






Chapter 11

Suspension and steering

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Degrees of difficulty

<p>Easy, suitable for novice with little experience</p> 	<p>Fairly easy, suitable for beginner with some experience</p> 	<p>Fairly difficult, suitable for competent DIY mechanic</p> 	<p>Difficult, suitable for experienced DIY mechanic</p> 	<p>Very difficult, suitable for expert DIY or professional</p> 
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Specifications

Front suspension

Type Axle with coil springs and shock absorbers. Axle movement controlled by radius arms and Panhard rod. Anti-roll bar fitted to all later models

Rear suspension

Type Axle with coil springs and shock absorbers. Axle movement controlled by upper and lower links. Anti-roll bar fitted on most models

Steering

Type Power-assisted steering box with drag link and track rod arrangement. Steering damper fitted to track rod

Power steering pump type:

Petrol models	ZF Unicorn
Diesel models	Hobourn Eaton 500 series

Front wheel alignment and steering angles

Note: All measurements should be taken with the vehicle unladen, with approximately five gallons of fuel in the tank.

Camber angle	0°
Castor angle	3°
Swivel pin inclination	7°
Toe setting	0° 0' to 0° 16' toe-out (0 to 2.0 mm toe-out)

Roadwheels

Type Pressed-steel or aluminium alloy (depending on model)

Tyres

Size 205 R 16 or 235/70 R 16 (depending on model)

Pressures See end of Weekly checks

Torque wrench settings**Nm****lbf ft****Front suspension****Anti-roll bar:**

Connecting link balljoint nuts	40	30
Mounting clamp bolts	30	22
Pivot bolt nuts	68	50

Panhard rod:

Mounting bracket bolts	88	65
Pivot bolts	88	65

Radius arm:

Retaining nut	176	130
Pivot bolts	197	145

Upper spring seat retaining nuts	14	10
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Rear suspension**Anti-roll bar:**

Connecting link balljoint nuts	40	30
Mounting clamp bolts	30	22
Pivot bolt nuts	68	50

Lower link:

Front nut	176	130
Pivot bolt	176	130

Shock absorber mounting nuts	37	27
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Upper link:

Balljoint bracket bolts	176	130
Mounting bracket bolts to crossmember	47	35
Pivot bolt	176	130

Upper link balljoint nut	176	130
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Roadwheels

Roadwheel nuts	129	95
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Steering**Drag link:**

Balljoint nuts	40	30
Clamp bolts	14	10

Drop arm retaining nut	176	130
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Intermediate shaft/universal joint clamp bolt:

Early models	35	26
Later models	25	18

Power steering pump:

Feed pipe union nut	20	15
Front mounting plate bolts	9	7
Mounting bolts	35	26
Pulley retaining bolts*	10	7

Steering box:

Mounting bolts	81	60
Tie-bar bolts/nuts	81	60

Steering column nuts/bolts:

Early models	27	20
Later models	22	16

Steering pipe union nuts:

14 mm thread	15	11
16 mm thread	20	15

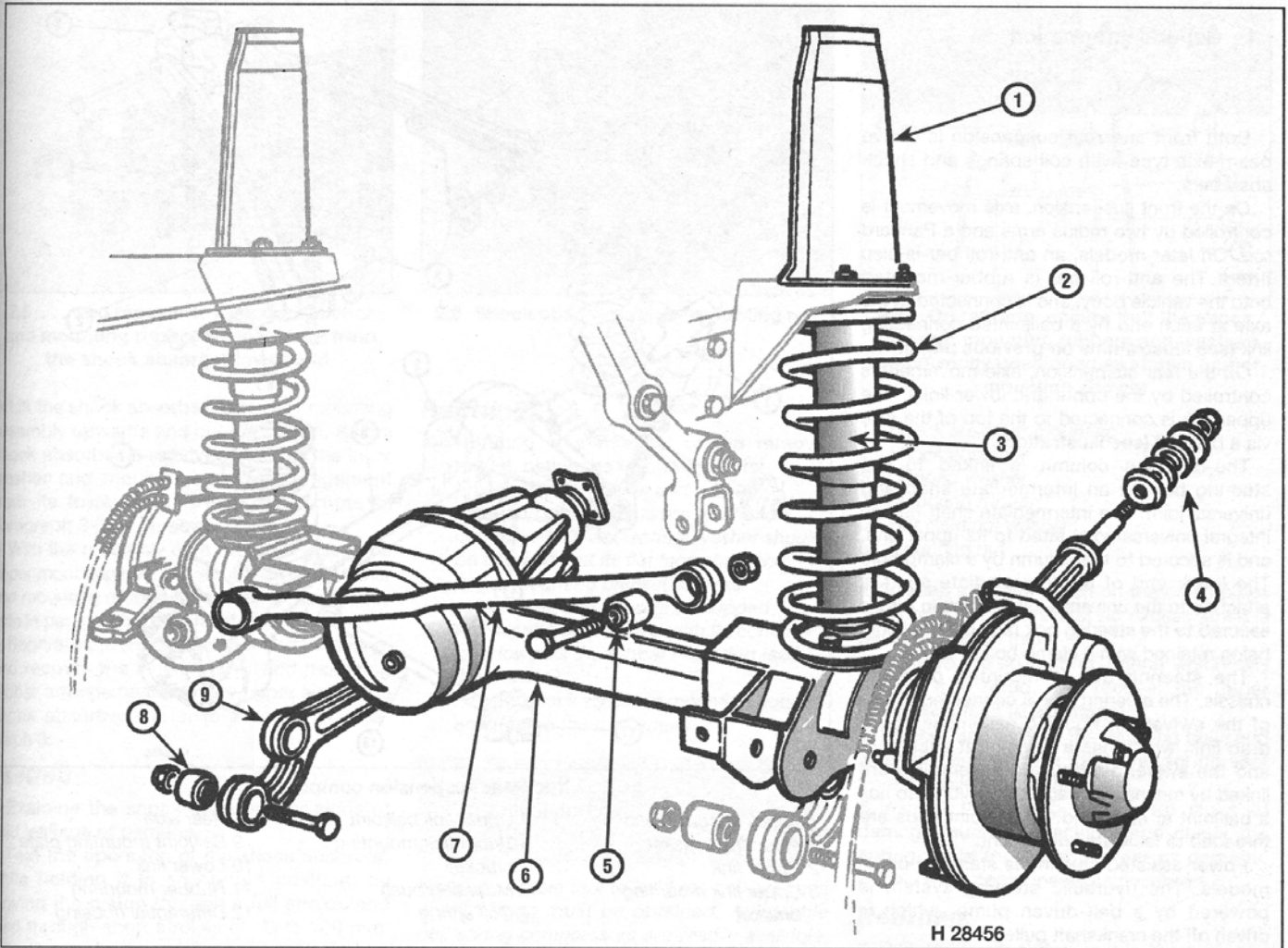
Steering wheel nut:

Early models	38	28
Later models	45	33

Track rod:

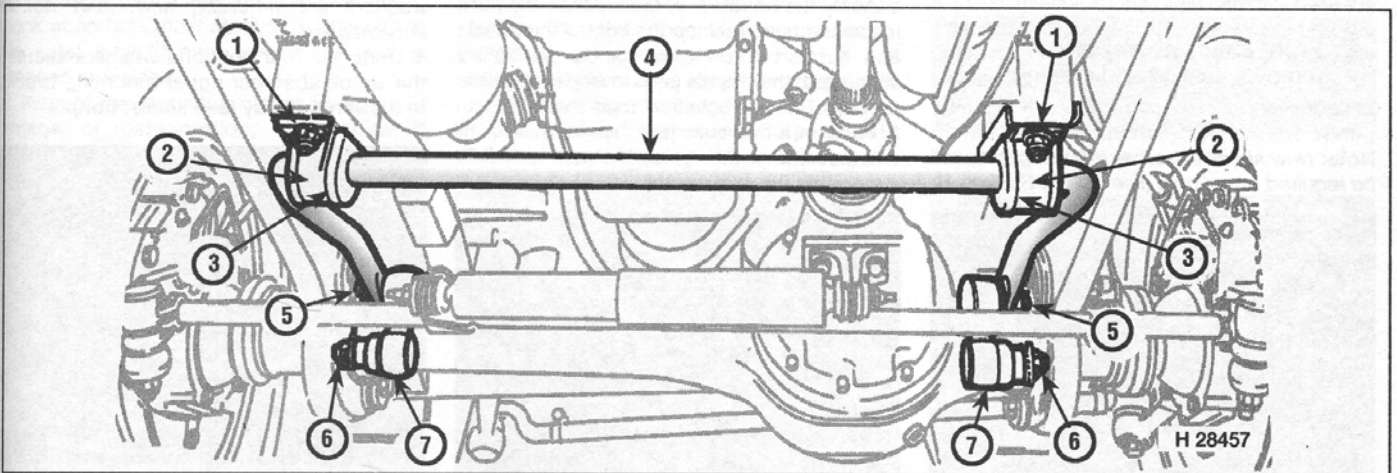
Balljoint nuts	40	30
Clamp bolts	14	10

*Use thread-locking fluid



1.2a Front suspension components

- | | | |
|---------------------------|-----------------|-----------------|
| 1 Shock absorber mounting | 4 Mounting bush | 7 Panhard rod |
| 2 Coil spring | 5 Mounting bush | 8 Mounting bush |
| 3 Shock absorber | 6 Front axle | 9 Radius arm |



1.2b Front suspension anti-roll bar components

- | | | | |
|------------------|-------------------|-----------------|-------------------|
| 1 Clamp nut | 3 Mounting rubber | 5 Retaining nut | 7 Connecting link |
| 2 Mounting clamp | 4 Anti-roll bar | 6 Retaining nut | |

1 General information

Both front and rear suspension is of live beam axle type, with coil springs and shock absorbers.

On the front suspension, axle movement is controlled by two radius arms and a Panhard rod. On later models, an anti-roll bar is also fitted. The anti-roll bar is rubber-mounted onto the vehicle body, and is connected to the axle at each end by a balljointed connecting link (see illustrations on previous page).

On the rear suspension, axle movement is controlled by the upper and lower links. The upper link is connected to the top of the axle via a balljoint (see illustration).

The steering column is linked to the steering box by an intermediate shaft and universal joint. The intermediate shaft has an integral universal joint fitted to its upper end, and is secured to the column by a clamp bolt. The lower end of the intermediate shaft is attached to the universal joint, which in turn is secured to the steering box pinion, both joints being retained with a clamp bolt.

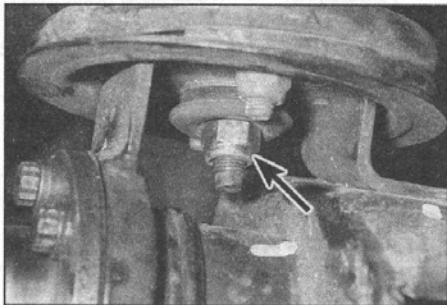
The steering box is mounted onto the chassis. The steering box is connected to one of the swivel pin housing assemblies by a drag link, which has a balljoint at each end, and the swivel pin housing assemblies are linked by means of a track rod, which also has a balljoint at each end. All balljoint ends are threaded to facilitate adjustment.

Power-assisted steering is standard on all models. The hydraulic steering system is powered by a belt-driven pump, which is driven off the crankshaft pulley.

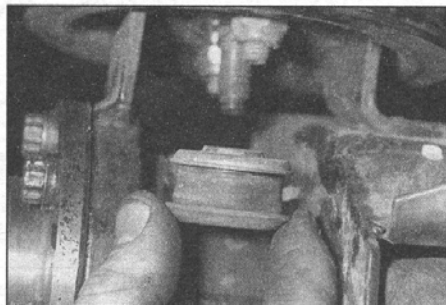
Note: Many of the suspension and steering components are secured in position with self-locking nuts. Whenever a self-locking nut is disturbed, it must be discarded and a new nut fitted.

2 Front shock absorber - removal, testing and refitting

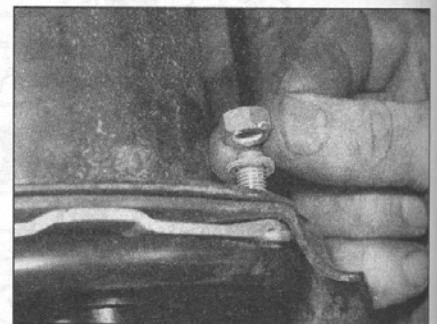
Note: New shock absorber mounting nuts will be required on refitting (see note in Section 1).



