

Chapter 10 Suspension and steering systems

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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 
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Specifications

Front wheel alignment

Toe setting (all models):

Tolerance allowed before resetting required	0.5 mm toe-in to 4.5 mm toe-out (0°05' toe-in to 0°45' toe-out)
Adjustment setting (if required)	2.0 mm toe-out ± 1.0 mm (0°20' toe-out ± 0°10')

Rear wheel alignment

Toe setting (all models):

Tolerance allowed before resetting required	4.0 mm toe-in to 0.0 mm toe-in (0.69° toe-in to 0.00° toe-in)
Adjustment setting (if required)	2.0 mm toe-in (0.34° toe-in)

Roadwheels and tyres

Wheel types and sizes:

Steel	13 x 5, 13 x 5 (Heavy Duty Van), 14 x 6
Alloy	13 x 5 or 14 x 6
Tyre sizes (dependent on model)	155 R 13 78T, 175/70R 13 82T, 175/70R 13 82H, 185/60R 14 82H, 185/60R 14 V, 195/50R 15 V, 165 R 13-T, 165R13-REINF
Tyre pressures	See Chapter 1 Specifications

10•2 Suspension and steering systems

Torque wrench settings	Nm	lbf ft
Front suspension		
Hub/driveshaft retaining nut:		
M20 x 1.5 (23 splines)	205 to 235	151 to 173
M22 x 1.5 (25 splines)	220 to 250	162 to 186
Lower arm balljoint-to-spindle carrier clamp bolt	48 to 60	35 to 44
Lower arm to subframe bolts (using torque-to-yield method with vehicle standing on its wheels):		
Stage 1	50	37
Stage 2	Slacken completely	
Stage 3	50	37
Stage 4	Tighten through a further 90°	
Anti-roll bar link to suspension strut	41 to 58	30 to 43
Anti-roll bar link to anti-roll bar	41 to 58	30 to 43
Anti-roll bar-to-subframe clamp bolts	20 to 28	15 to 21
Subframe retaining bolts	80 to 90	59 to 66
Suspension top mounting nut	40 to 62	30 to 38
Suspension strut piston rod top spring seat nut	52 to 65	38 to 48
Suspension strut-to-spindle carrier clamp bolt	80 to 90	59 to 66
Rear suspension (Hatchback, Saloon and Estate)		
Rear hub bearing nut	250 to 270	184 to 199
Axle front mounting bracket bolts	41 to 58	30 to 43
Axle front bush/bracket pivot nuts/bolts*	102 to 138	75 to 102
Strut upper mounting nuts (Hatchback and Saloon)	28 to 40	20 to 30
Strut lower mounting (Hatchback and Saloon)	102 to 138	75 to 102
Strut upper through-bolt (Hatchback and Saloon)	41 to 58	30 to 43
Shock absorber upper mounting (Estate)	41 to 58	30 to 43
Shock absorber lower mounting (Estate)	58 to 79	43 to 58
<i>*Torque to be measured from the bolt head (not the nut)</i>		
Rear suspension (Van)		
Rear hub bearing nut	250 to 270	184 to 199
Shock absorber upper mounting	41 to 58	30 to 43
Shock absorber lower mounting	58 to 79	43 to 58
Shock absorber mounting bracket to body	30 to 40	22 to 30
Axle/spring U-bolt nuts	34 to 47	25 to 35
Front spring mounting bolt	70 to 97	52 to 71
Rear shackle upper stud/nut	41 to 58	30 to 43
Rear shackle lower mounting bolt	70 to 97	52 to 71
Steering (manual)		
Steering wheel-to-column shaft bolt	45 to 55	33 to 40
Steering gear-to-subframe bolts	70 to 97	53 to 65
Steering column mounting nuts	10 to 14	7 to 10
Steering column-to-pinion shaft clamp bolt	26 to 35	19 to 26
Track rod end to spindle carrier arm	25 to 30	18 to 22
Track rod end-to-track rod locknut	57 to 68	42 to 50
Track rod to steering rack	68 to 90	50 to 66
Adjustable steering through-bolt	6 to 8	4 to 6
Steering (power-assisted)		
Steering wheel-to-column shaft bolt	45 to 55	33 to 40
Steering gear-to-subframe bolts:		
Stage 1	15	11
Stage 2	Tighten through a further 90°	
Steering column mounting nuts	17 to 24	12 to 18
Steering column-to-pinion shaft clamp bolt	20 to 28	15 to 21
Track rod end to spindle carrier arm	25 to 30	18 to 22
Track rod end-to-track rod locknut	57 to 68	42 to 50
Track rod to steering rack	68 to 90	50 to 66
Adjustable steering through-bolt	6 to 8	4 to 6
Steering pump bolts	21 to 28	15 to 21
Steering pump pulley bolts	21 to 28	15 to 21
Pressure hose to pump	26 to 31	19 to 22
Roadwheel nuts		
All models*	70 to 100	52 to 74
<i>*Special nuts incorporating washers are fitted for alloy wheels.</i>		

1 General information

The independent front suspension is of the MacPherson strut type, incorporating coil springs and integral telescopic shock absorbers (see illustration). The struts are attached to spindle carriers at their lower ends, and the carriers are in turn attached to the lower suspension arm by balljoints. High-series models are fitted with an anti-roll bar, and this is attached to the subframe and lower suspension arms by link rods with rubber bushes.

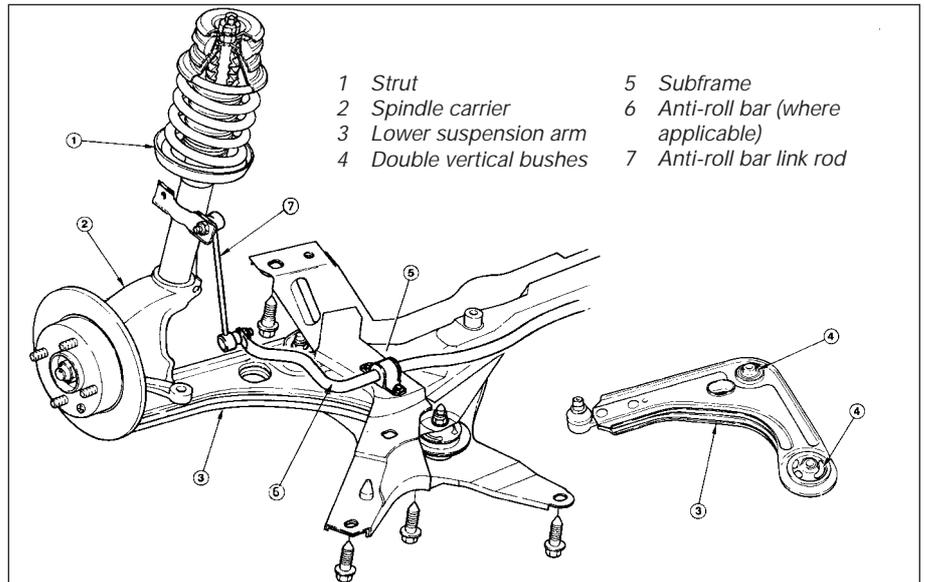
On all except Van models, the semi-independent rear suspension is of trailing arm type, incorporating a twist type axle beam (see illustration). This inverted V-section beam allows a limited torsional flexibility, giving each rear wheel a certain amount of independent movement whilst at the same time maintaining the track and wheel camber control for the rear axle. The axle is attached to the body by rubber void bushes, via brackets mounted on the underside of the body. Each bracket has a conical seating peg to ensure accurate alignment of the axle. It is important to note that the vehicle must never be jacked up at the rear under the axle beam. The axle beam itself is maintenance-free but where required, the pivot bushes of the trailing arm can be renewed.

