle.
9 Refitting is the reverse of removal. Tighten the balljoint nuts and the tie-rod end nuts to the specified torque. Tighten the brake fasteners to the torque values listed in the Chapter 9 Specifications.

7 Upper control arm - removal and refitting

1 Loosen the wheel nuts, raise the vehicle and support it securely on axle stands. Remove the wheel.
2 Support the lower control arm with a trolley jack **(see illustration 4.2)**.
3 Disconnect the upper balljoint from the steering knuckle (see Section 5).
4 If you're removing the right upper control arm on a vehicle equipped with the power hydraulic system, remove the three Torx screws which attach the accumulator **(see illustration)** and push the assembly aside just far enough to clear the pivot bolt.
5 Remove the upper control arm pivot bolt and nut **(see illustration)**. When removing the nut, note the number of washers used and the order in which they're installed. Put these parts in a plastic bag.
6 Remove the upper control arm. Inspect the bushings at either end of the arm and renew them if they're damaged or worn.
7 Refitting is the reverse of removal. Be sure to refit the washers in the same order in which they were removed. Raise the suspension with the trolley jack to simulate normal ride height, then tighten the upper control arm pivot bolt and nut to the torque listed in this Chapter's Specifications.

8 Coil spring (front) - removal and refitting

Warning: The coil springs cannot be removed without a special spring compressor tool (Jaguar tool JD115). Do not try to remove a coil spring without this special tool. If you do, you could be seriously injured.
1 Loosen the wheel nuts, raise the vehicle

6.4 To detach the ABS sensor from the steering knuckle, remove this bolt

6.5 To detach the brake shield from the steering knuckle, remove these three screws (arrowed)

7.4 Remove these three Torx screws (arrowed) and move the accumulator assembly to the side a little to provide clearance for pulling out the pivot bolt

7.5 To detach the upper control arm from the crossmember, remove the nut (at the rear) and pull the bolt out from the front; note the fitted order of the spacer washers

8.2a When refitting the spring compressor tool (JD115), insert the upper end of the rod into the cross-shaped slot in the suspension crossmember, then rotate the rod 90° so this pin on the upper end of the tool locks into the crossmember

8.2b This is how the spring compressor tool (JD115) looks when it's installed; note how the offset collet is oriented so that it's flush with the coil spring pan

8.3 To detach the coil spring pan from the lower control arm, compress the spring and remove these six bolts (arrowed)

and support it securely on axle stands. Remove the wheel.
2 Refit the special spring compressor tool (JD115) as shown **(see illustrations)**.
3 Tighten the tool until the spacer is tight against the spring pan, then remove the spring pan bolts **(see illustration)**.
4 Slowly back off the wingnut on the special tool until all tension is relieved from the spring. Remove the tool, remove the pan, and remove the coil spring.
5 Refitting is the reverse of removal. Place the coil spring in position with the spring pan below it, refit the special tool and carefully tighten the wingnut until the spring is compressed enough to allow the pan to be positioned and bolted to the lower control arm. Be sure to tighten the pan bolts to the torque listed in this Chapter's Specifications.

9 Lower control arm - removal and refitting

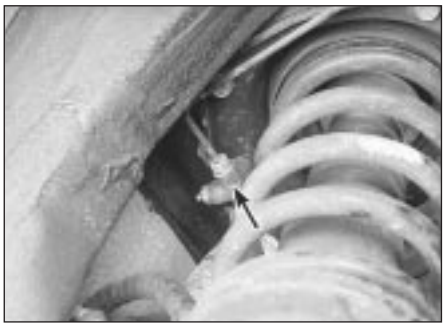
Warning: The lower control arms cannot be removed without a special spring compressor tool (Jaguar tool JD115). Do not try to remove a lower control arm without this tool, or you could be seriously injured.

1 Loosen the wheel nuts, raise the vehicle and support it securely on axle stands. Remove the wheel.
2 Remove the spring pan and the coil spring (see Section 8).
3 Detach the steering gear (see Section 17) and lower it far enough to provide clearance for the lower control arm pivot bolt.
4 Remove the pivot bolt and nut **(see illustration)**. Note any washers behind the nut and store them in a plastic bag.
5 Remove the lower control arm.
6 Refitting is the reverse of removal. Be sure to refit any washers removed. Raise the suspension with the trolley jack to simulate normal ride height, then tighten the pivot bolt and nut to the torque listed in this Chapter's Specifications. Refer to Section 8 for coil spring refitting.