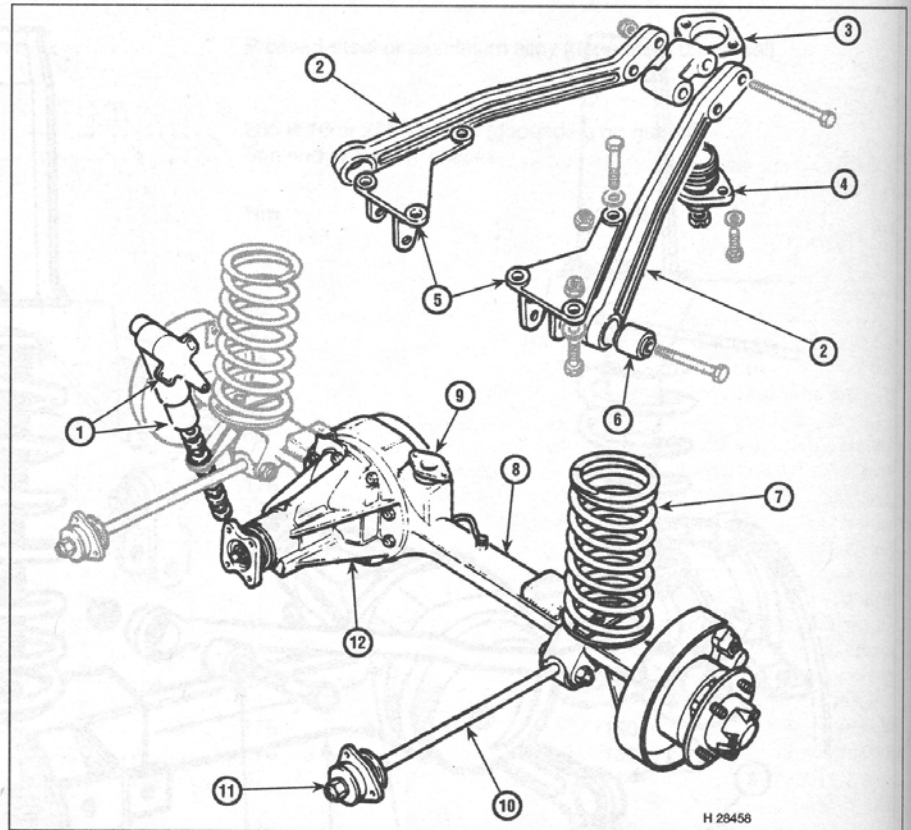
2.3a Slacken and remove the shock absorber lower mounting nut (arrowed) . . .



2.3b . . . and slide off the washer and mounting rubber arrangement



2.4 Unscrew the shock absorber upper mounting bracket retaining nuts and washers, then lift the shock absorber assembly out of position . . .



1.3 Rear suspension components

- | | | |
|---------------------------------------|-------------------------------|----------------------------|
| 1 Shock absorber and mounting bracket | 4 Upper link balljoint | 8 Rear axle |
| 2 Upper link | 5 Upper link mounting bracket | 9 Balljoint mounting plate |
| 3 Upper link mounting bracket | 6 Mounting bush | 10 Lower link |
| | 7 Coil spring | 11 Rubber mounting |
| | | 12 Differential housing |

Shock absorbers must ALWAYS be renewed in pairs, even if only one appears to be defective, in order to preserve safe handling.

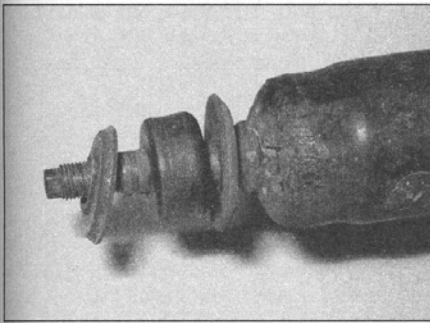
Removal

1 Apply the handbrake, then loosen the front roadwheel nuts. Jack up the front of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*). Remove both front roadwheels.

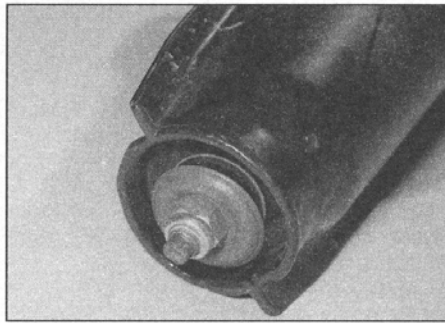
2 Position a hydraulic jack beneath the front axle assembly, then raise the jack until it is supporting the axle weight.

3 Slacken and remove the shock absorber lower mounting nut, and recover the outer washer and rubber mounting arrangement, noting each component's correct fitted position (see illustrations). **Note:** The washers are different, and must not be interchanged.

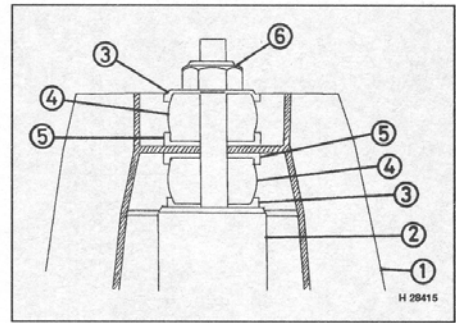
4 Undo the four nuts and washers securing the shock absorber upper mounting bracket to the vehicle body (see illustration).



2.5 . . . and recover the second washer and mounting rubber arrangement from the shock absorber lower end



2.6 Shock absorber upper mounting nut



2.12 On refitting, ensure that the shock absorber mounting rubbers and washers are correctly positioned as shown (upper mounting shown)

5 Lift the shock absorber and upper mounting assembly upwards and out of position. As the shock absorber is removed, recover the inner washer and mounting rubber arrangement from its lower end - refer to the note in paragraph 3 (see illustration).

6 With the assembly on a bench, unscrew the upper mounting nut, and lift off the outer washer and mounting rubber arrangement - refer to the note in paragraph 3 (see illustration).

7 Separate the shock absorber and mounting, and recover the inner washer and mounting rubber arrangement from the upper end of the shock absorber - refer to the note in paragraph 3.

Testing

8 Examine the shock absorber for signs of fluid leakage or damage.

9 Test the operation of the shock absorber, while holding it in an upright position, by moving the piston through a full stroke, and then through short strokes of 50 to 100 mm. In both cases, the resistance felt should be smooth and continuous. If the resistance is jerky, or uneven, or if there is any visible sign of wear or damage, renewal is necessary.

10 Renew the shock absorber complete if any damage or excessive wear is evident. Shock absorbers must always be renewed in axle sets, even if only one of the pair is damaged or leaking.

11 Inspect the mounting rubber for signs of damage or deterioration, and renew if necessary.

Refitting

12 Refitting is a reversal of the removal procedure, noting the following points:

- a) Ensure that all washer and rubber mounting components are positioned correctly. The flat (seating) washer should be fitted so that its flat face abuts the upper mounting bracket/axle (as applicable), and the slightly cupped washer should be fitted with its concave side towards the rubber mounting (see illustration).
- b) Fit new shock absorber mounting nuts, and tighten them securely.

- 1 Shock absorber mounting
- 2 Shock absorber
- 3 Cupped washer
- 4 Mounting rubber
- 5 Flat (seating) washer
- 6 Mounting nut

axle, keep a careful watch on the brake pipes and hoses, to ensure that no excess strain is being placed on them.

4 Remove the coil spring, noting which way around it is fitted, and recover the upper spring seat (see illustrations).

5 Slacken and remove the retaining bolts and washers, and remove the lower spring seat from the axle (see illustration).

6 Inspect the spring closely for signs of damage, such as cracking, and check the spring seats for signs of wear or damage. Renew worn components as necessary.

3 Front coil spring - removal and refitting



Note: A suitable tool to hold the coil spring in compression must be obtained. Adjustable coil spring compressors are readily available, and are recommended for this operation.

Removal

- 1 Remove the relevant shock absorber assembly as described in Section 2. Note that it is not necessary to separate the shock absorber from the upper mounting bracket.
- 2 Fit the spring compressors to the coil spring, and compress the spring slightly to relieve the spring tension from its seats.
- 3 Carefully lower the axle until it is possible to withdraw the coil spring. Whilst lowering the

Refitting

7 Refit the lower spring seat to the axle, and securely tighten its retaining bolt.

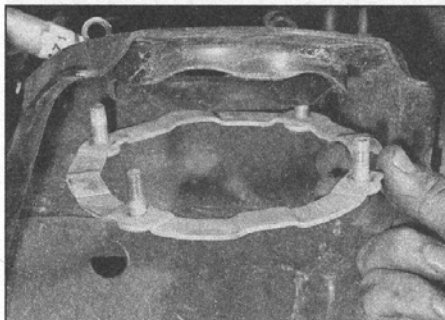
8 Fit the upper spring seat to the body, and secure it in position by temporarily fitting one of the strut nuts.

9 Install the coil spring, then carefully raise the axle into position whilst making sure that the upper spring seat studs remain correctly aligned with the body holes.

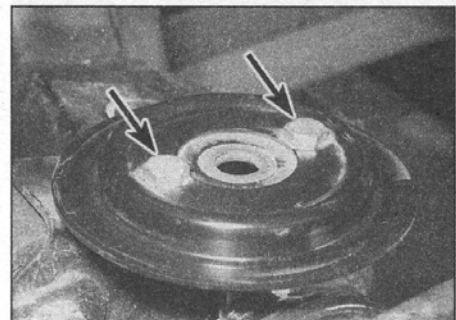
10 Refit the shock absorber as described in Section 2, then carefully remove the spring compressors.



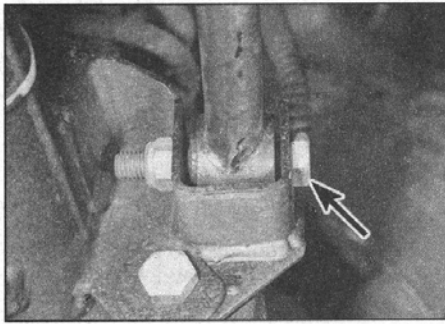
3.4a Remove the front coil spring . . .



3.4b . . . and recover the upper spring seat



3.5 Lower spring seat is secured to the axle by two bolts (arrowed)



4.2 Panhard rod-to-axle pivot bolt (arrowed)

4 Front suspension Panhard rod - removal, inspection and refitting

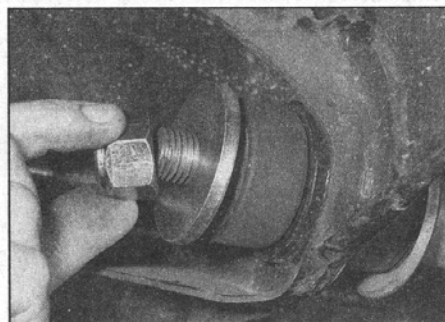
Note: New pivot bolt nuts will be required on refitting (see note in Section 1).

Removal

- 1 To improve access, apply the handbrake, then jack up the front of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*).
- 2 Slacken and remove the nuts and pivot bolts securing the Panhard rod to the chassis and axle, and remove the rod from underneath the vehicle (see illustration).
- 3 If necessary, slacken and remove the retaining nuts and bolts, and remove the Panhard rod mounting bracket from the chassis.

Inspection

- 4 Inspect the rod and mounting bracket for signs of damage, paying particular attention to the areas around the mounting bushes. Check the pivot bolt shanks for signs of wear, and renew if necessary.
- 5 Examine the Panhard rod mounting bushes for signs of wear and damage. If renewal is necessary, a hydraulic press and suitable spacers will be required, to press the bush out of position and install the new one. Press the old bush out, and install the new bush using a suitable tubular spacer which bears only on



5.3a Slacken and remove the nut and washer securing the radius arm to the chassis ...

the hard outer edge of the bush, not the bush rubber.

Refitting

- 6 Where removed, refit the mounting bracket to the chassis. Insert its retaining bolts and nuts, tightening them to the specified torque setting.
- 7 Offer up the Panhard rod, and insert both pivot bolts. Fit the new nuts to the pivot bolts, tightening them loosely only.
- 8 Lower the vehicle to the ground then, with it resting on its wheels, tighten both pivot bolt nuts to the specified torque setting.

5 Front suspension radius arm - removal, inspection and refitting

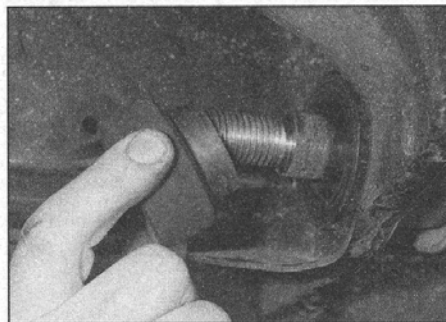
Note: New radius arm upper and lower pivot bolt nuts will be required on refitting (see note in Section 1).