The rear suspension struts on Hatchback and Saloon models are similar to those used for the front suspension, the combined coil spring and shock absorber being mounted between the suspension turret in the luggage area at the top and the trailing arm, inboard of the stub axle at the bottom. The Estate model differs in that the coil spring is separate from the shock absorber, and is enclosed between the underbody and the trailing suspension arm.

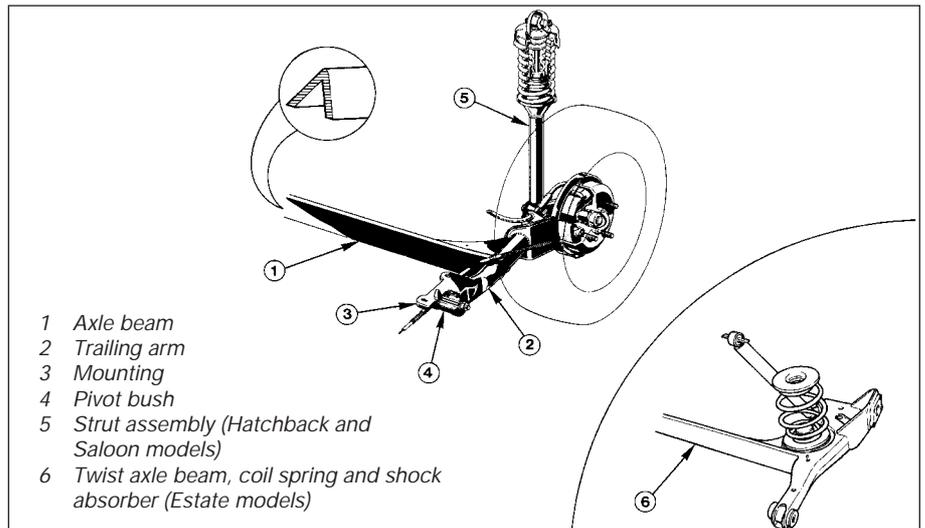
On Van models, the rear suspension comprises a transverse beam axle which is supported by a single leaf spring each side. Telescopic shock absorbers are used to control vertical movement.

A variable-ratio type rack-and-pinion steering gear is fitted, together with a conventional column and two-section shaft (see illustration). The steering gear is bolted to the front subframe. A height adjustment mechanism is fitted to some models, and power-assisted steering is also available.

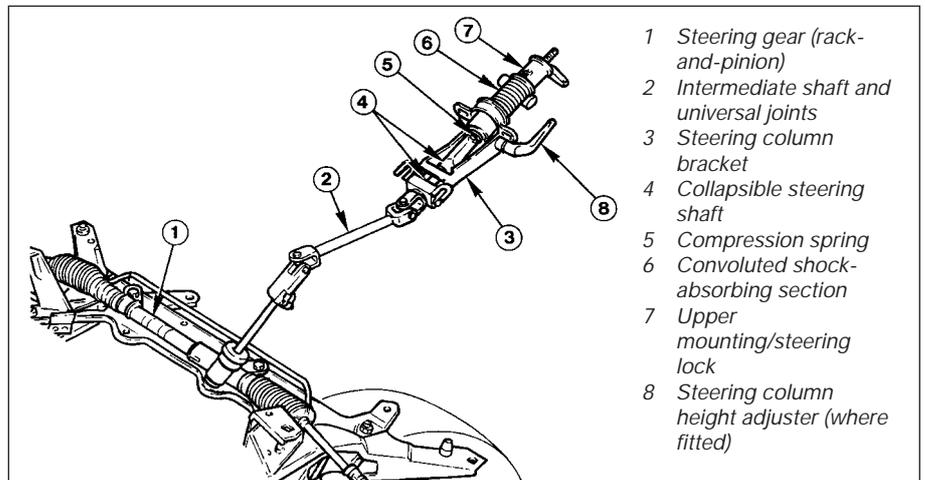
When working on the suspension or steering, you may come across nuts or bolts which seem impossible to loosen. These nuts and bolts on the underside of the vehicle are continually subjected to water, road grime, mud, etc, and can become rusted or seized, making them extremely difficult to remove. In order to unscrew these stubborn nuts and bolts without damaging them (or other



1.1 General view of the front suspension assembly



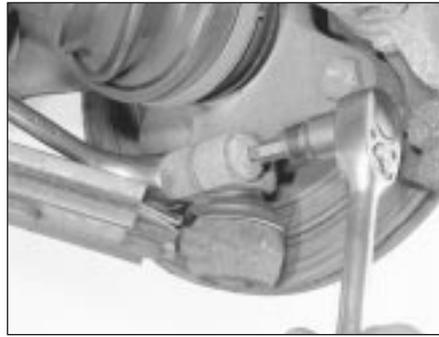
1.2 General view of the rear suspension assembly on Hatchback, Saloon and Estate models



1.5 Steering gear and column layout (left-hand drive version shown)



2.3 Disconnect the brake hose from the front suspension strut



2.6A Removing the lower arm-to-spindle clamp bolt and nut



2.6B Prise open the joint . . .

components), use lots of penetrating oil, and allow it to soak in for a while. Using a wire brush to clean exposed threads will also ease removal of the nut or bolt, and will help to prevent damage to the threads. Sometimes, a sharp blow with a hammer and punch will break the bond between a nut and bolt, but care must be taken to prevent the punch from slipping off and ruining the threads. Heating the nut or bolt and surrounding area with a blow lamp sometimes helps too, but this is not recommended, because of the obvious dangers associated with fire. Extension bars or pipes will increase leverage, but never use one on a ratchet, as the internal mechanism could be damaged. Actually *tightening* the nut or bolt first may help to break it loose. Nuts or bolts which have required drastic measures to remove them should always be renewed.

Since most of the procedures dealt with in this Chapter involve jacking up the vehicle and working underneath it, a good pair of axle stands will be needed. A hydraulic trolley jack is the preferred type of jack to lift the vehicle, and it can also be used to support certain components during removal and refitting operations.



Warning: Never, under any circumstances, rely on a jack to support the vehicle while working beneath it. When jacking up the vehicle, do not lift or support it beneath the front or rear subframes.

2 Front spindle carrier - removal and refitting



Removal

1 Apply the handbrake, loosen the front roadwheel nuts on the side concerned, then jack up the front of the car and support it on axle stands. Remove the appropriate front roadwheel.

2 Using a suitable pin punch, bend back the locking tab securing the driveshaft/hub nut, then loosen off the nut.

3 Unscrew the retaining bolt, and detach the brake hose and its locating bracket from the suspension strut (see illustration).