10 Shock absorber/coil spring (rear) - removal and refitting

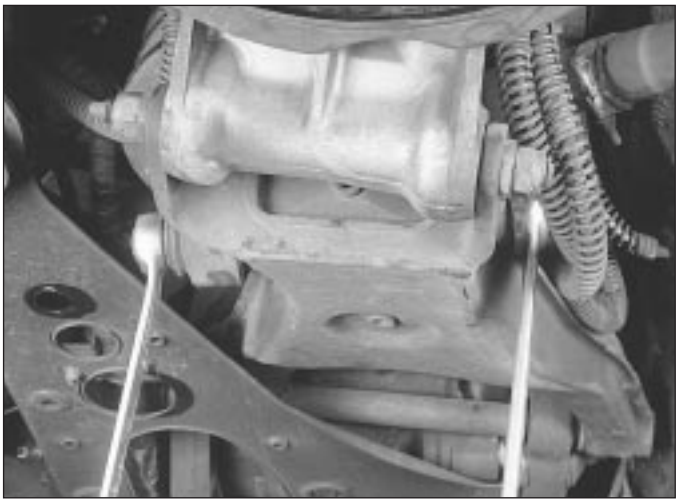
Note 1: *Always renew both left and right shocks at the same time to prevent handling peculiarities and abnormal ride quality.*
Note 2: *If you're replacing the shock absorbers on an earlier vehicle with the self-levelling system, we strongly recommend (and so does Jaguar) that you renew the self-levelling units with conventional units (available at the dealer as a retrofit kit for older vehicles equipped with the self-levelling system).*
1 Loosen the rear wheel nuts. Raise the rear of the vehicle and support it securely on axle stands. Remove the rear wheels. Support the control arm with a trolley jack. Place a block of wood on the jack head to serve as a cushion.
2 If you are removing/replacing the shocks on a vehicle equipped with the self-levelling rear suspension system, depressurise the system by pumping the brake pedal until it feels hard to push (this dissipates the pressure inside the accumulator), then locate the hydraulic line valve block just in front of the upper end of the left rear shock **(see illustration)**. Attach a plastic hose to the bleeder screw **(see illustration)**, put the other end of the hose in a catch bottle, crack the bleeder and drain off as much fluid as possible. Disconnect the hydraulic line that connects the left shock to the valve block. Now locate the other valve block just in front of the right rear shock; disconnect the hydraulic line that connects the right shock to this valve block too.
3 Remove the lower shock absorber-to-control arm nut and bolt **(see illustration)**.
4 Remove the upper mounting bolts **(see illustration)** and remove the shock absorber/coil spring assembly.

9.4 To detach the lower control arm from the crossmember, remove this nut and bolt (arrowed) (unbolt and lower the steering gear before you can pull out the pivot bolt)

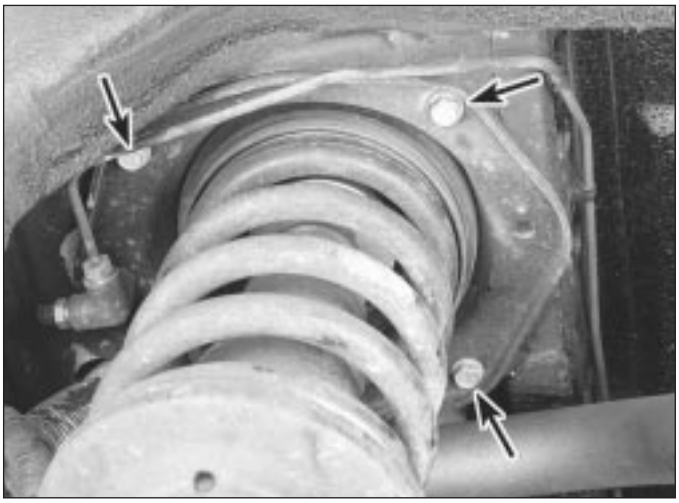


10.2a On a vehicle equipped with self-levelling rear suspension, the valve block (arrowed) for the left rear shock is located just in front of the shock absorber

10.2b After depressurising the system, attach a bleed hose to the bleed screw on the left valve block, open the bleed and drain any residual fluid into a catch bottle