Removal

- 1 Apply the handbrake, then loosen the relevant front roadwheel nuts. Jack up the front of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*). Remove the relevant front roadwheel.
- 2 Position a hydraulic jack beneath the front axle assembly, then raise the jack until it is supporting the axle weight.
- 3 Unscrew the nut securing the radius arm to the chassis, and remove the washer and outer mounting bush (see illustrations).
- 4 Remove the split-pin, then slacken and remove the nut and washer securing the steering gear track rod balljoint to the swivel pin housing. Release the balljoint tapered shank using a universal balljoint separator.
- 5 Slacken and remove the nuts and bolts securing the radius arm to the axle, and remove the arm from underneath the vehicle (see illustration).
- 6 With the arm removed, slide off the inner mounting bush and washer from its upper end.

Inspection

- 7 Inspect the arm for signs of damage, paying particular attention to the threaded



5.3b ... then slide off the outer mounting bush

end of the arm, and the areas around the mounting bushes. Check the pivot bolt shanks for signs of wear, and renew if necessary.

- 8 Inspect the upper mounting bushes for signs of damage or deterioration, and renew if necessary.
- 9 Examine the radius arm lower mounting bushes for signs of wear and damage. If renewal is necessary, a hydraulic press and suitable spacers will be required, to press the bush out of position and install the new one. Press the old bush out, and install the new bush using a suitable tubular spacer which bears only on the hard outer edge of the bush, not the bush rubber.

Refitting

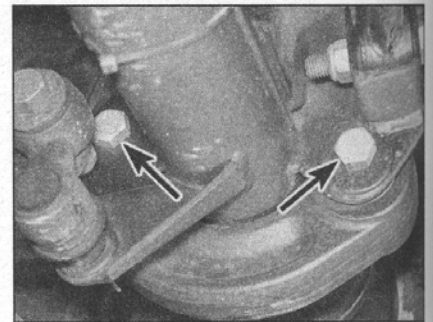
- 10 Fit the washer and inner mounting bush to the threaded end of the radius arm.
- 11 Manoeuvre the arm assembly into position, and insert the pivot bolts. Fit the new nuts to the pivot bolts, tightening them loosely only at this stage.
- 12 Reconnect the track rod balljoint to the swivel pin housing assembly, tightening its retaining nut to the specified torque setting. Secure the nut in position with a new split-pin.
- 13 Slide the outer mounting bush and washer onto the threaded end of the arm. Fit the new retaining nut, tightening it to the specified torque setting.
- 14 Refit the wheel, then lower the vehicle to the ground and tighten the wheel nuts to the specified torque.
- 15 With the vehicle resting on its wheels, tighten both radius arm pivot bolt nuts to the specified torque setting.

6 Front anti-roll bar - removal and refitting

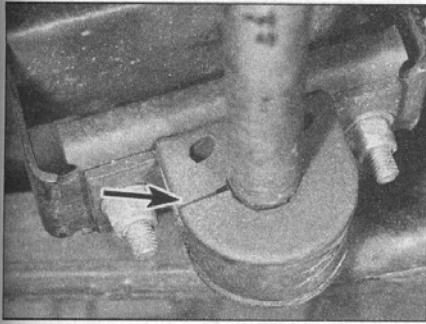
Note: New anti-roll bar mounting clamp and connecting link nuts will be required on refitting (see note in Section 1).

Removal

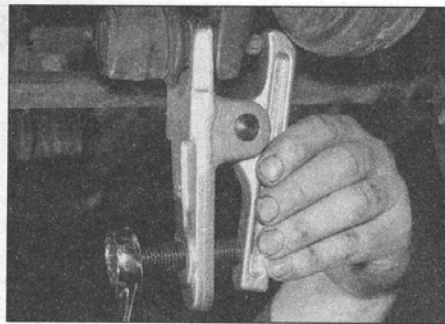
- 1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands



5.5 Unscrew the radius arm-to-axle bolts (arrowed), and remove the arm from underneath the vehicle



6.5 Front anti-roll bar mounting clamp. Note which way the mounting rubber split (arrowed) is facing



7.4a Release the balljoint shank with a balljoint separator . . .



7.4b . . . and remove the connecting link from underneath the vehicle

positioned underneath the chassis (see *Jacking and vehicle support*).

2 Position a hydraulic jack beneath the front axle assembly, then raise the jack until it is supporting the axle weight.

3 Prior to removal, mark the position of each mounting clamp rubber on the anti-roll bar.

4 Slacken and remove the nuts, and withdraw the bolts and washers securing each end of the anti-roll bar to the connecting links.

5 Unscrew the nuts and washers securing the mounting clamps to the vehicle body, then remove the bolts and mounting clamps, and lower the anti-roll bar out from underneath the vehicle (see illustration).

6 Remove the mounting rubbers from the anti-roll bar, and inspect them for signs of damage. Renew both rubbers if they are damaged or show signs of deterioration.

Refitting

7 Fit the mounting rubbers to the anti-roll bar. Fit the right-hand rubber so that its split will be facing towards the axle, and the left-hand rubber so that its split will be facing away from the axle once the bar is installed.

8 Align both rubbers with the marks made prior to removal, and manoeuvre the anti-roll bar into position.

9 Ensure that the flat side of each rubber is against the vehicle body, then refit the mounting clamps. Insert the bolts, then fit the washers and new nuts, tightening them loosely only at this stage.

10 Align the anti-roll bar ends with the

connecting links, and insert the pivot bolts and washers. Fit the new retaining nuts to the bolts, and tighten them loosely only.

11 Lower the vehicle to the ground and, with it resting on its wheels, tighten the mounting clamp and pivot bolt nuts to the specified torque.

7 Front anti-roll bar connecting link - removal, inspection and refitting



Note: New connecting link pivot bolt nuts will be required on refitting (see note in Section 1).

Removal

1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*). Remove the relevant front roadwheel.

2 Position a hydraulic jack beneath the front axle assembly, then raise the jack until it is supporting the axle weight.

3 Slacken and remove the nut, then withdraw the pivot bolt and washer securing the connecting link to the anti-roll bar.

4 Remove the split-pin, and undo the nut and washer securing the connecting link balljoint to the axle assembly. Release the balljoint tapered shank using a universal balljoint separator, and remove the connecting link from the vehicle (see illustrations).

Inspection

5 Check that the link balljoint moves freely, without any sign of roughness. Check also that the balljoint gaiter shows no sign of deterioration, and is free from cracks and splits. If any sign of wear or damage is found, the complete link must be renewed.

6 Examine the upper mounting bushes for signs of wear and damage, and renew if necessary. A hydraulic press and suitable spacers may be required, to press the bushes out of position and install the new ones.

Refitting

7 Fit the connecting link assembly, and insert its pivot bolt and washer (see illustration).

8 Locate the balljoint shank in the axle, and refit its washer and nut. Tighten the nut to the specified torque setting, and secure it in position with a new split-pin (see illustrations).

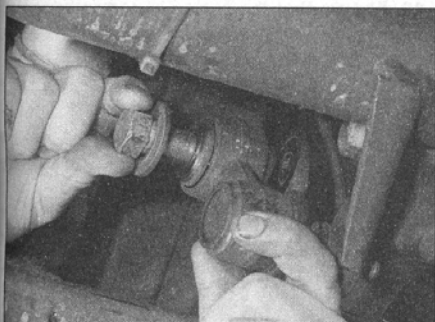
9 Fit a new nut to the pivot bolt, tighten it to the specified torque setting, then refit the roadwheel and lower the vehicle to ground.

8 Front suspension bump stop - inspection, removal and refitting



Inspection

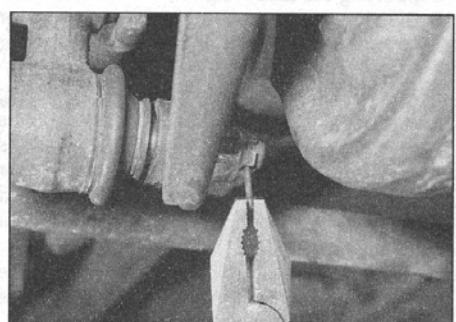
1 The bump stops are mounted onto the chassis, directly above the axle assembly



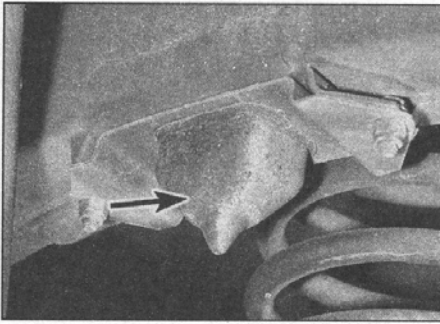
7.7 Offer up the connecting link, and insert its pivot bolt and washer



7.8a Locate the balljoint in the axle, and refit its retaining nut and washer



7.8b Tighten the nut to the specified torque, and secure it in position with a new split-pin



8.1 Bump stops are mounted onto the vehicle underbody, directly above each end of the axle

(see illustration). Inspect each bump stop rubber for signs of damage or deterioration, and renew if necessary.

Removal

2 Slacken and remove the nuts, washers and bolts securing the bump stop in position, and remove it from the chassis.

Refitting

3 Fit the bolts to the slots in the chassis, then offer up the bump stop, ensuring that it is correctly located in the chassis slot. Refit the washers and nuts to the retaining bolts, and tighten them securely.

9 Rear shock absorber - removal, testing and refitting

Note: Shock absorbers must ALWAYS be renewed in pairs, even if only one appears to be defective, in order to preserve safe handling.

Removal

1 Chock the front wheels, then loosen the relevant rear roadwheel nuts. Jack up the rear of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*). Remove the relevant rear roadwheel.

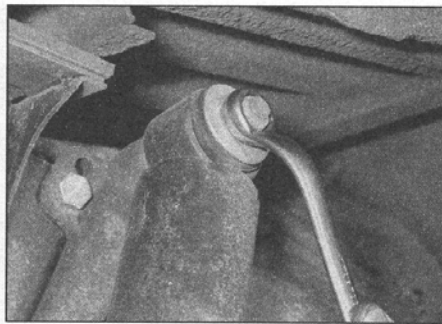
2 Position a hydraulic jack beneath the rear axle assembly, then raise the jack until it is supporting the axle weight.

3 Slacken and remove the nut and outer washer from the shock absorber upper mounting (see illustration).

4 Unscrew the nut from the lower mounting, and slide off the outer mounting rubber and its washers, noting their correct fitted positions (see illustration). Free the shock absorber from the axle, and recover the second mounting rubber and washer arrangement from its lower end.

5 Remove the shock absorber from the vehicle, and recover the inner washer from its upper mounting.

6 If necessary, slacken and remove the retaining nuts and bolts, and remove the upper mounting bracket from the chassis.



9.3 Slacken and remove the shock absorber upper mounting nut and washer . . .

Testing

7 Examine the shock absorber for signs of fluid leakage or damage.

8 Test the operation of the shock absorber, while holding it in an upright position, by moving the piston through a full stroke, and then through short strokes of 50 to 100 mm. In both cases, the resistance felt should be smooth and continuous. If the resistance is jerky, or uneven, or if there is any visible sign of wear or damage, renewal is necessary.

9 Renew the shock absorber complete if any damage or excessive wear is evident. Shock absorbers must always be renewed in axle sets, even if only one of the pair is damaged or leaking.

10 Inspect the upper mounting bush and the lower mounting rubbers for signs of damage or deterioration, and renew as necessary.

Refitting

11 Where removed, refit the upper mounting bracket to the chassis, and insert its retaining bolts and nuts, tightening them securely.

12 Fit the inner washer, then locate the shock absorber on the upper mounting bracket.

13 Fit the first mounting rubber and washer arrangement to the lower end of the shock absorber, positioning a washer on each side of the rubber. Engage the shock absorber with the axle, then fit the second rubber mounting and washer arrangement, followed by the retaining nut.

14 Refit the outer washer and upper retaining nut, then tighten both retaining nuts to the specified torque setting.

10 Rear coil spring - removal and refitting

Note: A suitable tool to hold the coil spring in compression must be obtained. Adjustable coil spring compressors are readily available, and are recommended for this operation.

Removal

1 Chock the front wheels, then loosen the relevant rear roadwheel nuts. Jack up the rear of the vehicle and support it on axle stands



9.4 . . . then unscrew the lower mounting nut, and recover the washers and mounting rubber

positioned underneath the chassis (see *Jacking and vehicle support*). Remove the relevant rear roadwheel.

2 Position a hydraulic jack beneath the rear axle assembly, then raise the jack until it is supporting the axle weight.

3 Slacken and remove the nut and outer washer from the shock absorber upper mounting, and disengage the shock absorber from its mounting bracket.

4 Fit the spring compressor, and compress the coil spring.

5 Carefully lower the axle until the upper end of the spring is released from its seat. Whilst lowering the axle, keep a careful watch on the brake pipes and hoses, to ensure that no excess strain is being placed on them.