4 Unscrew the brake caliper-to-carrier retaining bolts, then withdraw the caliper and suspend it from a suitable fixing in the inner wing to avoid straining the brake hose. Where applicable, detach the ABS sensor and its lead clip from the spindle carrier.

5 Extract the split pin from the track rod end balljoint, then unscrew the nut and detach the rod from the spindle carrier using a conventional balljoint removal tool, but take care not to damage the balljoint seal.

6 Note the direction of fitting, then unscrew and remove the lower arm balljoint-to-spindle carrier clamp bolt. Prise the joint open carefully using a large flat-bladed tool, and detach the balljoint from the spindle carrier

(see illustrations). Take care not to damage the balljoint seal during the separation procedures.

7 Unscrew the brake disc retaining screw, and remove the brake disc from the hub.

8 Unscrew and remove the driveshaft retaining nut and washer.

9 Note the direction of fitting, then unscrew and remove the suspension strut-to-spindle retaining bolt. Prise open the clamping slot using a suitable wedged tool, and release the spindle from the strut. If necessary, tap the spindle carrier downwards to separate the two components (see illustrations).

10 Connect up a universal puller to the spindle carrier, and withdraw it from the driveshaft. When the driveshaft is free of the spindle, suspend it from a suitable fixing point under the wheel arch. This will prevent it from hanging down and its joint being pivoted beyond the maximum angle specified (see Section 9 of Chapter 8).

Refitting

11 Refitting is a reversal of removal, but observe the following points:

- Ensure that all mating faces, particularly those of the disc and hub flange, are clean before refitting.
- Lubricate the hub splines with molybdenum disulphide grease, and take care not to dislodge the hub bearings as the driveshaft is refitted through the hub.
- Tighten all nuts and bolts to the specified



2.6C . . . and detach the lower arm balljoint from the spindle



2.9A Remove the suspension strut-to-spindle carrier clamp bolt . . .



2.9B . . . and separate the spindle carrier from the strut

torque. Fit a new split pin to the track rod end balljoint nut to secure it. When reconnecting the suspension lower arm balljoint to the spindle carrier, ensure that the clamp bolt is fully engaged in the locating groove, and prevent the bolt from turning as the nut is tightened.

- d) When the hub nut is tightened to its specified torque wrench setting, spin the hub to ensure that it turns freely, then stake the nut flange into the groove in the end of the driveshaft.

3 Front hub bearings - checking



1 All models are fitted with non-adjustable front wheel bearings which are supplied pre-greased by the manufacturer.

2 To check the bearings for excessive wear, apply the handbrake, then raise and support the front end of the vehicle securely on axle stands.

3 Grip the roadwheel at the top and bottom, and attempt to rock it. If excessive movement is noted, or if there is any roughness or vibration felt when the wheel is spun, this indicates that the hub bearings are in need of renewal. Refer to Chapter 8 Specifications to determine whether a 23-spline or 25-spline driveshaft is fitted, then refer to Section 4 or 5 (as applicable) and proceed as described to renew the bearings.

4 Front hub bearings (23-spline type) - renewal



Note: The front hub bearings should only be removed from the spindle carrier if they are to be renewed. The removal procedure renders the bearings unserviceable, and they must not be re-used. Prior to dismantling, it should be noted that a hub/bearing puller and an assortment of metal tubes of various diameters (and preferably, a press) will be required. Unless these tools are available, the renewal of the spindle carrier/hub bearings will have to be entrusted to a Ford garage. Under no circumstances attempt to tap the hub bearings into position, as this will render them unserviceable. On ABS-equipped models, care must be taken during the bearing removal and refitting procedures not to damage the ABS wheel sensor ring.

Removal

1 Remove the spindle carrier from the vehicle as described in Section 2.

2 The hub must now be removed from the bearing inner races. It is preferable to use a press to do this, but it is possible to drive out the hub using a length of metal tube of suitable diameter.

3 Part of the inner race will remain on the hub, and this should be removed using a puller.

4 Using a suitable punch, tap the outer bearing race at diametrically-opposed points and remove it from the spindle carrier (see illustration). Do not allow the bearing to tilt during its withdrawal from the housing, or it will jam and possibly damage the surface of the bore. Any burrs left in a bearing bore will prevent the new bearing from seating correctly.

5 Thoroughly clean the bearing bore and hub before reassembly begins.

Refitting

6 Press the new outer bearing assembly into the spindle carrier using a length of metal tube of diameter slightly less than the outer race. Do not apply any pressure to the inner race. Alternatively, a long threaded rod or bolt, a nut and large flat washers may be used to draw the bearing into position (see illustration). Fit the new inner bearing assembly in the same way.

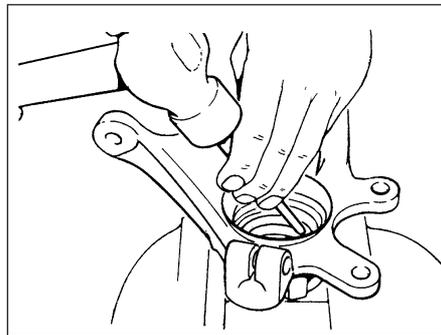
7 Support the inner race on a length of metal tube, then press the hub fully into the bearing.

8 Check that the hub spins freely in the bearings, then refit the spindle carrier as described in Section 2.

5 Front hub bearings (25-spline type) - renewal



Note: The front hub bearings should only be removed from the spindle carrier if they are to be renewed. The removal procedure renders the bearings unserviceable, and they must not be re-used. Prior to dismantling, it should be noted that a hub/bearing puller and an assortment of metal tubes of various diameters (and preferably, a press) will be required. Unless these tools are available, the renewal of the spindle carrier/hub bearings will have to be entrusted to a Ford garage. Under no circumstances attempt to tap the hub bearings into position, as this will render them unserviceable. On ABS-equipped models, care must be taken during the bearing removal and refitting procedures not to damage the ABS wheel sensor ring.



4.4 Using a punch to remove the hub bearing outer race from the spindle carrier

Removal

1 Remove the spindle carrier from the vehicle as described in Section 2.

2 The hub must now be removed from the bearing inner races. It is preferable to use a press to do this, but it is possible to drive out the hub using a length of metal tube of suitable diameter.

3 Part of the inner race will remain on the hub, and this should be removed using a puller.

4 Extract the bearing retaining circlip using circlip pliers, then drive the bearing outer race from the spindle carrier. Do not allow the bearing to tilt during its withdrawal from the housing, or it will jam and possibly damage the surface of the bore. Any burrs left in a bearing bore will prevent the new bearing from seating correctly. If necessary, insert the old inner race to facilitate removal of the bearing.

5 Thoroughly clean the bearing bore and hub before reassembly begins.

Refitting

6 Press the new outer bearing assembly into the spindle carrier, using a length of metal tube of diameter slightly less than the outer race. Do not apply any pressure to the inner race. Alternatively, a long threaded rod or bolt, a nut and large flat washers may be used to draw the bearing into position (see illustration 4.6).