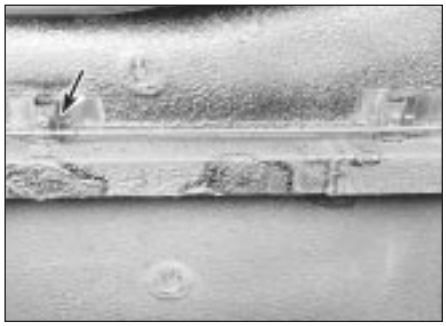
10.3 To detach the bottom of the shock absorber/coil spring from the control arm, remove this nut and bolt, then pull out the bolt



10.4 To detach the top of the shock absorber/coil spring from the body, remove these bolts (arrowed) - not all bolts are visible here

10.6a Where applicable, unplug the connector to the ride height sensor and fill the connector with silicone . . .

10.6b . . . then disconnect and remove both valve blocks . . .



10.6c . . . and remove all associated plumbing, including the metal line (arrow) to the valve block in the engine compartment

5 The shock/coil spring assemblies must be dismantled, and the coil springs installed on the new shocks. Although the shock/coil spring assembly is similar in appearance to the a MacPherson strut/coil spring assembly, the spring on this unit is much stiffer. Therefore, DO NOT attempt to take apart this unit yourself with a strut spring compressor tool. Instead, take the unit to a Jaguar dealer service department or to a Jaguar specialist workshop and have the springs installed on the new shocks by professionals.

6 If you are retrofitting conventional shocks - rather than refitting the same or another pair of self-levelling shocks - unplug the electrical connector at the ride height sensor, and fill the connector with silicone **(see illustration)** to prevent it from shorting out and causing electrical problems. Then disconnect and remove all hydraulic lines **(see illustrations)**.

7 Refitting is the reverse of removal. Be sure to tighten all fasteners to the torque values listed in this Chapter's Specifications.

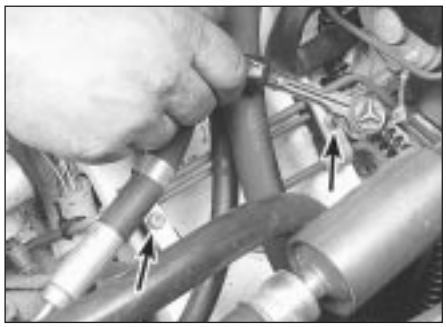
8 Remove the jack supporting the control arm, refit the rear wheels and lower the vehicle.

9 Tighten the rear wheel nuts to the torque listed in the Chapter 1 Specifications.

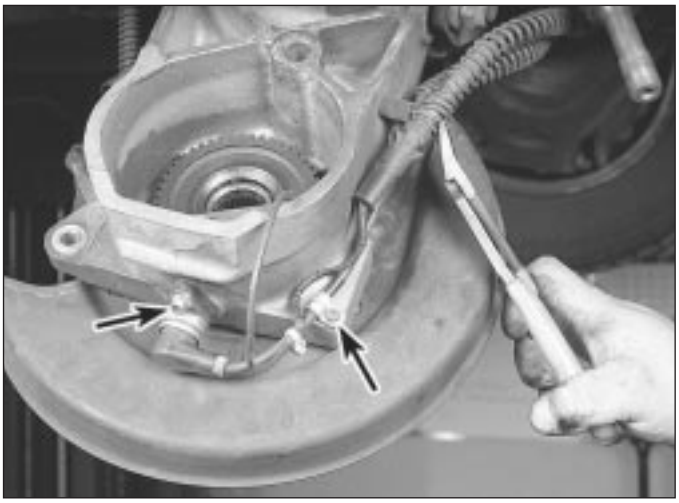
10 If you retrofitted conventional shocks to a vehicle formerly equipped with the self-levelling rear suspension system, disconnect the forward end of the hydraulic line from the valve block and refit the plug included in the kit **(see illustrations)**. Then finish removing the forward section of hydraulic line and the brackets for the line **(see illustration)**.

10.10a After the vehicle has been lowered, disconnect the forward end of the hydraulic line from the valve block . . .