6 Recover the upper spring seat, then slacken and remove the retaining bolts and washers and remove the retaining plate securing the spring to the axle. Withdraw the coil spring, and lift off the lower spring seat from the axle.

7 Inspect the spring closely for signs of damage, such as cracking, and check the spring seats for signs of wear or damage. Renew worn components as necessary.

Refitting

8 If a new spring is being installed, slowly release the old spring, then transfer the spring compressor from the old spring to the new one.

9 Refit the lower spring seat to the axle, then manoeuvre the coil spring into position.

10 Ensure that the spring is correctly seated, then refit the retaining plate to the axle and securely tighten its retaining bolts.

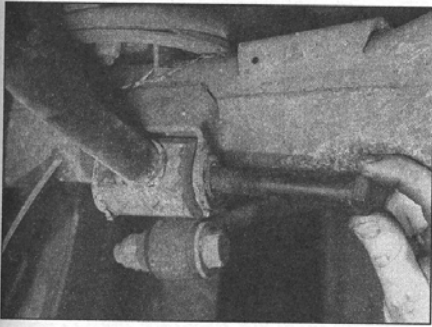
11 Fit the upper spring seat to the top of the coil spring.

12 Align the upper spring seat with the chassis, then carefully raise the axle assembly with the jack.

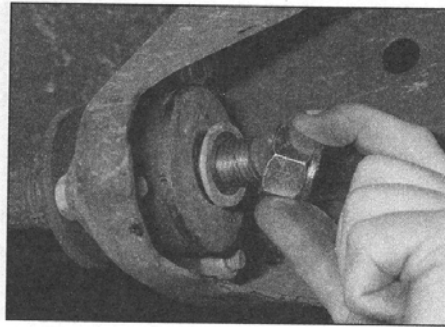
13 Locate the shock absorber on its upper mounting, then refit the outer washer and retaining nut, tightening it to the specified torque setting.

14 Carefully release the spring compressor whilst ensuring that the spring remains correctly seated.

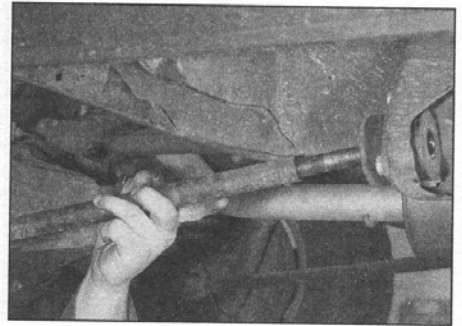
15 Remove the jack from underneath the



11.2 Remove the pivot bolt securing the lower link to the axle . . .



11.3a . . . then unscrew the front retaining nut and washer . . .



11.3b . . . and manoeuvre the lower link out from underneath the vehicle

axle, refit the roadwheel and lower the vehicle to the ground.

11 Rear suspension lower link - removal, inspection and refitting



Note: New a new lower link pivot bolt nut and front mounting nut will be required on refitting (see note in Section 1). If the rubber mounting is to be removed, new mounting bolt nuts will also be required.

Removal

- 1 Chock the front wheels, then jack up the rear of the vehicle and support it on axle stands positioned underneath the rear axle (see *Jacking and vehicle support*). Remove the relevant rear roadwheel.
- 2 Slacken and remove the nut, then withdraw the pivot bolt securing the lower link to the axle (see *illustration*).
- 3 Slacken and remove the lower link front retaining nut and washer, then manoeuvre the link out from underneath the vehicle (see *illustrations*).
- 4 If necessary, undo the three nuts and bolts securing the rubber mounting in position, and remove it from the chassis (see *illustration*).

Inspection

- 5 Inspect the link for signs of damage, paying particular attention to its threaded end, and

the area around its mounting bush. Check the pivot bolt shanks for signs of wear, and renew if necessary.

- 6 Examine the lower link mounting bush for signs of wear and damage. If renewal is necessary, a hydraulic press and suitable spacers will be required, to press the bush out of position and install the new one. Press the old bush out, and install the new bush using a suitable tubular spacer which bears only on the hard outer edge of the bush, not the bush rubber.

- 7 Inspect the rubber mounting for signs of damage or deterioration, and renew if necessary.

Refitting

- 8 Where necessary, fit the rubber mounting to the chassis, and insert its mounting bolts. Fit new nuts to the bolts, and tighten them securely.
- 9 Manoeuvre the link into position, and insert the pivot bolt.
- 10 Refit the washer to the threaded end of the link, then fit the new nuts to both the link and pivot bolt. Tighten each nut loosely only at this stage.
- 11 Refit the roadwheel, then lower the vehicle to the ground and tighten the wheel nuts to the specified torque.
- 12 With the vehicle resting on its wheels, tighten both the lower link front nut and pivot bolt nut to the specified torque setting (see *illustrations*).

12 Rear suspension lower link mounting - renewal



To renew the rubber mounting, the lower link must be removed. Refer to Section 11 for removal and refitting details.

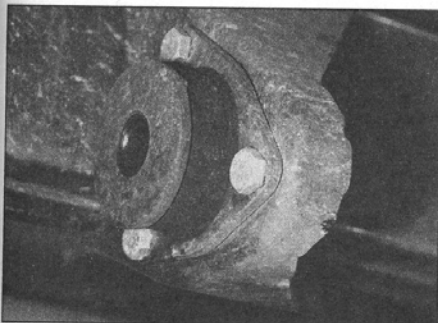
13 Rear suspension upper link - removal, inspection and refitting



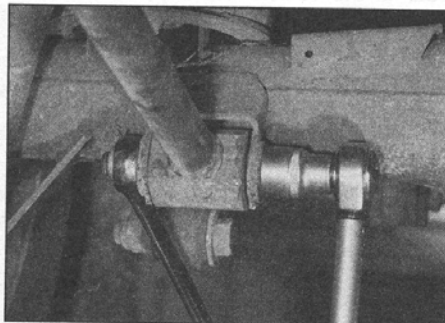
Note: New upper link pivot bolt and mounting bracket retaining bolt nuts will be required on refitting (see note in Section 1).

Removal

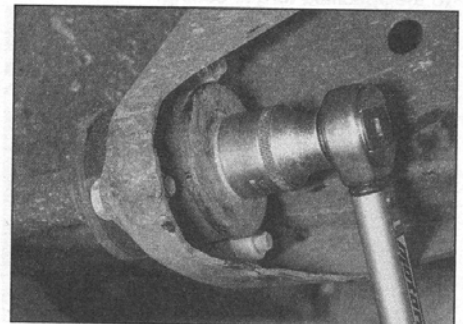
- 1 Chock the front wheels, then jack up the rear of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*).
- 2 Position a hydraulic jack beneath the rear axle assembly, then raise the jack until it is supporting the axle weight.
- 3 Slacken and remove the nuts and bolts securing the upper link mounting bracket to the chassis.
- 4 Slacken and remove the nuts securing the upper links to the balljoint bracket on the top



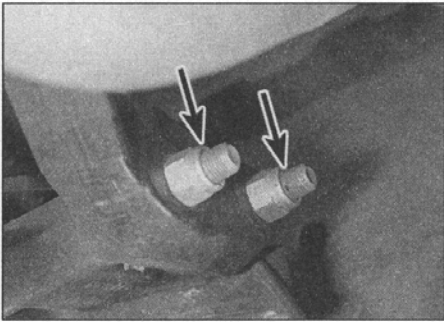
11.4 The lower link mounting is secured to the chassis by three bolts



11.12a With the vehicle standing on its wheels, tighten the lower link pivot bolt . . .



11.12b . . . and front retaining nut to the specified torque



13.4 Upper link-to-balljoint bracket retaining bolts (arrowed)

of the axle (see illustration). Withdraw both retaining bolts, and remove the relevant upper link and mounting bracket assembly from underneath the vehicle.

5 If necessary, undo the nut, withdraw the pivot bolt, and separate the link from its mounting bracket.

Inspection

6 Inspect the link for signs of damage, paying particular attention to the area around its mounting bush. Check the pivot bolt shanks for signs of wear, and renew if necessary.

7 Examine the upper link mounting bush for signs of wear and damage. If renewal is necessary, a hydraulic press and suitable spacers will be required, to press the bush out of position and install the new one. Press the old bush out, and install the new bush using a suitable tubular spacer which bears only on the hard outer edge of the bush, not the bush rubber.

8 Inspect the mounting bracket for signs of damage, and renew if necessary.

Refitting

9 Reassemble the upper link and mounting bracket, and insert the pivot bolts. Fit a new nut to the bolt, tightening it loosely only at this stage.

10 Manoeuvre the link and bracket assembly into position, and insert the bolts securing them to the balljoint bracket and second upper link. Fit new nuts to the bolts, and tighten them to the specified torque setting.

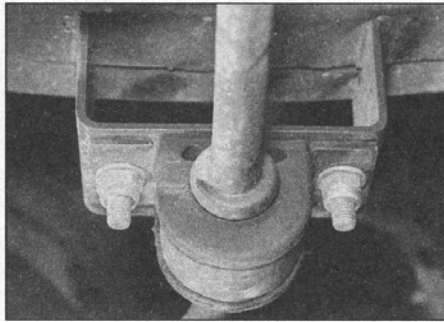
11 Insert the mounting bracket-to-chassis bolts, then fit the new nuts and tighten them to the specified torque setting.

12 Lower the vehicle to the ground and, with the vehicle resting on its wheels, tighten the upper pivot bolt nut to the specified torque setting.

14 Rear suspension upper link balljoint - removal and refitting

Removal

1 Remove both rear suspension upper links as described in Section 13.



15.5 Rear anti-roll bar mounting clamp assembly

2 Withdraw the split-pin, then slacken and remove the nut securing the balljoint to the top of the rear axle.

3 Remove the balljoint and upper link bracket assembly from the top of the axle, then slacken and remove the two retaining bolts and washers, and separate the two components.

4 Check that the lower arm balljoint moves freely, without any sign of roughness. Check also that the balljoint gaiter shows no sign of deterioration, and is free from cracks and splits. If necessary, renew the balljoint.

Refitting

5 Refit the upper link bracket to the balljoint, and securely tighten its retaining bolts.

6 Locate the balljoint shank in its bracket on top of the axle, and refit its retaining nut. Tighten the balljoint nut to the specified torque setting, and secure it in position with a new split-pin.

7 Refit the rear suspension upper links as described in Section 13.

15 Rear anti-roll bar - removal and refitting

Note: New anti-roll bar mounting clamp and connecting link nuts will be required on refitting (see note in Section 1).

Removal

1 Chock the front wheels, then jack up the rear of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*).

2 Position a hydraulic jack beneath the axle assembly, then raise the jack until it is supporting the axle weight.

3 Prior to removal, mark the position of each mounting clamp rubber on the anti-roll bar.

4 Slacken and remove the nuts, and withdraw the bolts and washers securing each end of the anti-roll bar to the connecting links. If they are loose, remove the mounting rubbers from the connecting link.

5 Unscrew the nuts and washers securing the mounting clamps to the vehicle body. Remove the bolts and mounting clamps, and

lower the anti-roll bar out from underneath the vehicle (see illustration).

6 Remove the mounting rubbers from the anti-roll bar, and inspect them for signs of damage. Renew both rubbers if they are damaged or show signs of deterioration.

Refitting

7 Fit the mounting rubbers to the anti-roll bar, aligning them with the marks made prior to removal.

8 Manoeuvre the anti-roll bar into position, ensuring that the flat side of each mounting rubber is against the vehicle body, then refit the mounting clamps. Insert the bolts and fit the washers and new nuts, tightening them loosely only at this stage.

9 Ensure that the mounting rubbers are in position, and align the anti-roll bar ends with the connecting links. Insert the pivot bolts and washers, then fit the new retaining nuts and tighten them loosely.

10 Lower the vehicle to the ground and, with it resting on its wheels, tighten the mounting clamp and pivot bolt nuts to the specified torque.

16 Rear anti-roll bar connecting link - removal, inspection and refitting

Note: New connecting link pivot bolt nuts will be required on refitting (see note in Section 1).

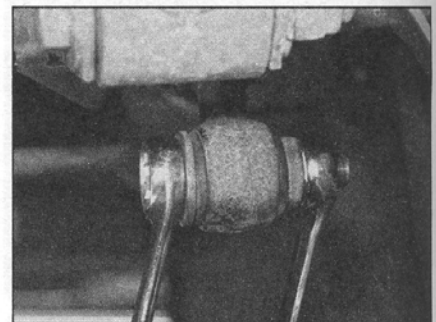
Removal

1 Chock the front wheels, then jack up the rear of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*).

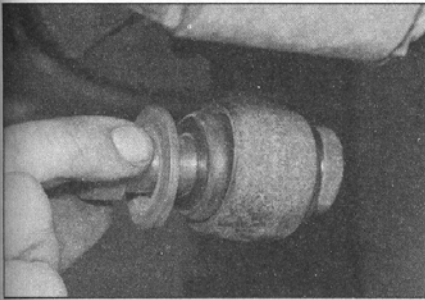
2 Position a hydraulic jack beneath the axle assembly, then raise the jack until it is supporting the axle weight.