7 Secure the bearing in the spindle carrier using the circlip.

8 Support the inner race on a length of metal tube, then press the hub fully into the bearing.

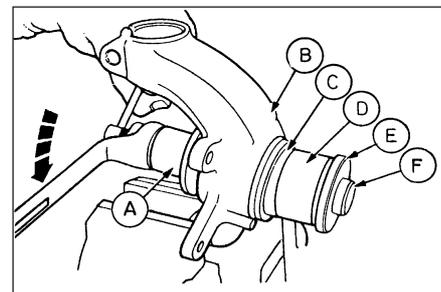
9 Check that the hub spins freely in the bearings, then refit the spindle carrier as described in Section 2.

6 Front suspension strut - removal and refitting



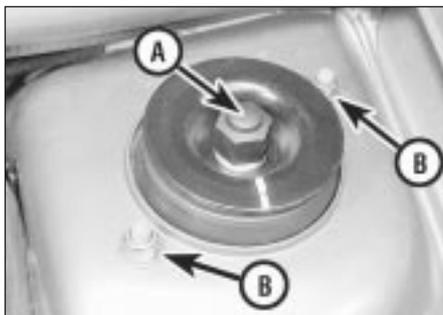
Removal

1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands. Remove the appropriate front roadwheel.



4.6 Using home-made tools to fit the outer bearing assembly to the spindle carrier

- | | |
|-------------------|-----------------|
| A Steel tube | D Steel tube |
| B Spindle carrier | E Flat washer |
| C Bearing | F Threaded bolt |



6.2A Front suspension strut upper mounting showing the protective cap over retaining nut (A) and the strut-to-body mounting nuts (B)

2 Open and support the bonnet. Prise free the protective cap from the strut upper retaining nut, then loosen off, *but do not remove*, the central retaining nut. As the nut is loosened off, hold the strut piston rod with an Allen key to prevent the rod from turning as the nut is loosened (see illustrations).

3 Detach the front brake hose from the support bracket on the strut.

4 Where applicable, unbolt and detach the anti-roll bar link rod from the suspension strut.

5 Unscrew and remove the strut-to-spindle carrier clamp bolt.

6 Note the direction of fitting, then unscrew and remove the lower arm balljoint-to-spindle carrier clamp bolt. Prise the joint open using a large flat-bladed tool, and detach the balljoint from the spindle carrier. Take care not to damage the balljoint seal during the separation procedures.

7 Prise open the spindle carrier-to-strut joint, and separate the carrier from the strut. Tap the carrier downwards using a soft-faced hammer to release it from the strut if necessary.

8 Support the weight of the strut underneath, and unscrew the two nuts securing it to the turret at the top. Lower the strut and remove it from the vehicle.

Refitting

9 Refitting is a reversal of removal. Tighten all the retaining bolts to the specified torque. When reconnecting the suspension lower arm balljoint to the spindle carrier, ensure that the clamp bolt is fully engaged in the locating groove, and prevent the bolt from turning as the nut is tightened.

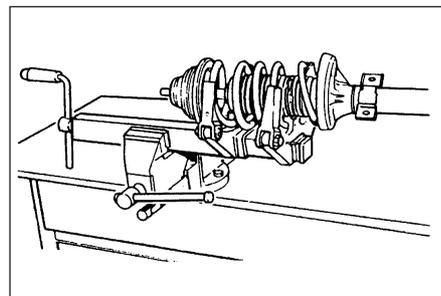
7 Front suspension strut - dismantling, examination and reassembly



Note: Before attempting to dismantle the front suspension strut, a tool to hold the coil spring in compression must be obtained. The Ford tool is shown in the accompanying illustrations, however careful use of conventional coil spring compressors will prove satisfactory.



6.2B Method to use when loosening off the strut upper mounting



7.2 Ford special tool in use to compress the front suspension strut coil spring

Dismantling

1 With the strut removed from the vehicle, clean away all external dirt, then mount it upright in a vice.

2 Fit the spring compressor tool (ensuring that it is fully engaged) and compress the coil spring until all tension is relieved from the upper mounting (see illustration).

3 Hold the strut piston with an Allen key, and unscrew the nut with a ring spanner.

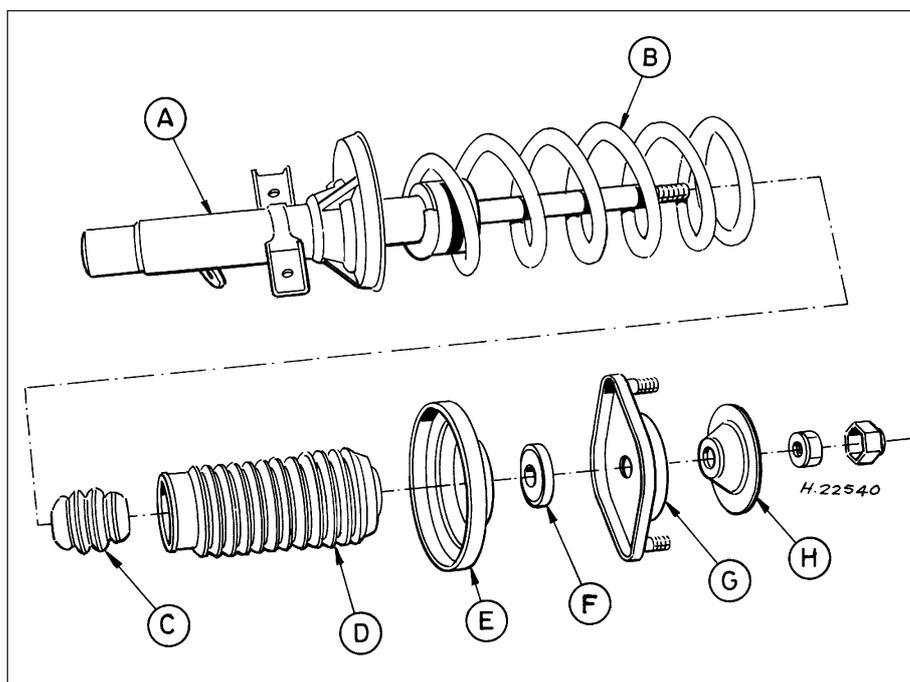
4 Withdraw the cup, retainer (top mounting), the bearing and upper spring seat, followed by the gaiter and the bump stop (see illustration).

5 The suspension strut and coil spring can now be separated. If a new coil spring or strut is to be fitted, the original coil spring must be released from the compressor. If it is to be re-used, the coil spring can be left in compression.

Examination

6 With the strut assembly now completely dismantled, examine all the components for wear, damage or deformation, and check the bearing for smoothness of operation. Renew any of the components as necessary.

7 Examine the strut for signs of fluid leakage. Check the strut piston for signs of pitting along its entire length, and check the strut body for signs of damage or elongation of the mounting bolt holes. Test the operation of the strut, 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 to the strut, renewal is necessary.