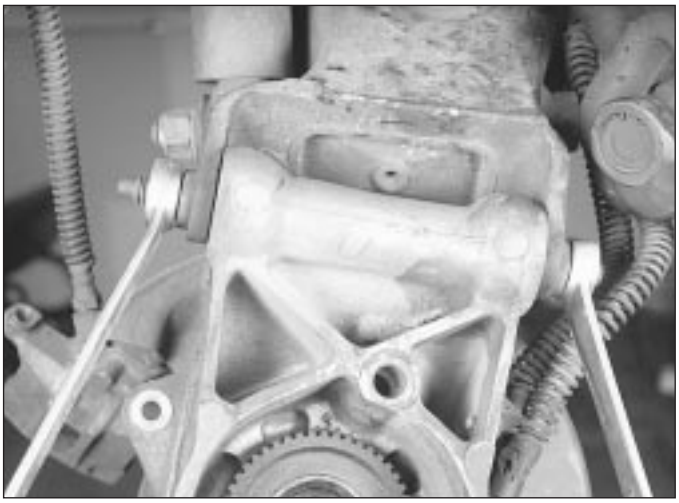
10.10b . . . refit the plug included in the retrofit kit . . .



10.10c . . . then remove these bracket screws (arrowed), the brackets and the forward section of hydraulic line



11.4 Before detaching the hub carrier from the rear control arm, remove the ABS sensor (left arrow), detach the ABS harness clip (right arrow) and cut the cable tie securing the harness



11.5 To detach the hub carrier from the rear control arm, remove the carrier-to-control arm nut and bolt

11 If you installed another pair of self-levelling shocks, or removed and installed the same pair of self-levelling shocks, be sure to top up the power hydraulic system reservoir (see Chapter 1).

11 Hub carrier (rear) - removal and refitting

1 Loosen the wheel nuts, raise the rear of the vehicle and support it securely on axle stands. Remove the wheel.
2 Remove the rear caliper and brake pads, the caliper bracket, the brake disc, the handbrake cable and the handbrake shoe assembly (see Chapter 9).
3 Disconnect the outer end of the propshaft from the hub carrier (see Chapter 8).
4 Remove the ABS sensor, the ABS harness clip and cut off the cable tie which secures the ABS harness to the carrier **(see illustration)**.
5 Remove the nut and bolt which attach the carrier to the control arm **(see illustration)**.
6 Remove the hub carrier assembly.
7 Refitting is the reverse of removal. Be sure to tighten all fasteners to the torque values listed in this Chapter's Specifications.

12 Hub and bearing (rear) - renewal

If you want to renew the rear hub and bearing assembly (or the ABS trigger wheel), remove the hub carrier (see Section 11), then take the carrier to a Jaguar dealer service department or to an automotive machine workshop. These parts require a hydraulic press and special fixtures to dismantle and reassemble.

13 Control arm (rear) - removal and refitting

1 Loosen the wheel nuts, raise the rear of the vehicle and support it securely on axle stands. Remove the wheel.
2 Remove the rear caliper and brake pads, the caliper bracket, the brake disc, the handbrake cable and the handbrake shoe assembly (see Chapter 9).
3 Disconnect the outer end of the propshaft from the hub carrier (see Chapter 8).
4 Disconnect the lower end of the shock absorber/coil spring assembly from the control arm (see Section 10).
5 Remove the hub carrier (see Section 11).
6 Remove the control arm pivot bolt nut **(see illustration)**.
7 Support the differential/crossmember assembly with a trolley jack. Place a block of wood between the jack head and the differential to protect the differential. Disconnect the lower end of the differential tie-bar **(see illustration)** and carefully lower the differential crossmember just enough to allow the control arm pivot bolt to be pulled out to the rear without hitting the boot well.
8 Remove the control arm.
9 Inspect the control arm pivot bolt bushings. If they're cracked, dried out or torn, take the arm to an automotive machine workshop and have them replaced.
10 Refitting is the reverse of removal. Tighten all suspension fasteners to the torque listed in this Chapter's Specifications. Tighten all brake fasteners to the torque listed in the Chapter 9 Specifications.