3 Slacken and remove the nut, then withdraw the pivot bolt and washer securing the connecting link to the anti-roll bar. If they are loose, remove the mounting rubbers from the connecting link (see illustrations).

4 Remove the split-pin, and undo the nut and washer securing the connecting link balljoint to the axle assembly. Release the balljoint tapered shank using a universal balljoint



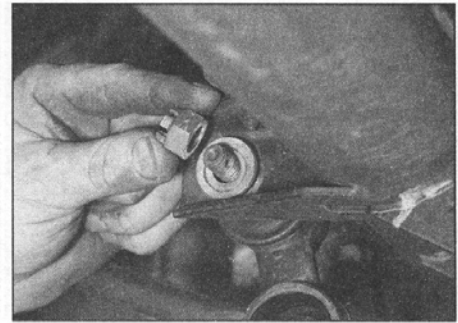
16.3a Slacken and remove the nut...



16.3b ... then withdraw the pivot bolt and washer securing the anti-roll bar to the connecting link



16.3c If they are loose, remove the mounting rubbers from the connecting link



16.4a Slacken and remove the nut and washer ...



16.4b ... then use a universal balljoint separator ...

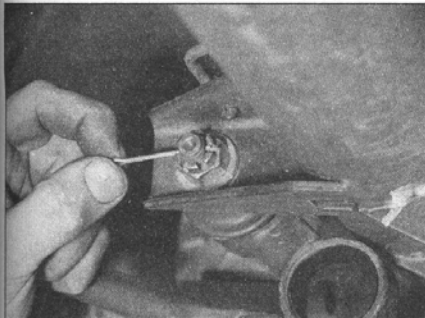


16.4c ... to free the connecting link from the axle

17 Rear suspension bump stop - inspection, removal and refitting

Refer to Section 8.

18 Steering wheel - removal and refitting



16.7 Tighten the balljoint nut to the specified torque setting, and secure it in position with a new split-pin

separator, and remove the connecting link from the vehicle (see illustrations).

Inspection

5 Check that the link balljoint moves freely,

without any sign of roughness. Check also that the balljoint gaiter shows no sign of deterioration, and is free from cracks and splits. If any sign of wear or damage is found, the complete link must be renewed.

6 Examine the link mounting bushes for signs of wear or damage. If renewal is necessary, a hydraulic press and suitable spacers may be required, to press the bushes out of position and install the new ones.

Refitting

7 Locate the balljoint shank in the axle, and refit its washer and nut. Tighten the nut to the specified torque setting, and secure it in position with a new split-pin (see illustration).

8 Ensure that the mounting rubbers are correctly fitted, and insert the pivot bolt and washer.

9 Fit a new nut to the pivot bolt, tighten it to the specified torque setting, then lower the vehicle to ground.

Removal

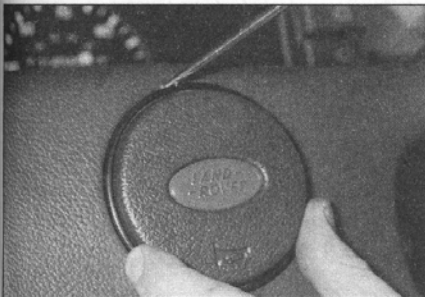
Models without an airbag

1 Disconnect the battery negative terminal.

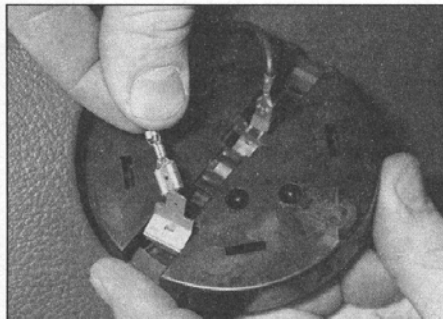
2 Set the front wheels in the straight-ahead position, and release the steering lock by inserting the ignition key.

3 On early models, prise out the badge from the centre of the steering wheel, and remove the trim cap from the retaining nut.

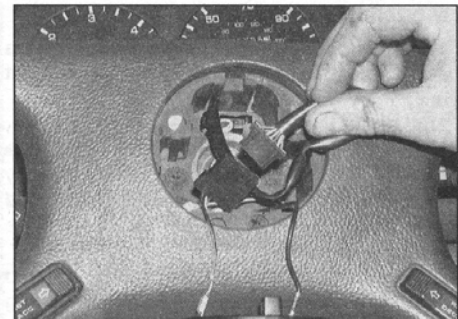
4 On later models, prise out the horn button/trim pad from the centre of the steering wheel. This operation is harder than it first appears, as the steering wheel padding must be pulled considerably to free the edge of the horn pad. Take care to reduce the potential risk of damage to the wheel padding as this is done. Once the horn button has been removed, disconnect its wiring connectors. On models with cruise control, the horn and cruise control switch wiring is all fed through a single multi-plug - if this plug is separated, the individual wiring to each switch can be left connected (see illustrations).



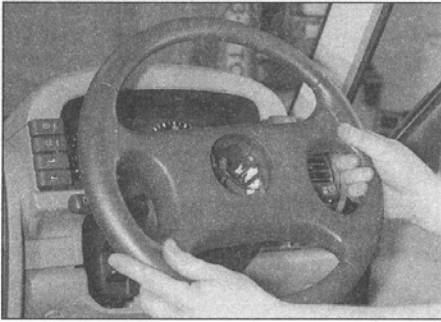
18.4a On later models, prise out the horn button from the centre of the steering wheel ...



18.4b ... and disconnect it from the wiring connectors



18.4c On models with cruise control, separate this plug if preferred



18.6 Unscrew the retaining nut, and withdraw the steering wheel from the end of the column

5 Slacken the steering wheel retaining nut, but do not remove it at this stage.

6 Make alignment marks between the steering wheel and steering column shaft, then pull the wheel to release it from the splines (see illustration). **Note:** If the wheel is a tight fit on the column splines, a suitable legged puller will then be required to free the steering wheel.

7 Remove the retaining nut and washer, then, checking that all wiring has been released from its retaining clips, remove the wheel from the steering column.

Models with an airbag

8 Set the front wheels in the straight-ahead position, and release the steering lock by inserting the ignition key.

9 Remove the airbag unit as described in Chapter 13, then return the steering wheel to the straight-ahead position.

10 Free the airbag unit wiring from its retaining clips on the wheel.

11 Remove the steering wheel as described above in paragraphs 6 and 7.



Whilst the steering wheel is removed, wrap adhesive tape around the airbag (or cruise control) contact unit.

This will prevent unnecessary rotation of the contact unit, and will ensure that it remains correctly positioned until the steering wheel is refitted.

Refitting

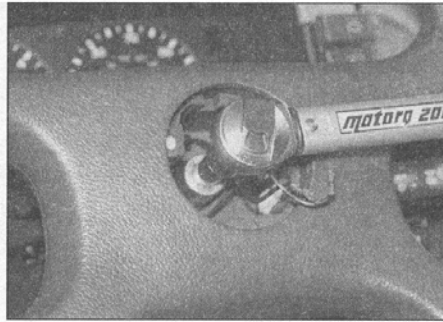
Models without an airbag

12 On models with cruise control, where applicable, remove the tape from the contact unit.

13 Locate the wheel on the column splines, aligning the marks made on removal. Take care to ensure that the wheel is correctly aligned with the indicator cancelling cam, and with the cruise control contact unit pegs (where applicable).

14 Refit the washer and retaining nut, and tighten the nut to the specified torque setting (see illustration).

15 On later models, reconnect the wiring to



18.14 Ensure that the wheel is correctly located on the column splines, and tighten the retaining nut to the specified torque

the horn, then clip the horn button/trim pad back into position in the centre of the wheel. On models with cruise control, reconnect the multi-plug, then refit the steering wheel pad and secure with the two Torx screws.

16 On early models, refit the trim cap to the retaining nut, then fit the badge to the centre of the wheel.

17 On all models, reconnect the battery on completion.

Models with an airbag

18 Remove the tape from the contact unit, then feed the airbag unit wiring up through the wheel.

19 Locate the steering wheel on the column splines, aligning the marks made on removal, whilst making sure that the wheel is correctly engaged with the contact unit tabs.

20 Refit the washer and/or retaining nut (as applicable), and tighten it to the specified torque setting.

21 Clip the airbag unit wiring back into the steering wheel, then refit the airbag unit as described in Chapter 13.

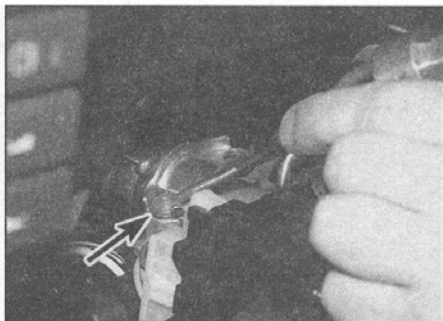
19 Ignition switch/steering column lock - removal and refitting



Note: If the lock assembly is to be removed, new shear-bolts will be required on refitting.

Removal

1 Disconnect the battery negative lead.



19.6 Remove the shear-bolts using a hammer and chisel ...

2 Release the fasteners and release the driver's side lower fascia panel; on later models, undo the hinge retaining screws to remove the panel. Where necessary, undo the retaining screws and remove the support pad from the fascia.

3 Undo the steering column shroud retaining screws, unclip the shroud halves, and remove both the upper and lower shrouds from the steering column. On early models, it may be necessary to pull off the hazard warning light switch button to allow the upper shroud to be removed. Proceed as described under the relevant sub-heading. If necessary, the steering wheel can be removed (see Section 18) to improve access.

Lock assembly

4 Trace the wiring back from the switch assembly, and disconnect its wiring connector(s). On later models, unclip the immobiliser reader coil from the lock assembly, and disconnect the wiring plug.

5 Release the bulbholder from the end of the lock assembly.

6 Using a hammer and suitable chisel, tap the head of each shear-bolt around anti-clockwise until each bolt is loose enough to be unscrewed by hand (see illustration).

7 Unscrew both shear-bolts, then lift off the retaining clamp and remove the lock assembly from the steering column (see illustration).

Ignition switch wiring block

8 Trace the wiring back from the switch assembly, and disconnect its wiring connector(s).

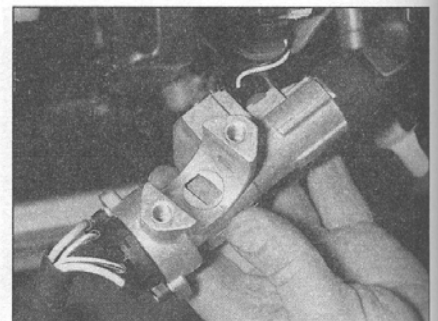
9 Slacken and remove the wiring block retaining screws, and withdraw the wiring block from the end of the switch assembly.

Refitting

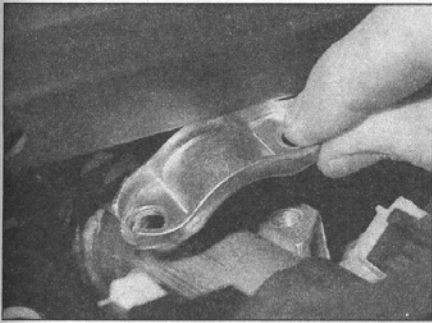
Lock assembly

10 Refit the lock assembly retaining clamp, making sure its lug is correctly located in the steering column hole.

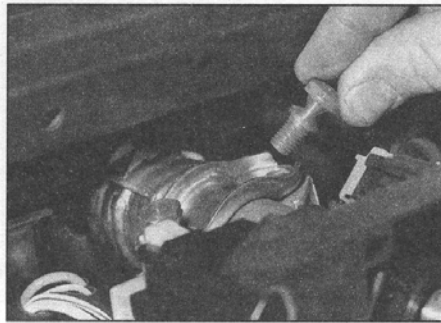
11 Manoeuvre the lock assembly into position and fit the new shear-bolts,



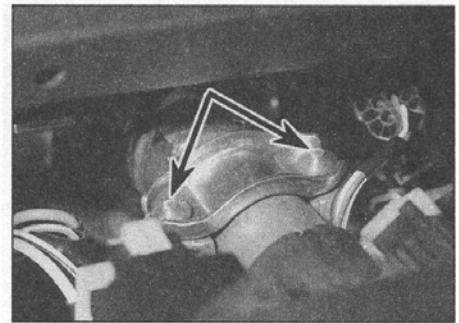
19.7 ... then remove the steering lock assembly from the column



19.11a Engage the lock with the column, then refit the retaining clamp . . .