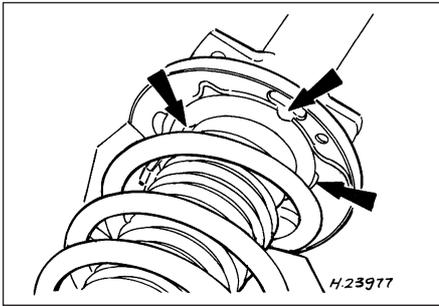


7.4 Front suspension strut components

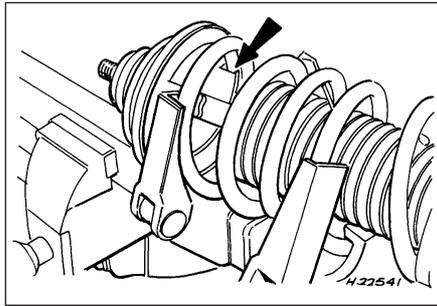
A Strut
B Spring
C Bump stop

D Gaiter
E Upper spring seat
F Bearing

G Top mounting retainer
H Top mounting cup



7.8A Spring location in the lower seat



7.8B Spring end location in the upper seat



8.2 Link rod-to-strut connection

Reassembly

8 Reassembly is a reversal of dismantling, but make sure that the spring ends are correctly located in the upper and lower seats (see illustrations). Check that the bearing is correctly fitted to the piston rod seat. Tighten the upper nut to the specified torque.

8 Front suspension anti-roll bar - removal and refitting

Removal

- 1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands. Remove the front roadwheels.
- 2 Unscrew the retaining nut, and detach the link rod from the suspension strut each side (see illustration).
- 3 Similarly, detach the link rod from the anti-roll bar each side (see illustration).
- 4 Unscrew the retaining nuts, and remove the anti-roll bar mounting brackets from the subframe each side, then withdraw the anti-roll bar from the side (see illustration).
- 5 Check the bar for damage, and the rubber bushes for wear and deterioration. If the bushes are in need of renewal, slide them off the bar, and fit new ones after lubricating them with rubber grease. If the link rod bushes are in poor or suspect condition, they will have to be renewed complete with the link rods.

Refitting

6 Refitting is a reversal of the removal procedure. Tighten the retaining nuts to the specified torque setting.

9 Front suspension lower arm - removal and refitting

Removal

- 1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands. Remove the appropriate roadwheel.
- 2 Note the direction of fitting, then unscrew and remove the lower arm balljoint-to-spindle carrier clamp bolt. Prise the joint open using a large flat-bladed tool, and detach the balljoint from the spindle carrier. Take care not to damage the balljoint seal during the separation procedures.
- 3 Unscrew and remove the inboard retaining bolts on the subframe, and withdraw the suspension arm from it (see illustration).
- 4 If the balljoint and/or the inboard mounting bushes are found to be in poor condition, the complete suspension arm must be renewed. The suspension arm must also be renewed if it has suffered structural damage.

Refitting

5 Refitting is a reversal of the removal procedure, but note the following special points:

- a) When reconnecting the arm to the subframe, the bolts must be fitted from underneath, and hand-tightened until the vehicle is resting on its wheels.
- b) When reconnecting the suspension lower arm balljoint to the spindle carrier, ensure that the clamp bolt is fully engaged in the locating groove, and prevent the bolt from turning as the nut is tightened.
- c) Fully tighten the suspension arm-to-subframe bolts when the vehicle is lowered and is standing on its wheels. These bolts must then be tightened in the sequence specified.

10 Subframe - removal and refitting

Removal

- 1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands. Remove the front roadwheels.
- 2 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1).
- 3 Fit an engine support bar (or a sling and hoist) to support the combined weights of the engine and transmission when the subframe is detached (as during engine/transmission removal and refitting).
- 4 Centralise the steering so that it is in the straightahead position, then working within the vehicle, unscrew and remove the steering column-to-pinion shaft clamp bolt.



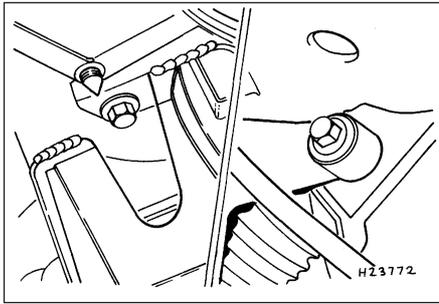
8.3 Link rod-to-bar connection



8.4 Anti-roll bar-to-subframe mounting



9.3 Suspension arm-to-subframe retaining bolts (arrowed)



10.5 Engine/transmission mounting bracket securing bolt locations on the subframe

5 Undo the engine/transmission mounting bracket bolts at the subframe connection (see illustration).

6 Where applicable, disconnect the oxygen sensor wiring multi-plug, then undo the retaining nuts and detach the exhaust downpipe (Chapter 4).

7 Disconnect the gear linkage at the transmission (Chapter 7).

8 Extract the split pin and unscrew the track rod end balljoint nut on each side, then using a conventional separator tool, detach each joint from its spindle carrier connection.

9 Note the direction of fitting, then unscrew and remove the lower arm balljoint-to-spindle carrier clamp bolt. Prise the joint open using a large flat-bladed tool, and detach the balljoint from the spindle carrier. Take care not to damage the balljoint seal during the separation procedure.

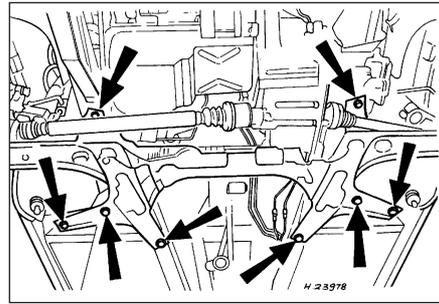
10 Unscrew the retaining bolt, and detach the right-hand engine support bar from the subframe.

11 Referring to illustration 10.5, unscrew and remove the second engine/transmission mounting bolt.

12 Where applicable, unscrew the retaining nuts and detach the anti-roll bar link rods from the suspension strut each side.

13 Where applicable, detach the power-assisted steering hydraulic lines from the steering gear (refer to Section 25 for details).

14 Locate suitable support jacks or blocks under the subframe to support it, then unscrew and remove the eight subframe fixing



10.14 Subframe securing bolt locations

bolts from the positions shown (see illustration). Lower the support jacks or blocks and withdraw the subframe. As it is lowered, disengage the steering pinion shaft from the column.

15 When the subframe is lowered from the vehicle, the steering gear, the suspension arms and the anti-roll bar (where applicable) can be unbolted and removed from it as necessary.

16 If the subframe and/or its associated components have suffered damage or are in poor condition, they must be renewed.

Refitting

17 Refitting is a reversal of removal, but observe the following points:

- Ensure that all mating faces are clean before refitting.
- When raising the subframe into position, ensure that the location dowels engage in the guide bores in the floorpan, and carefully engage the steering pinion shaft with the column shaft. Check that the various fixing bolt holes are in alignment, then loosely insert all of the retaining bolts before tightening them to the specified torque setting.
- When reconnecting the suspension lower arm balljoint to the spindle carrier, ensure that the clamp bolt is fully engaged in the locating groove, and prevent the bolt from turning as the nut is tightened.
- Tighten all nuts and bolts to the specified torque. Fit a new split pin to the track rod end balljoint nut to secure it.

e) On completion, check the wheel alignment and steering angles as described in Section 29.

11 Rear hub bearings - checking and renewal



Checking

1 All models are fitted with non-adjustable rear wheel bearings which are supplied pre-greased by the manufacturer.

2 To check the bearings for excessive wear, chock the front wheels, then raise and support the rear end of the vehicle securely on axle stands. Fully release the handbrake.