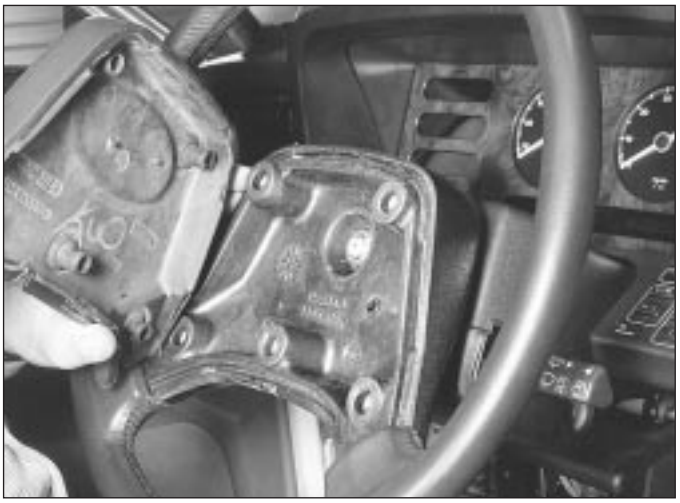
13.6 Hold the pivot bolt and unscrew the nut

13.7 Remove this nut (arrowed) and bolt from the lower end of each tie-bar (right above the control arm pivot)

14 Steering wheel - removal and refitting

Warning: If your car is equipped with an airbag, do not attempt this procedure. Have it done by a dealer service department or other qualified repair workshop.

1 Disconnect the negative battery cable.
Caution: If the radio in your vehicle is equipped with an anti-theft system, make



14.2 To remove the centre pad from the steering wheel, simply pry it off

14.3 After removing the steering wheel nut, make a pair of alignment marks on the steering wheel and steering shaft to ensure proper reassembly

sure you have the correct activation code before disconnecting the battery.

2 Pry off the centre pad **(see illustration)**.

3 Remove the steering wheel nut and mark the relationship of the steering wheel hub to the shaft **(see illustration)**.

4 Slide the steering wheel off the steering shaft **(see illustration)**.

5 Refitting is the reverse of removal. Make sure you align the match marks you made on the steering wheel and the shaft. Tighten the steering wheel nut to the torque listed in this Chapter's Specifications.

15 Tie-rod ends - removal and refitting

1 Loosen the wheel nuts, raise the front of the vehicle and support it securely on axle stands. Remove the front wheel.

2 Back off the locknut that locks the tie-rod end to the tie-rod, then paint an alignment mark on the threads to ensure the new tie-rod end is installed in the same position **(see illustration)**.

3 Loosen the nut on the tie-rod ball stud, then fit a small puller and pop the ball stud loose **(see illustration)**. Remove the nut and separate the ball stud from the steering knuckle. Unscrew the tie-rod end from the tie-rod.

4 Refitting is the reverse of removal. Make sure you thread the tie-rod end all the way up to the mark on the threads, but no further. Tighten the ball stud nut to the torque listed in this Chapter's Specifications. Tighten the locknut securely.

5 Have the toe-in checked and, if necessary, adjusted at a dealer service department or alignment workshop.

16 Steering gear boots - renewal

1 Remove the tie-rod ends (see Section 15).

2 Cut the boot clamps at both ends of the old boots **(see illustration)** and slide off the boots.

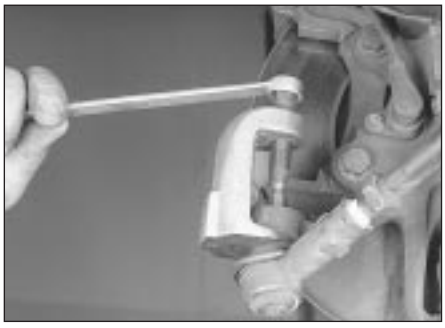
3 While the boots are removed, inspect the seals in the end of the steering gear. If they're leaking, have them replaced by a dealer service department or other qualified repair workshop, or replace the steering gear with a new or rebuilt unit (see Section 17).

4 Slide the new boots into place and refit new boot clamps.

5 Refit the tie-rod ends (see Section 15).

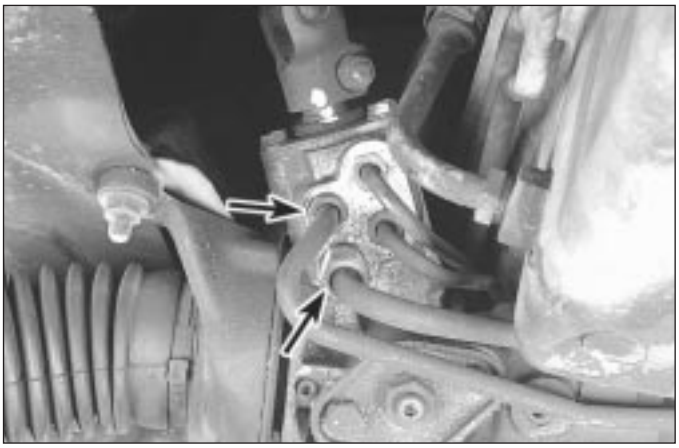
14.4 To remove the steering wheel, simply pull it straight off