19.11b . . . and screw in the new shear-bolts



19.13 Check the operation of the lock, then fully tighten the shear-bolts until they break

tightening them loosely only at this stage (see illustrations).

12 Reconnect the switch wiring, ensuring that it is correctly routed, and clip the bulbholder back into the lock.

13 Reconnect the battery, then check the operation of the ignition switch and steering column lock. If all is well, tighten each lock assembly bolt until its head shears off (see illustration).

14 Manoeuvre the steering column shrouds into position, and clip them securely together. Refit the shroud retaining screws, and tighten them securely. Where necessary, refit the hazard warning switch button.

15 Refit the support pad (where removed), then install the lower fascia panel and secure it in position.

Ignition switch wiring block

16 Fit the wiring block to the switch assembly, ensuring that its centre is correctly aligned with the lock cylinder rod flats.

17 Ensure that the wiring block is correctly seated, then securely tighten its retaining screw.

18 Reconnect the wiring connector(s) and the battery, and check the operation of the ignition switch.

19 Manoeuvre the steering column shrouds into position, and clip them securely together. Refit the shroud retaining screws, and tighten them securely. Where necessary, refit the hazard warning light switch button.

20 Refit the support pad (where removed),

then install the lower fascia panel and secure it in position.

20 Steering column - removal, inspection and refitting

Note: On early models (pre-March 1994), a new universal joint clamp bolt nut will be required on refitting (see note in Section 1).

Removal

1 Remove the steering wheel as described in Section 18.

2 Release the two fasteners and release the driver's side lower fascia panel; on later models, undo the hinge retaining screws to remove the panel. Where necessary, undo the retaining screws and remove the support pad from the fascia.

3 Undo the steering column shroud retaining screws, unclip the shroud halves, and remove both the upper and lower shrouds from the steering column. On early models, it may be necessary to pull off the hazard warning light switch button to allow the upper shroud to be removed.

4 On models with an airbag, remove the airbag contact unit as described in Chapter 13.

5 Trace the wiring back from the column switch assembly and ignition switch, and disconnect the wiring connectors. Free the wiring from any relevant retaining clips.

6 Using paint or a marker pen, make alignment marks between the steering column and universal joint.

7 Slacken and remove the nut (early models only) and clamp bolt securing the intermediate shaft to the steering column.

8 On early models, slacken and remove the steering column upper and lower mounting nuts, washers and bolts, then remove the column assembly from the vehicle. Recover the gasket which is fitted to the lower end of the column.

9 On later models, slacken and remove the retaining nuts, and remove the support bracket from the lower end of the column. Unscrew the lower column mounting bolts and washers, and the upper mounting nuts and washers, and remove the steering column assembly from the vehicle (see illustrations).

Inspection

10 Examine steering column and mountings for signs of damage and deformation, and check the steering shaft for signs of free play in the column bushes. If there are signs of damage or play, the column must be renewed. Overhaul of the column is not possible.

Refitting

11 Manoeuvre the steering column into position; engage it with the universal joint, aligning the marks made on removal.

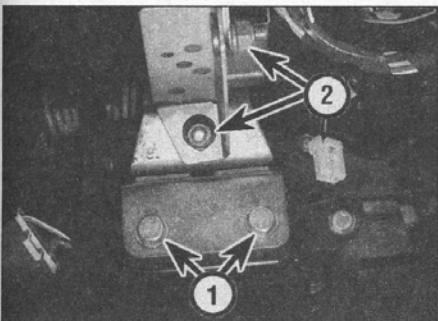
12 On early models, fit a new gasket (where used) to the base of the column, then refit the column upper and lower mounting bolts, washers and nuts. Tighten all bolts by hand only at this stage.

13 On later models, refit the column upper mounting nuts and lower mounting bolts, tightening them by hand only. Refit the support bracket to the lower end of the column, and loosely tighten its retaining nuts.

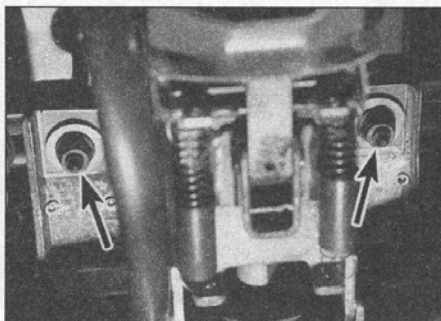
14 On all models, check that the column is correctly positioned on its mountings, then go around and tighten all mounting nuts/bolts to the specified torque setting.

15 Insert the universal joint clamp bolt, fit a new nut (where necessary) and tighten it to the specified torque setting.

16 The remainder of refitting is a direct reversal of the removal procedure.



20.9a Lower steering column mounting bolts (1) and support bracket nuts (2) . . .



20.9b . . . and upper mounting nuts (arrowed)



21.3 Intermediate shaft-to-steering column clamp bolt (arrowed)

21 Steering column intermediate shaft - removal, inspection and refitting

Note: On early models (pre-March 1994), new clamp bolt nuts will be required on refitting (see note in Section 1).

Removal

- 1 Set the front wheels in the straight-ahead position, then disconnect the battery negative terminal.
- 2 Using paint or a marker pen, make alignment marks between the intermediate shaft universal joint and steering column, and the shaft and lower universal joint.
- 3 Slacken and remove the nuts (early models only) and clamp bolts securing the intermediate shaft to the steering column and universal joint (see illustration).
- 4 Disengage the shaft from the steering column and joint, and remove it from the vehicle.

Inspection

- 5 Inspect the intermediate shaft universal joints for signs of roughness in its bearings and ease of movement, and check the shaft coupling for signs of damage or deterioration. If either joint or the coupling is damaged in any way, the complete shaft assembly must be renewed.
- 6 On some models, the intermediate shaft incorporates a collapsible joint. In the event of a front-end crash, the joint collapses and prevents the steering wheel injuring the driver. On these models, inspect the shaft joint closely for signs of impact damage, and renew it if necessary.

Refitting

- 7 Aligning the marks made on removal, engage the shaft with the universal joint, then engage the upper end of the shaft with the steering column.
- 8 Make sure that the shaft is correctly seated, then insert both its clamp bolts. Fit a new nut to each clamp bolt (where necessary), then tighten them both to the specified torque setting.

22 Steering column universal joint - removal, inspection and refitting

Note: On early models (pre-March 1994), new clamp bolt nuts will be required on refitting (see note in Section 1).

Removal

- 1 Set the front wheels in the straight-ahead position, then disconnect the battery negative terminal.
- 2 Using paint or a marker pen, make alignment marks between the universal joint and intermediate shaft, and the lower end of the joint and steering box pinion.
- 3 Slacken and remove the nuts (early models only) and clamp bolts securing the universal joint in position, then disengage it from the shaft and pinion, and remove it from the vehicle.

Inspection

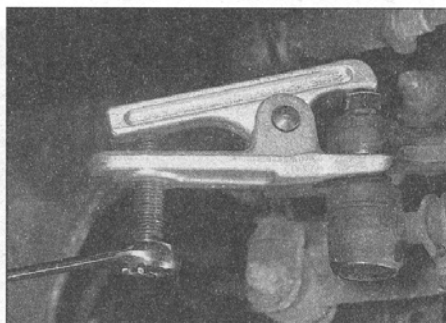
- 4 Inspect the universal joint for signs of roughness in its bearings, and check it for ease of movement. If it is damaged in any way, the joint must be renewed.

Refitting

- 5 Aligning the marks made on removal, engage the universal joint with the steering box pinion and intermediate shaft splines.
- 6 Make sure that the joint is correctly seated, then insert both its clamp bolts. Fit a new nut to each clamp bolt (where necessary), then tighten them both to the specified torque setting.

23 Steering - adjustment

- 1 If at any time it is noted that the steering action has become stiff or sloppy, the vehicle should be taken to a Land Rover dealer for the steering components to be checked. Adjustments of the steering components and power steering box are possible, but specialist knowledge and equipment are



24.6 Using a balljoint separator to release the drag link balljoint from the steering box drop arm

needed. Therefore, this task must be entrusted to a Land Rover dealer.

2 The only adjustment which can easily be carried out by the home mechanic is steering lock stop adjustment.

3 Once the wheel alignment is known to be correct (see Section 33), turn the steering onto full left-hand lock, and measure the clearance between the left-hand front tyre wall and the radius arm. This should be 20 mm.

4 If adjustment is necessary, slacken the stop-bolt locknut, and rotate the bolt as required. Once the clearance is correctly set, securely tighten the locknut.

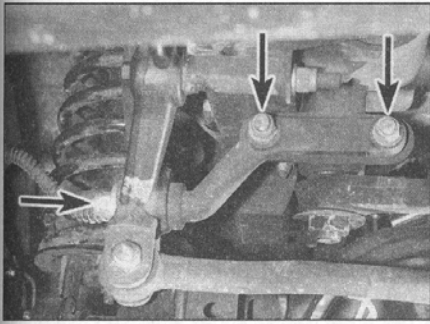
5 Turn the steering onto full right-hand lock, and then repeat the adjustment on the right-hand side.

24 Steering box - removal, inspection and refitting

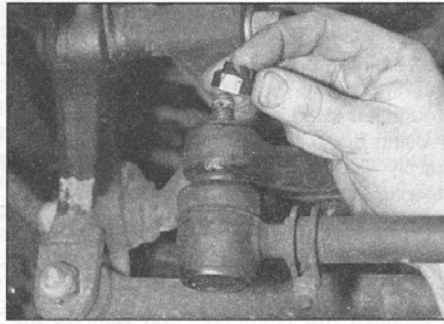
Note: New tie-bar mounting bolt nuts will be required on refitting (see note in Section 1). On early models (pre-March 1994), a new clamp bolt nut will also be required.

Removal

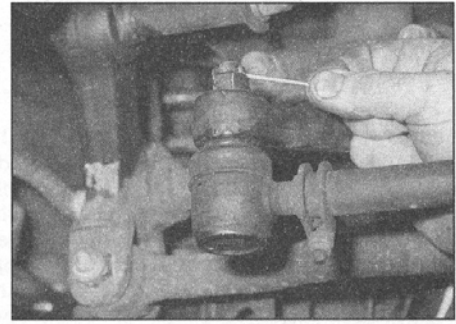
- 1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*).
- 2 Position the front wheels in the straight-ahead position, then disconnect the battery negative terminal.
- 3 Using brake hose clamps, clamp both the supply and return hoses near the power steering fluid reservoir. This will minimise fluid loss during subsequent operations.
- 4 Clean the area around the steering box hose unions, then make identification marks on each pipe to ensure that they are correctly positioned on reassembly. Unscrew the feed and return pipe union nuts from the steering box; be prepared for fluid spillage, and position a suitable container beneath the pipes whilst unscrewing the union nuts. Disconnect both pipes; plug the pipe ends and steering box orifices, to prevent excessive fluid leakage and the entry of dirt into the hydraulic system.
- 5 Withdraw the split-pin, then unscrew the nut securing the drag link to the steering box drop arm.
- 6 Using a universal balljoint separator, free the drag link from the drop arm (see illustration).
- 7 Using paint or a marker pen, make an alignment mark between the universal joint and steering box pinion.
- 8 Slacken and remove the nut (early models only) and clamp bolt securing the universal joint to the steering box pinion.
- 9 Loosen the nut securing the steering box tie-bar to its mounting. Slacken and remove the nuts, washers and bolts securing the tie-bar to the steering box, and position the tie-



24.9 Steering box tie-bar retaining nut locations (arrowed)



24.16a Refit the balljoint retaining nut . . .



24.16b . . . then tighten it to the specified torque and secure it in position with a new split-pin

bar clear of the box (see illustration).

10 Unscrew the mounting bolts, and remove the steering box assembly from the vehicle.

Inspection

11 Inspect the steering box assembly for signs of wear or damage. If overhaul of the steering box assembly is necessary, the task must be entrusted to a Land Rover dealer.

Refitting

12 Manoeuvre the steering box into position, and engage it with the universal joint splines, aligning the marks made prior to removal.

13 Position the steering box assembly on the chassis, making sure its locating lug is correctly engaged, then fit the mounting bolts and tighten them to the specified torque setting.

14 Insert the clamp bolt securing the universal joint to the steering box. Fit a new nut to the clamp bolt (where necessary), and tighten the bolt to the specified torque.

15 Align the tie-bar with the box, and insert the retaining bolts and washers. Fit new nuts to the bolts, and tighten them to the specified torque setting. Tighten the tie-bar-to-mounting nut to the specified torque setting.

16 Connect the drag link to the drop arm, and refit its retaining nut. Tighten the nut to

the specified torque setting, and secure it in position with a new split-pin (see illustrations).

17 Wipe clean the feed and return pipe unions, and refit them to their respective unions on the steering box. Tighten the union nuts to the specified torque setting, and ensure that the pipes are securely retained by all the necessary retaining clips.