3 Grip the rear roadwheel at the top and bottom, and attempt to rock it. If excessive movement is noted, or if there is any roughness or vibration felt when the wheel is spun, it is indicative that the hub bearings are in need of renewal.

Renewal

Drum brake models

4 Unbolt and remove the roadwheel on the side concerned.

5 Check that the handbrake is still released, then remove the rubber blanking plug from the inside face of the brake backplate, reach through with a suitable screwdriver, and release the automatic brake adjuster by levering the catch from the pawl.

6 On certain models, the brake drum may be removed independently of the hub if desired. Remove the drum retaining screw (if fitted), and withdraw the drum off the wheel hub.

7 Prise free the outer grease cap from the centre of the hub (see illustration). The cap will be deformed during its removal, and will need to be renewed when the hub is refitted.

8 Unscrew and remove the hub nut, but note that the hub nut threads are "handed" according to side - right-hand to right, left-hand to left (see illustration). A left-hand thread unscrews in a clockwise direction.

9 Withdraw the brake drum/hub from the spindle of the rear stub axle (see illustration).



11.7 Remove the outer grease cap from the centre of the rear hub . . .



11.8 . . . unscrew the hub nut . . .



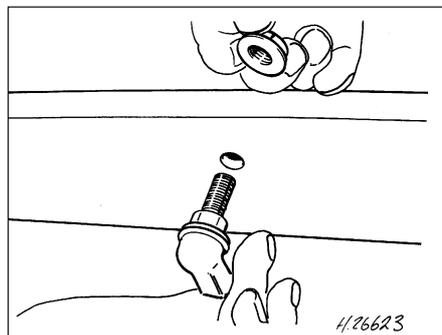
11.9 . . . and remove the brake drum

Disc brake models

- 10 Unbolt and remove the roadwheel on the side concerned.
- 11 Refer to Chapter 9, and remove the rear brake pads.
- 12 Referring to Chapter 9, undo the two rear brake caliper retaining bolts, and slide the caliper off the brake disc. Tie up the caliper using string or wire, but take care not to stretch the flexible brake hose.
- 13 Undo the brake disc retaining screw, and withdraw the disc off the handbrake shoes and wheel hub.
- 14 Prise free the outer grease cap from the centre of the hub. The cap will be deformed during its removal, and will need to be renewed when the hub is refitted.
- 15 Unscrew and remove the hub nut, but note that the hub nut threads are "handed" according to side - right-hand to right, left-hand to left. *A left-hand thread unscrews in a clockwise direction.*
- 16 Withdraw the wheel hub from the spindle of the rear stub axle.

All models

- 17 Use a screwdriver or suitable lever to prise free the grease retainer (seal) from the hub bore, but take care not to damage the bore surface.
- 18 Remove the inner and outer bearing cones from the bore of the hub.
- 19 To remove the bearing cups from the hub, drive them out using a suitable punch (preferably one made of brass). Drive each cup from its respective end by tapping it alternately at diametrically-opposed points (see illustration). Do not allow the cups to tilt in the bore, or the surfaces may become burred and prevent the new bearings from seating correctly as they are fitted.
- 20 Clean the bore and spindle thoroughly before reassembly.
- 21 To reassemble, tap the new bearing cups into position in the hub, using a piece of tubing slightly smaller in its outside diameter than that of the bearing cup. Ensure that the cups are squarely inserted and abut their respective shoulders in the hub.
- 22 Pack the inner bearing cone with grease, and insert it into its cup in the hub.



12.2 Detaching the ABS load-apportioning valve connecting link from the axle beam on models so equipped

- 23 To fit the grease retainer (seal), first lubricate its inner lip to ease installation, then lightly tap the seal into position using a block of wood. Ensure that the seal is correctly orientated.
- 24 Pack the outer bearing cone with grease, and fit it into position in its cup.
- 25 The brake drum/hub or separate wheel hub (according to model) can now be refitted to the axle spindle. Before fitting into position, first check that the brake surface area in the drum is free of grease and oil. Locate the drum/hub into position, then fit the retaining nut. Tighten it to the specified torque wrench setting whilst simultaneously rotating the assembly to ensure that the bearings are correctly seated.
- 26 Carefully tap the new hub grease cap into position in a progressive manner around its outer edge until it is fully fitted.
- 27 On models with disc brakes or separate brake drums, refit the disc or drum, and secure with the retaining screw (where fitted).
- 28 On models with disc brakes, refit the brake caliper and tighten the retaining bolts to the specified torque. Refer to Chapter 9 and refit the rear brake pads.
- 29 Refit the rubber blanking plug to the brake backplate, and firmly apply the footbrake a few times to take up the brake adjustment. Check that the rear brakes do not bind when the brakes are released. Refit the roadwheel, lower the vehicle and then tighten the retaining nuts to the specified torque wrench setting.

12 Rear strut (Hatchback and Saloon models) - removal and refitting

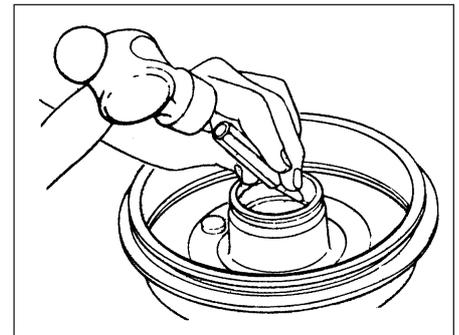


Removal

- 1 Chock the front wheels, then jack up the rear of the vehicle and support it on axle stands. Remove the inner wheel arch trim.
- 2 On ABS-equipped models, unscrew the retaining nut and detach the load-apportioning valve connecting link from the axle beam (see illustration).
- 3 Unscrew and remove the securing bolt from the strut-to-axle mounting (see illustration).



12.3 Rear strut lower mounting on Hatchback and Saloon models



11.19 Use a suitable punch to drive out the bearing cups from the rear hub

- 4 Prise free the protective cap from the top of the shock absorber mounting, located in the luggage compartment (see illustration).
- 5 Unscrew and remove the two retaining nuts to detach the strut from its upper mounting. Do not unscrew the central upper mounting bolt.
- 6 Withdraw the suspension strut from the vehicle.

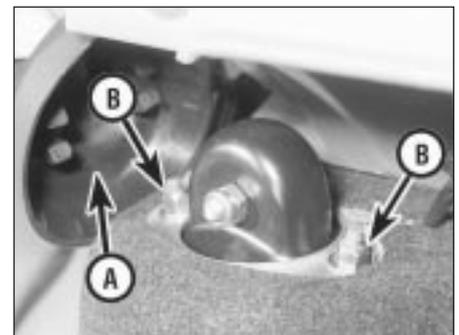
Refitting

- 7 Refitting is a reversal of the removal procedure, but note the following special points:
 - a) With the suspension strut located to its upper mounting, tighten the retaining nuts to the specified torque wrench setting.
 - b) When reconnecting the suspension strut to the lower mounting, hand-tighten the retaining bolt, then lower the vehicle so that it is standing on its wheels before fully tightening the bolt to its specified torque setting.