15.2 Back off this locknut and mark the threads to ensure that the new tie-rod end is installed properly



15.3 Loosen the ball stud nut, fit a small puller and pop the ball stud loose from the steering knuckle

16.2 Cut off the boot clamps (arrowed) and slide the boot off the steering gear



17.3 Mark the relationship of the steering shaft U-joint to the steering gear pinion shaft, then unscrew the pressure and return line fittings (arrowed) - plug the lines to prevent contamination from entering the system

17.6 To detach the steering gear from the vehicle, remove these nuts and bolts (arrowed) from the mounting brackets (right bracket shown, left bracket similar)

17 Steering gear - removal and refitting

Warning: On models with an airbag, do not apply excessive force or severe shock to the steering column shaft, or accidental deployment of the airbag could occur.

1 Using a large syringe or hand pump, empty the power steering fluid reservoir.

2 Loosen the wheel nuts, raise the vehicle and support it securely on axle stands. Remove the wheels.

3 Mark the relationship of the steering shaft U-joint to the steering gear pinion shaft **(see illustration)** to ensure proper alignment when they're reassembled. Remove the nut and bolt that clamp the U-joint to the pinion shaft.

4 Disconnect the power steering pressure and return lines from the steering gear. Place a container under the lines to catch spilled fluid. Plug the lines to prevent excessive fluid loss and contamination. Discard the sealing washers (new ones should be used when reassembling).

5 Disconnect the tie-rod ends from the steering knuckle arms (see Section 17).

6 Remove the nuts and bolts from the steering gear mounting brackets **(see illustration)**.

7 Remove the steering gear assembly, detaching the U-joint as you lower it. Don't damage the steering gear dust boots.

8 Refitting is the reverse of removal. Ensure the marks you made on the U-joint and the pinion shaft are aligned before you tighten the U-joint clamp bolt and nut. Tighten the mounting bolts, the tie-rod end nuts and the U-joint shaft clamping bolts to the specified torque.

9 After lowering the vehicle, fill the reservoir with the recommended fluid (see Chapter 1).

10 Bleed the power steering system (see Section 19).

11 Have the front wheels aligned by a dealer service department or alignment workshop after reassembly.

18 Power steering pump - removal and refitting

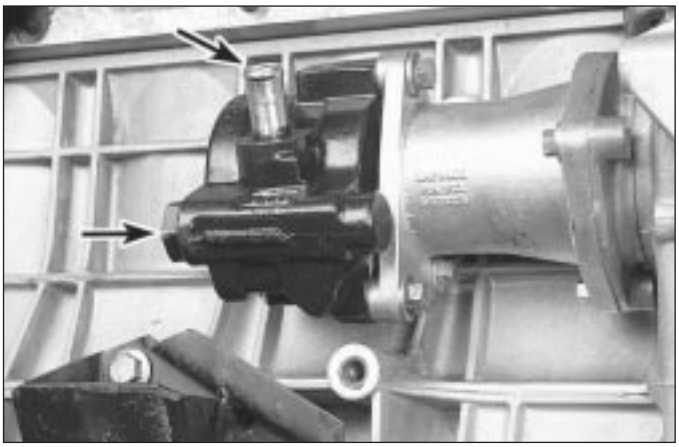
1 Raise the vehicle and support it securely on axle stands. Remove the engine under-cover.

2 Loosen the hose clamp and disconnect the fluid return hose from the top of the pump **(see illustration)** and drain the power steering fluid from the reservoir into a clean container. Unscrew the pressure line fitting from the back of the pump. Plug the return hose and the pressure line to prevent fluid from leaking and to protect the power steering system from contamination.