18 Remove the clamp from the steering hoses, then lower the vehicle to the ground. Bleed the hydraulic system as described in Section 27.

25 Steering box drop arm - removal and refitting

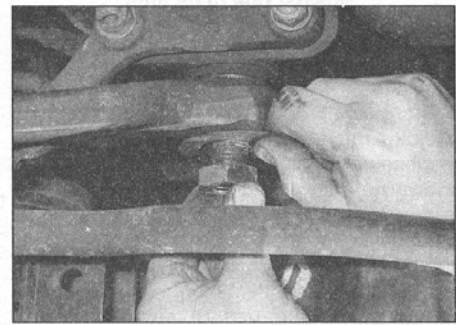


Note: A new retaining nut lockwasher will be required on refitting.

Removal

1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*).

2 Position the front wheels in the straight-ahead position, then disconnect the battery negative terminal.



25.5a Unscrew the drop arm retaining nut . . .

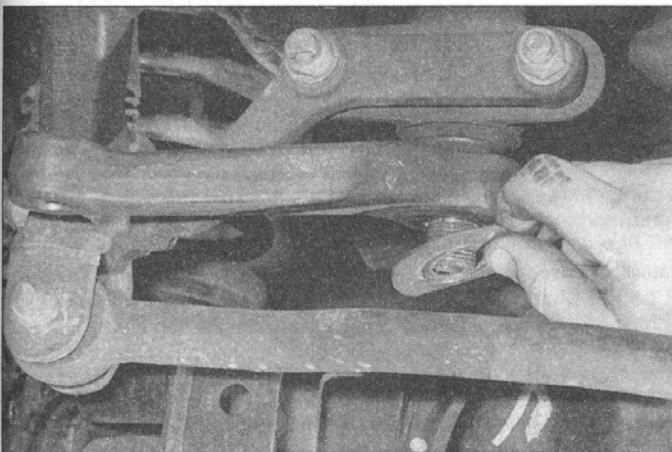
3 Withdraw the split-pin, then unscrew the nut securing the drag link to the steering box drop arm.

4 Using a universal balljoint separator, free the drag link from the drop arm.

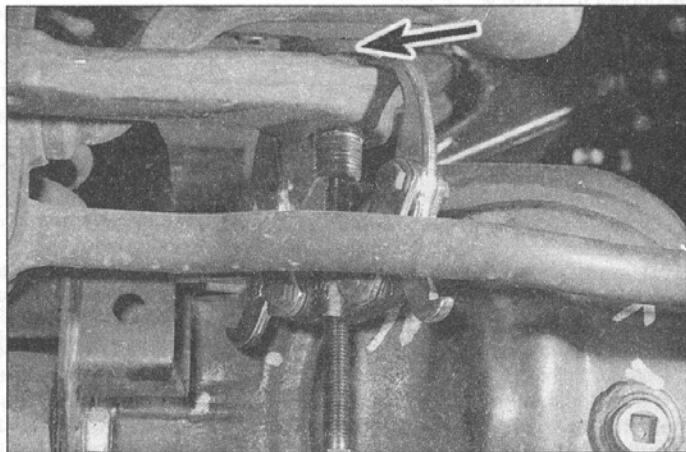
5 Bend down the lockwasher tab, then slacken and remove the drop arm retaining nut and lockwasher (see illustrations).

6 Make alignment marks between the drop arm and steering box shaft.

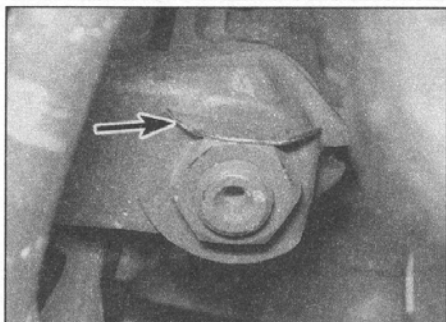
7 A suitable legged puller will now be required to draw the arm off the box shaft. Locate the legs of the puller behind the arm, and carefully draw it off the steering box shaft (see illustration).



25.5b . . . and recover the lockwasher



25.7 Using a legged puller to draw the drop arm off the steering box



25.11 Tighten the drop arm retaining nut to the specified torque, and secure it in position by bending down the lockwasher against one of its flats

8 Once the arm is loose, remove the puller, then lower the drop arm away from the steering box.

9 On early models, check that the link balljoint moves freely, without any sign of roughness. Check also that the balljoint gaiter shows no sign of deterioration, and is free from cracks and splits. If any sign of wear or damage is found, the drop arm assembly should be renewed/overhauled. Overhaul of the balljoint components is possible, but the task requires the use of several special service tools, and should therefore be entrusted to a Land Rover dealer.

Refitting

10 Align the marks made prior to removal, and locate the drop arm on the steering box shaft splines.

11 Fit a new lockwasher to the shaft, and refit the retaining nut. Tighten the nut to the specified torque setting, then secure it in position by bending down the tab of the lockwasher so that it contacts one of the nut flats (see illustration).

12 Connect the drag link to the drop arm, and refit its retaining nut. Tighten the nut to the specified torque setting, and secure it in position with a new split-pin.

13 Lower the vehicle to the ground, and reconnect the battery.

26 Power steering pump - removal and refitting

Removal

1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*).

2 On all except 200 TDi engines, remove the cooling fan and viscous coupling as described in Chapter 3.

3 On all engines, loosen the bolts securing the drivebelt pulley to the power steering pump. On petrol models, a 9 mm Allen key can be inserted into the centre of the pulley, to hold it against rotation.

4 Remove the auxiliary drivebelt as described in the relevant part of Chapter 1, then remove the retaining bolts and withdraw the power steering pump pulley, noting which way around it is fitted.

5 Using brake hose clamps, clamp both the supply and return hoses near the power steering fluid reservoir. This will minimise fluid loss during subsequent operations. **Note:** *If the reason for removing the pump is to replace it due to internal wear, then the fluid should be replaced as a matter of course.*

6 Release the fasteners, and remove the undershield from beneath the engine.

7 Slacken the retaining clip, and disconnect the fluid supply hose from the pump. Slacken the union nut, and disconnect the feed pipe from the pump. Be prepared for some fluid spillage as the pipe and hose are disconnected; plug the hose/pipe end and pump unions, to minimise fluid loss and to prevent the entry of dirt into the system.

8 On petrol models, release the HT lead from the clip above the pump, and move the lead to one side without disconnecting it.

9 Slacken and remove the power steering pump mounting bolts, and remove the pump from the engine.

10 Overhaul of the pump is not possible, if the pump is worn or damaged it must be renewed.

Refitting

11 Prior to refitting, remove all traces of locking compound from the pump pulley bolt holes, ideally by running a tap of the correct thread down them.

12 If a new pump is being fitted, unbolt the front mounting plate from the old pump (five bolts on petrol models, three on diesels) and transfer it to the new pump. Tighten the bolts to the specified torque.

13 Manoeuvre the pump into position, then refit its mounting bolts and tighten them to the specified torque setting.

14 On petrol models, clip the HT lead back into position above the pump.

15 Reconnect the feed pipe to the pump and tighten its union nut to the specified torque.

16 Reconnect the supply hose, and securely tighten its retaining clip.

17 Remove all traces of locking compound from the pulley bolts, and apply a drop of fresh locking compound to them.

18 Refit the pulley to the pump, making sure it is the correct way around, and install the mounting bolts.

19 Refit and tension the auxiliary drivebelt as described in the relevant part of Chapter 1, then tighten the pulley retaining bolts to the specified torque setting.

20 Where removed, refit the viscous coupling and cooling fan as described in Chapter 3.

21 Refit the undershield, then lower the vehicle to the ground.

22 Bleed the steering system as described in Section 27.

27 Power steering system - bleeding

1 With the engine stopped, top-up the fluid reservoir up to the maximum mark with the specified type of fluid.

2 Have an assistant start the engine, while you keep watch on the fluid level. Be prepared to add more fluid as the engine starts - the fluid level is likely to drop quickly.

3 Once the fluid level has stabilised, warm the engine up to normal operating temperature. Ensure that the front wheels are positioned in the straight-ahead position, then turn the engine off.

4 Check that the power steering fluid level is still up to the maximum mark, topping-up if necessary.

5 Start the engine and allow it idle. During the following procedure, the engine speed must not be raised above idle, and the steering must not be turned.

6 Slowly slacken the bleed screw which is situated on the top of the power steering box assembly. Ensuring that the fluid level in the reservoir remains at the maximum level, allow fluid to seep from the screw, until a steady flow of fluid which is free from air bubbles is seen to be emerging. Once this is so, securely tighten the bleed screw, and mop up all traces of fluid from the top of the steering box.

7 Turn the steering onto full left-hand lock, holding it there for a few seconds, and then onto full right-hand lock; check all steering hose/pipe unions for signs of leakage. **Note:** *Do not hold the steering at full lock for more than 30 seconds at a time, otherwise the hydraulic system may be damaged.*

8 Once all air is removed from the system, stop the engine, and check the fluid level as described in *Weekly checks*.

28 Steering damper - removal and refitting

Removal

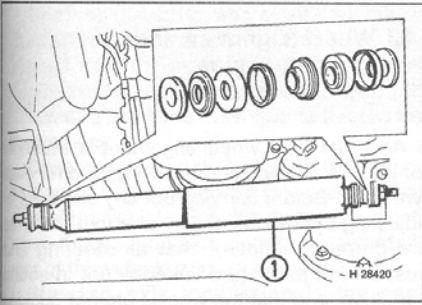
1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*).

2 Slacken and unscrew the locknut and retaining nut securing the damper to the track rod. Slide off the outer washer, rubber mounting and mounting seat arrangement, noting each component's correct fitted location. Free the damper from the track rod, and recover the inner washer rubber mounting and mounting seat arrangement from the damper.

3 Repeat the operation described in paragraph 2, and detach the steering damper from the differential housing.

4 Remove the steering damper from underneath the vehicle.

5 Inspect the damper assembly for signs of wear or damage, and renew if necessary. Inspect



28.6 On refitting, ensure that the steering damper (1) mounting rubber components are correctly arranged, as shown in the inset

the rubber mountings for signs of damage and deterioration, and renew if necessary.

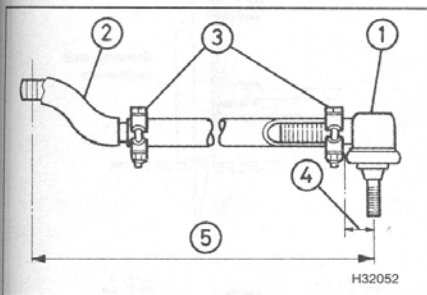
Refitting

6 Refitting is the reverse of removal, ensuring that all mounting rubber arrangement components are correctly positioned (see illustration). Securely tighten each retaining nut, then secure them in position by securely tighten the locknuts.

29 Drag link - removal, refitting and adjustment

Removal

- 1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*).
- 2 Position the front wheels in the straight-ahead position, then disconnect the battery negative terminal.
- 3 Withdraw the split-pin, then unscrew the nut securing the drag link to the steering box drop arm.
- 4 Using a universal balljoint separator, free the drag link from the drop arm.



30.6 Drag link adjustment details - early models

- 1 Balljoint
- 2 End fitting
- 3 Adjustment clamps
- 4 Balljoint centre-to-drag link end measurement = 28.5 mm
- 5 Balljoint centre-to-end fitting hole centre measurement = 919 mm

5 Repeat paragraphs 3 and 4, and free the drag link from the swivel pin housing assembly. If necessary, remove the roadwheel to improve access to the balljoint nut. Remove the drag link from underneath the vehicle.

6 Check that the link balljoint(s) move freely, without any sign of roughness. Check also that the balljoint gaiter(s) show no sign of deterioration, and are free from cracks and splits. If any sign of wear or damage is found, the balljoint(s) must be renewed (see Section 30). If the drag link itself is damaged, it must be renewed - do not attempt to straighten it.

Refitting

7 Offer up the drag link, and engage it with the swivel pin housing and steering box drop arm. Refit the retaining nuts, and tighten them to the specified torque setting. Secure each nut in position with a new split-pin.

8 Refit the roadwheel (where removed), then lower the vehicle to the ground and reconnect the battery negative terminal. Where necessary, tighten the wheel nuts to the specified torque setting

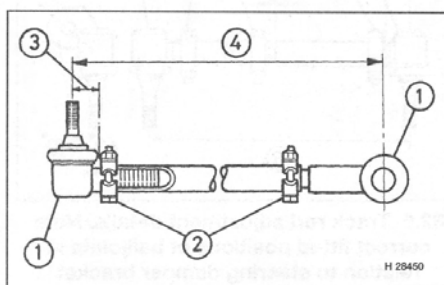
9 Road test the vehicle, and check that the steering wheel is centralised when the vehicle is driven straight-ahead. If the steering wheel is more than 5° out of position, adjustment should be made by removing the wheel and repositioning it on the column splines. If the wheel is less than 5° out of alignment, adjustment can be made by altering the drag link length as follows.