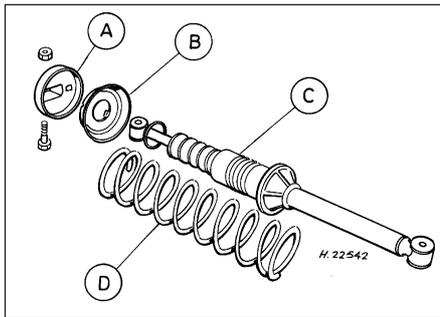
13 Rear strut (Hatchback and Saloon models) - dismantling, examination and reassembly



Note: Before attempting to dismantle the suspension strut, a tool to hold the coil spring in compression must be obtained. A Ford tool is available (tool No MS-1516), however careful use of conventional coil spring compressors will prove satisfactory.



12.4 Rear strut upper mounting on Hatchback and Saloon models showing the protective cap (A) and the mounting nuts (B)



13.3 Rear suspension strut components as fitted to Hatchback and Saloon models

- A Upper mounting cup
 B Spring seat
 C Suspension strut
 D Spring

Dismantling

- 1 With the strut removed from the vehicle, clean away all external dirt, then secure it in a vice.
- 2 Fit the spring compressor tool (ensuring that it is fully engaged) and compress the coil spring until all tension is relieved from the upper mounting.
- 3 Unscrew and remove the upper mounting through-bolt and nut (see illustration).
- 4 Withdraw the upper mounting cup and the spring seat.
- 5 The suspension strut and coil spring can now be separated. If the coil spring or strut is to be renewed, the original coil spring must be released from the compressor. If it is to be re-used, the coil spring can be left in compression.

Examination

- 6 With the strut assembly now completely dismantled, examine all components for wear, damage or deformation, and check the bearing for smoothness of operation. Renew any of the components as necessary.
- 7 Examine the strut for signs of fluid leakage. Check the strut piston for signs of pitting along its entire length, and check the strut body for signs of damage or elongation of the mounting bolt holes. Test the operation of the strut, 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 to the strut, renewal is necessary.

Reassembly

- 8 Reassembly is a reversal of the dismantling procedure but note the following points:
 - a) When the spring is located over the suspension strut, the spring seat, cup and through-bolt fitted, tighten the retaining bolt to the specified torque setting.
 - b) When reassembled, check that the upper and lower spring tails are correctly engaged with their spring seats before removing the spring compressor.

14 Rear axle (Hatchback, Saloon and Estate models) - removal and refitting



Removal

- 1 Chock the front wheels, then raise and support the vehicle at the rear on axle stands. Unbolt and remove the roadwheels.
- 2 Refer to Chapter 9 for details, and disconnect the handbrake cable equaliser from the primary cable. Detach the non-adjustable cable circlip and the cable from the underbody fastenings.
- 3 Disconnect the rear brake flexible hydraulic brake hoses from their rigid line connections. Clamp the hoses before disconnecting them, to minimise the fluid loss and air entry into the hydraulic system (see Chapter 9 for details).
- 4 On ABS-equipped models, undo the retaining nut and detach the ABS load-apportioning valve from the axle beam. Do not remove the load-apportioning valve (see Chapter 9).

Hatchback and Saloon models

- 5 Locate suitable jacks or axle stands under the axle beam to support its weight (not to lift it), then unscrew the mounting bracket bolts each side (see illustration).
- 6 Unscrew and remove the strut-to-axle mounting bolt each side.
- 7 Check that all associated fittings are clear, then lower the axle and remove it from under the vehicle.
- 8 If the twist beam axle has been damaged, it must be renewed. Refer to Chapter 9 for details on removing the rear brakes from the axle. To remove the front mounting/pivot brackets from the axle, unscrew the pivot bolt.

Estate models

- 9 Position a jack under the coil spring area of the suspension arm (not under the axle beam) each side, and raise them so that they just take the weight of the trailing arms.
- 10 Unscrew and remove the shock absorber retaining bolt from the lower attachment point to the rear axle each side.
- 11 Slowly lower the jack under the suspension arm each side, and allow the

trailing arms to drop and the compression in the coil springs to be released.

12 With the coil springs fully relaxed, withdraw them from their mounting locations between the body and the suspension arms. As they are removed, mark each for its direction of fitting and side so that they are refitted to their original locations.

13 Reposition the jacks, or place axle stands under the axle beam to support its weight (not to lift it), then unscrew the mounting bracket bolts each side.

14 Check that all associated fittings are clear, then lower the axle and remove it from under the vehicle.

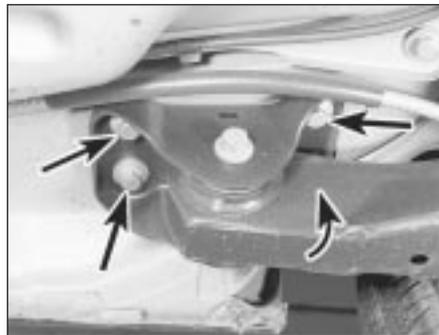
15 If the twist beam axle has been damaged, it must be renewed. Refer to Chapter 9 for details on removing the rear brakes from the axle. To remove the front mounting/pivot brackets from the axle, unscrew the pivot bolt.

Refitting

All models

16 Refitting is a reversal of the removal procedure, but note the following:

- a) Reconnect the axle at the front floor mountings first, and tighten the retaining bolts to the specified torque setting.
- b) On Hatchback and Saloon models, reconnect the axle to the suspension struts, but do not fully retighten the securing bolts until after the vehicle is lowered to the ground and is standing on its wheels.
- c) On Estate models, when relocating the coil springs between the body and the suspension arm each side, ensure that they are correctly orientated, and that their tails abut against the stops. When the coil springs are correctly located, raise the jacks under the suspension arms, and reconnect the shock absorber each side.
- d) Ensure that all brake fluid line connections are clean before reconnecting them. Refer to the appropriate Sections in Chapter 9 for specific details on reconnecting the brake lines, bleeding the brake hydraulic system, and for reconnecting the handbrake cable and its adjustment.
- e) When the vehicle is lowered and is standing on its wheels, tighten the suspension fastenings to the specified torque wrench settings.



14.5 Rear axle forward mounting bolts (arrowed)

15 Rear axle pivot bushes (Saloon and Estate models) - renewal



- 1 Chock the front roadwheels, then raise and support the vehicle at the rear on axle stands.
- 2 Position a suitable support (preferably adjustable) under the axle twist beam so that it is capable of carrying the weight of the axle (not the weight of the vehicle).



16.3 Rear shock absorber-to-axle mounting (Estate models)

3 Unscrew the nuts and pivot bolts, then lower the rear axle so that the bushes are clear of their mounting brackets. Take care not to allow the brake pipes to become distorted and stretched - if necessary, disconnect the hydraulic lines (see Chapter 9 for details).

4 Using a steel tube of suitable diameter, various flat washers and a long bolt and nut, draw the bush out of its location in the axle arm.

5 Clean the bush eye in the axle arm; lubricate it, and the new bush, with a soapy solution (washing-up liquid, for example) prior to installation.

6 Locate the new bush in position, together with the steel tube, washers, bolt and nut as used for removal. Ensure that the bush flange is positioned on the outside, then draw the bush fully into position so that its lip is engaged.