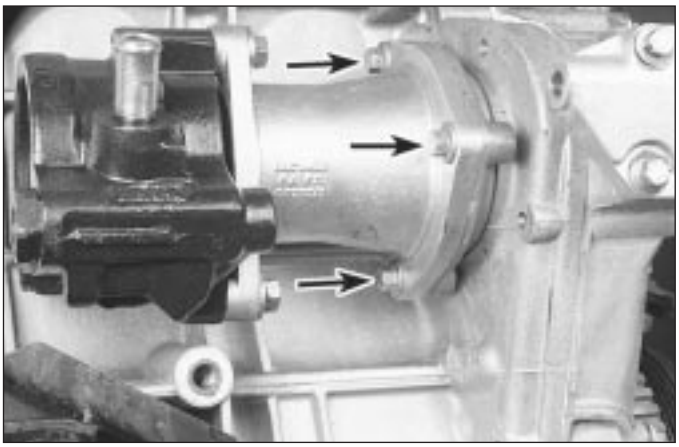
3 Remove the bolts **(see illustration)** that attach the power steering pump adapter to the auxiliary shaft housing.

4 Remove the power steering pump and adapter.

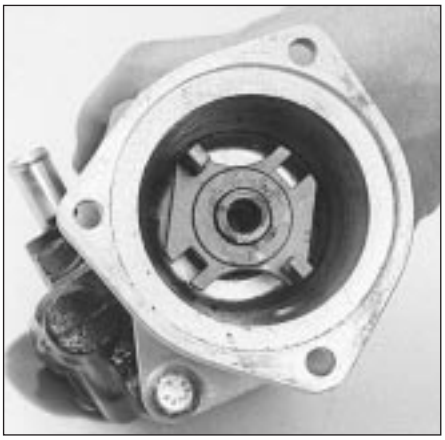
5 Take the power steering pump and adapter to a Jaguar dealer service department and have the adapter removed from the old pump



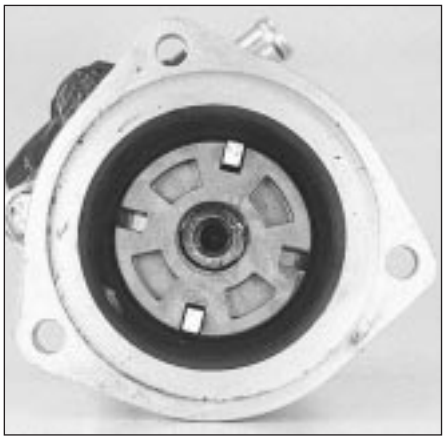
18.2 Disconnect the steering fluid return hose from the upper pipe (arrowed) and disconnect the pressure line from the back of the pump



18.3 To detach the pump adapter from the auxiliary shaft housing, remove these bolts



18.6a This driven coupling is the reason you can't remove the adapter from the pump at home; this requires special tools, and the coupling must be installed on the shaft of the new or rebuilt pump at a very precise height - if you try to pry off the coupling, you will damage it



18.6b The coupling disc fits onto the driven coupling on the pump side . . .

18.6c . . . and on the drive coupling on the auxiliary shaft side; note that the two lugs on each drive coupling fit into their corresponding slots in the coupling disc, 180° apart - all four lugs must be properly engaged or you won't be able to bolt the adapter to the auxiliary shaft housing

and installed on a new or rebuilt pump. (This procedure requires special tools, and the height of the driven coupling on the shaft must be set with a depth gauge.)

6 Refitting is the reverse of removal. Study the accompanying photos carefully before reattaching the adapter to the auxiliary shaft housing **(see illustrations)**. Be sure to tighten the fasteners securely.

7 Top up the fluid level in the reservoir (see "*Weekly checks*" for vehicles with a separate power steering system, or Chapter 1 for vehicles with a power hydraulic system) and bleed the system (Section 19).

19 Power steering system - bleeding

1 To bleed the power steering system, begin by checking the power steering fluid level and adding fluid if necessary (see "*Weekly checks*" or Chapter 1, dependent on system fitted).

2 Raise and support the front of the vehicle on axle stands.

3 Turn the steering wheel from lock-to-lock several times and recheck the fluid level.

4 Start the engine. Turn the steering wheel from lock-to-lock again (three or four times) and recheck the fluid level one more time.

5 Lower the car to the ground. Run the engine and again turn the wheels from lock-to-lock several more times. Set the wheels straight ahead and recheck the fluid level.