Adjustment

10 Apply the handbrake, then raise the front of the vehicle and detach the outer balljoint from the swivel pin housing assembly, as described above in paragraphs 1 to 4.

11 Slacken the balljoint clamp bolt, and adjust the drag link length by screwing the balljoint in or out (as applicable):

- a) On right-hand drive models, if the steering wheel was found to be slightly right of centre, shorten the drag link length, and if it was found to be slightly left of centre, extend the drag link length.



30.7 Drag link adjustment details - later models

- 1 Balljoint
- 2 Adjustment clamps
- 3 Balljoint centre-to-drag link end measurement = 28.5 mm
- 4 Balljoint centre to centre measurement = 924 mm

- b) On left-hand drive models, if the steering wheel was found to be slightly right of centre, extend the drag link length, and if it was found to be slightly left of centre, shorten the drag link length.

12 Once the drag link length is correct, refit the balljoint to the swivel pin housing, and tighten its retaining nut to the specified torque setting.

13 Secure the nut in position with a new split-pin, then tighten the drag link clamp bolt to the specified torque.

14 Refit the roadwheel, then lower the vehicle to the ground and tighten the wheel nuts to the specified torque.

15 Road test the vehicle and, if necessary, repeat the adjustment procedure.

30 Drag link balljoint/end fitting - removal and refitting

Removal

1 Remove the drag link as described in Section 29.

2 If the balljoint/end fitting is to be re-used, use a straight-edge and a scribe, or similar, to mark its relationship to the drag link.

3 Slacken the clamp bolt, then counting the exact number of turns necessary to do so, unscrew the balljoint/end fitting from the drag link end.

4 Carefully clean the balljoint/end fitting and the drag link threads. Renew the balljoint if its movement is sloppy or if it is too stiff, if it is excessively worn, or if it is damaged in any way; carefully check the stud taper and threads. If the balljoint gaiter is damaged, the complete balljoint assembly must be renewed; it is not possible to obtain the gaiter separately.

Refitting

5 If the original balljoint/end fitting is being refitted, screw it into the drag link by the number of turns noted on removal, and tighten the clamp bolt to the specified torque. This should line up the alignment marks that were made on removal.

6 On early models, if a new balljoint or end fitting are being installed, slacken both clamp bolts, and screw both the balljoint and end fitting into position. Referring to the accompanying illustration, position the balljoint so that the distance from its centre to the drag link end is as shown (see illustration). Then position the drop arm end fitting so that the distance between the centre of the balljoint and the centre of the end fitting hole is as given. Make sure that the offset end fitting is correctly positioned in relation to the balljoint shank, and tighten both drag link clamp bolts to the specified torque setting.

7 On later models, if a new balljoint(s) is/are being fitted, slacken both clamp bolts, and screw both balljoints into the drag link. Position one of the balljoints so that the distance from its centre to the drag link end is as shown (see illustration). Then position the

second balljoint so that the distance between the balljoint centres is as given. Make sure that the balljoints are correctly positioned in relation to each other, and tighten both drag link clamp bolts to the specified torque setting.

8 Refit the drag link as described in Section 29, and check that the steering wheel is centralised.

31 Track rod - removal and refitting



Removal

- 1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*).
- 2 Position the front wheels in the straight-ahead position, then disconnect the battery negative terminal.
- 3 Free the steering damper from the track rod, as described in paragraph 2 of Section 28.
- 4 Withdraw the split-pin, then unscrew the nut securing the track rod to the left-hand swivel pin housing.
- 5 Using a universal balljoint separator, free the track rod from the swivel pin housing.
- 6 Repeat paragraphs 4 and 5, and free the track rod from the right-hand swivel pin housing assembly. Remove the track rod from underneath the vehicle.
- 7 Check that the track rod balljoints move freely, without any sign of roughness. Check also that the balljoint gaiters show no sign of deterioration, and are free from cracks and splits. If any sign of wear or damage is found, the balljoint(s) must be renewed (see Section 32). If the track rod itself is damaged, it must be renewed - do not attempt to straighten it.

Refitting

- 8 Offer up the track rod, and engage it with the swivel pin housings. Refit the retaining nuts, and tighten them to the specified torque setting. Secure each nut in position with a new split-pin.
- 9 Reconnect the steering damper to the track rod as described in Section 28.
- 10 Check the front wheel alignment as described in Section 33.

32 Track rod balljoint - removal and refitting



Removal

- 1 Remove the track rod as described in Section 31.
- 2 If the balljoint is to be re-used, use a

straight-edge and a scribe, or similar, to mark its relationship to the track rod.

3 Slacken the clamp bolt, then counting the exact number of turns necessary to do so, unscrew the balljoint from the track rod end.

4 Carefully clean the balljoint and the track rod threads. Renew the balljoint if its movement is sloppy or if it is too stiff, if it is excessively worn, or if it is damaged in any way; carefully check the stud taper and threads. If the balljoint gaiter is damaged, the complete balljoint assembly must be renewed; it is not possible to obtain the gaiter separately.

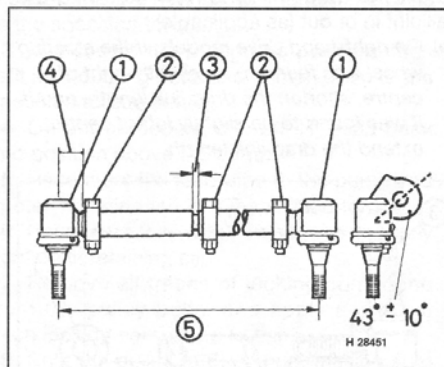
Refitting

5 If the original balljoint is being refitted, screw it into the track rod by the number of turns noted on removal. This should line up the alignment marks that were made on removal.

6 If a new balljoint is being installed, slacken all the clamp bolts, and screw both balljoints fully into position. Position the track rod adjuster sleeve so that the distance between its end and the track rod is as shown (see illustration). Position the adjuster sleeve balljoint so that the distance from its centre to the adjuster sleeve end is as given. Then position the track rod balljoint so that the distance between the balljoint centres is as shown. Make sure that both balljoints are correctly positioned in relation to the steering damper hole.

7 Refit the track rod as described in Section 31.

8 Prior to using the vehicle, check the front wheel alignment as described in Section 33. Tighten the track rod clamp bolts to the specified torque.



32.6 Track rod adjustment details. Note correct fitted positions of balljoints in relation to steering damper bracket

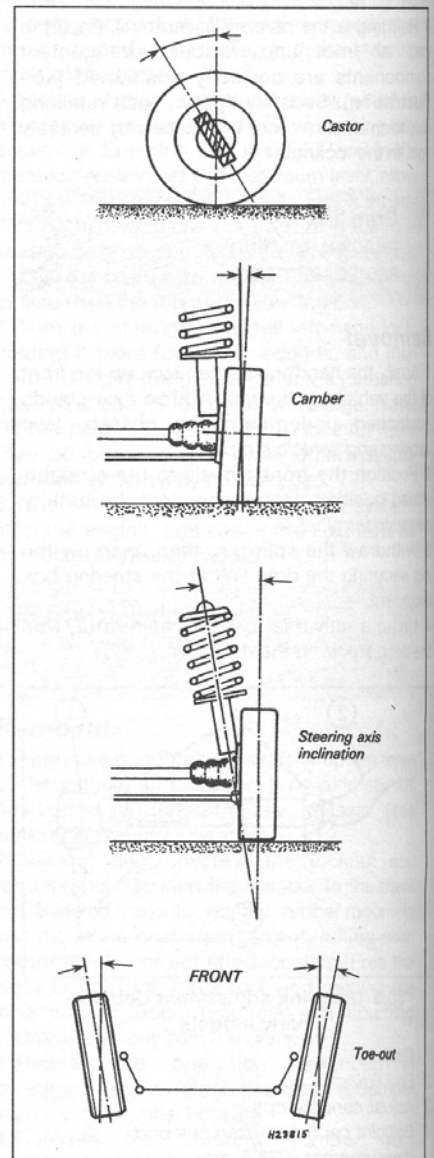
- 1 Balljoint
- 2 Adjustment clamps
- 3 Adjuster sleeve-to-track rod measurement = 9 mm
- 4 Balljoint centre-to-track rod end measurement = 28.5 mm
- 5 Balljoint centre-to-centre measurement = 1230 mm

33 Wheel alignment and steering angles - general information



1 Accurate front wheel alignment is essential for precise steering and handling, and for even tyre wear. Before carrying out any checking or adjusting operations, make sure that the tyres are correctly inflated, that all steering and suspension joints and linkages are in sound condition, and that the wheels are not buckled or distorted, particularly around the rims. It will also be necessary to have the vehicle positioned on flat, level ground, with enough space to push the car backwards and forwards through about half its length.

2 Front wheel alignment consists of four factors (see illustration):



33.2 Wheel alignment and steering angle measurements

Camber is the angle at which the roadwheels are set from the vertical, when viewed from the front or rear of the vehicle. Positive camber is the angle (in degrees) that the wheels are tilted outwards at the top from the vertical.

Castor is the angle between the steering axis and a vertical line when viewed from each side of the vehicle. Positive castor is indicated when the steering axis is inclined towards the rear of the vehicle at its upper end.

Steering axis inclination is the angle, when viewed from the front or rear of the vehicle, between the vertical and an imaginary line drawn between the upper and lower front suspension strut mountings.

Toe setting is the amount by which the distance between the front inside edges of the roadwheels differs from that between the rear

inside edges, when measured at hub height. If the distance between the front edges is less than at the rear, the wheels are said to toe-in. If it is greater than at the rear, the wheels are said to toe-out.

3 Camber, castor and steering axis inclination are set during manufacture, and are not adjustable. Unless the vehicle has suffered accident damage, or there is gross wear in the suspension mountings or joints, it can be assumed that these settings are correct. If for any reason it is believed that they are not correct, the task of checking them should be left to a Land Rover dealer, who will have the necessary special equipment needed to measure the small angles involved.

4 It is, however, within the scope of the home mechanic to check and adjust the front wheel toe setting. To do this, a tracking gauge must

first be obtained. Two types of gauge are available, and can be obtained from motor accessory shops. The first type measures the distance between the front and rear inside edges of the roadwheels, as previously described, with the vehicle stationary. The second type, known as a scuff plate, measures the actual position of the contact surface of the tyre, in relation to the road surface, with the vehicle in motion. This is achieved by pushing or driving the front tyre over a plate, which then moves slightly according to the scuff of the tyre, and shows this movement on a scale. Both types have their advantages and disadvantages, but either can give satisfactory results if used correctly and carefully.

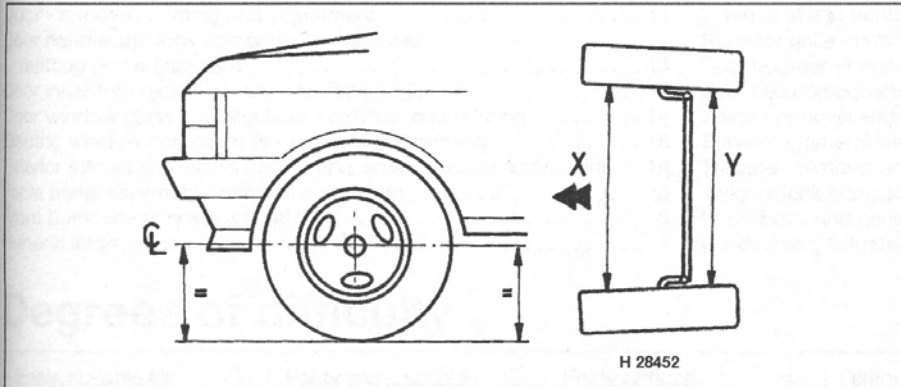
5 Many tyre specialists will also check toe settings free, or for a nominal charge.

6 Make sure that the steering is in the straight-ahead position when making measurements. The measurement will only be accurate if the vehicle ride height is as shown (see illustration).

7 If adjustment is necessary, apply the handbrake, then jack up the front of the vehicle and support it securely on axle stands. Slacken the track rod adjuster sleeve clamp bolts, then rotate the adjuster sleeve to alter the length of the track rod (as necessary); shortening the track rod will reduce toe-in/increase toe-out.

8 When the setting is correct, tighten both the clamp bolts to the specified torque setting.

9 Recheck the toe setting and, if necessary, repeat the adjustment procedure.



33.6 For the front wheel alignment check to be accurate, the vehicle must be at correct ride height, as shown. Take the measurements X and Y and calculate the toe setting