20 Wheels and tyres - general information

1 All vehicles covered by this manual are equipped with steel belted radial tyres. Use of other size or type of tyres may affect the ride and handling of the vehicle. Don't mix different types of tyres, such as radials and bias belted, on the same vehicle as handling may be seriously affected. It's recommended that tyres be replaced in pairs on the same axle, but if only one tyre is being replaced, be sure it's the same size, structure and tread design as the other.

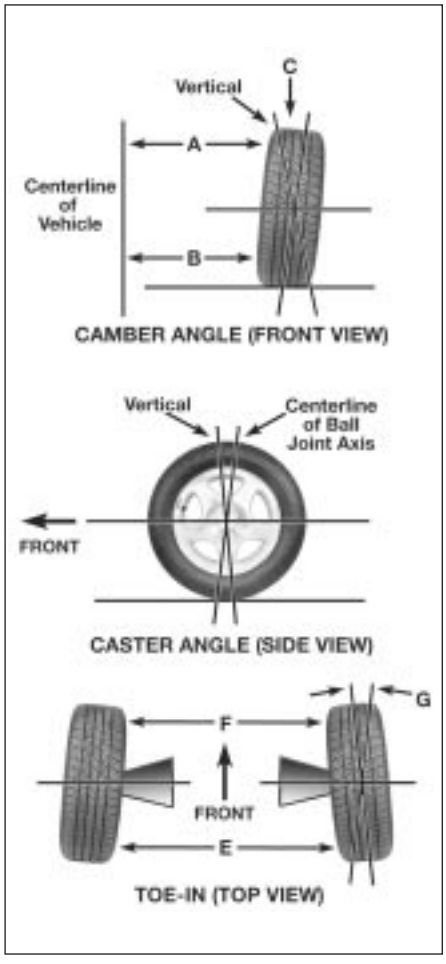
2 Because tyre pressure has a substantial effect on handling and wear, the pressure on all tyres should be checked at least once a month or before any extended trips (see Chapter 1).

3 Wheels must be replaced if they are bent, dented, leak air, have elongated bolt holes, are heavily rusted, out of vertical symmetry or if the wheel nuts won't stay tight. Wheel repairs that use welding or peening are not recommended.

4 Tyre and wheel balance is important in the overall handling, braking and performance of the vehicle. Unbalanced wheels can adversely affect handling and ride characteristics as well as tyre life. Whenever a tyre is installed on a wheel, the tyre and wheel should be balanced by a workshop with the proper equipment.

21 Wheel alignment - general information

A wheel alignment refers to the adjustments made to the wheels so they are in proper angular relationship to the suspension and the ground. Wheels that are out of proper alignment not only affect vehicle control, but also increase tyre wear. The alignment angles normally measured are camber, caster and toe-in **(see illustration)**. Front-wheel toe-in and caster are adjustable; camber is not adjustable.



21.1 Front end alignment details

A minus B = C (degrees camber)
E minus F = toe-in (measured in inches)
G - toe-in (expressed in degrees)

10

None of these three angles are adjustable on the rear wheels. Even the non-adjustable angles should be checked to determine if any of the suspension components are bent.

Getting the proper wheel alignment is a very exacting process, one in which complicated and expensive machines are necessary to perform the job properly. Because of this, you should have a technician with the proper equipment perform these tasks. We will, however, use this space to give you a basic idea of what is involved with a wheel alignment so you can better understand the process and deal intelligently with the workshop that does the work.

Toe-in is the turning in of the wheels. The purpose of a toe specification is to ensure parallel rolling of the wheels. In a vehicle with zero toe-in, the distance between the front edges of the wheels will be the same as the distance between the rear edges of the wheels. The actual amount of toe-in is normally only a fraction of an inch. Toe-in is controlled by the tie-rod end position on the tie-rod. Incorrect toe-in will cause the tyres to wear improperly by making them scrub against the road surface.

Camber is the tilting of the wheels from vertical when viewed from one end of the vehicle. When the wheels tilt out at the top, the camber is said to be positive (+). When the wheels tilt in at the top the camber is negative (-). The amount of tilt is measured in degrees from vertical and this measurement is called the camber angle. This angle affects the amount of tyre tread which contacts the road and compensates for changes in the suspension geometry when the vehicle is cornering or travelling over an undulating surface.

Caster is the tilting of the front steering axis from the vertical. A tilt toward the rear is positive caster and a tilt toward the front is negative caster. Caster is adjusted by moving shims from one side of the upper control arm balljoint to the other.