7 Raise the axle to reposition the bush pin bores in line with the bolt holes in the mounting brackets, then insert the pivot bolts. Screw the retaining nuts into position on the pivot bolts, but do not fully tighten them at this stage.

8 If necessary, reconnect the brake lines, then top-up and bleed the braking system as described in Chapter 9.

9 Lower the vehicle to the ground, then tighten the rear axle pivot bolts nuts to the specified torque wrench setting to complete.

16 Rear shock absorber (Estate and Van models) - removal, testing and refitting



Removal

1 Chock the front wheels, then jack up the rear of the vehicle and support it on axle stands. Remove the appropriate roadwheel.

2 On Estate models, position a jack under the coil spring area of the suspension arm (not under the axle beam), and raise it to just take the weight of the suspension.

3 Unscrew and remove the shock absorber retaining bolt from the lower mounting (see illustration).



16.4 Rear shock absorber upper mounting (Estate models)

4 On Estate models, unscrew the retaining nuts securing the shock absorber top mounting on the underside of the body (from underneath) and withdraw the shock absorber (see illustration).

5 On Van models, unscrew and remove the four shock absorber upper mounting bracket-to-body retaining bolts (see illustration). Remove the shock absorber and its upper mounting bracket from the vehicle. To disconnect the shock absorber from the mounting bracket, unscrew the retaining nut, withdraw the through-bolt and remove the shock absorber from the bracket.

Testing

6 Mount the shock absorber in a vice, gripping it by the lower mounting. Check the mounting rubbers for damage and deterioration. Examine the shock absorber for signs of fluid leakage. Extend the shock absorber, then check the piston for signs of pitting along its entire length. Check the body for signs of damage or elongation of the mounting bolt holes. Test the operation of the shock absorber, 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 to the strut, renewal of the complete is necessary.

Refitting

7 Refitting is a reversal of removal procedure. Tighten the retaining nuts and bolts to the specified torque wrench settings (where given), then lower the vehicle to the ground.

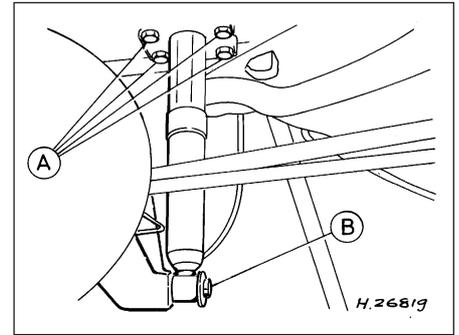
17 Rear coil springs (Estate models) - removal and refitting



Removal

1 Chock the front wheels, then jack up the rear of the vehicle and support it on axle stands. Remove the rear roadwheels.

2 Position a jack under the coil spring area of the suspension arm (not under the axle beam)



16.5 Shock absorber upper (A) and lower (B) mountings on Van models

each side, and raise them so that they just take the weight of the trailing arms.

3 Unscrew and remove the shock absorber retaining bolt from the lower attachment point to the rear axle each side.

4 Slowly lower the jack under the suspension arm each side, and allow the trailing arms to drop and the compression in the coil springs to be released. Check that no excessive strain is imposed on the handbrake cables and/or the hydraulic hoses to the rear brakes. Disconnect them as described in Chapter 9 if necessary.

5 With the coil springs fully relaxed, withdraw them from their mounting locations between the body and the suspension arms. As they are removed, mark each for its direction of fitting and side, so that they are refitted to their original locations (where applicable).

Refitting

6 Refitting is a reversal of the removal procedure but note the following special points:

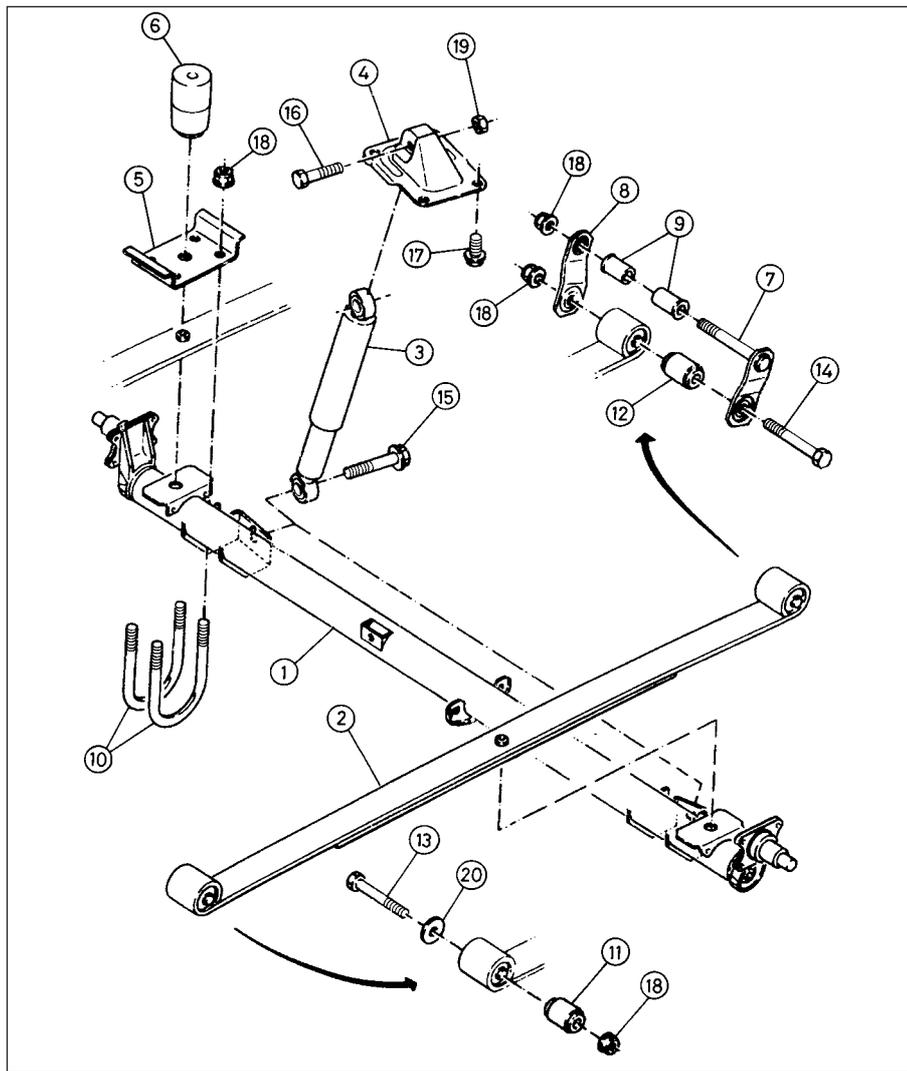
- When relocating the coil springs between the body and the suspension arm each side, ensure that they are correctly orientated, and that their tails abut against the stops.
- When the coil springs are correctly located, raise the jacks under the suspension arms, and reconnect the shock absorber each side.
- Tighten the retaining bolts to the specified torque setting.
- If the brake cables and/or the hydraulic hoses were detached, refer to Chapter 9 for the reconnecting details, and to bleed the hydraulic system.

18 Rear leaf spring, shackle and bushes (Van models) - removal, inspection and refitting



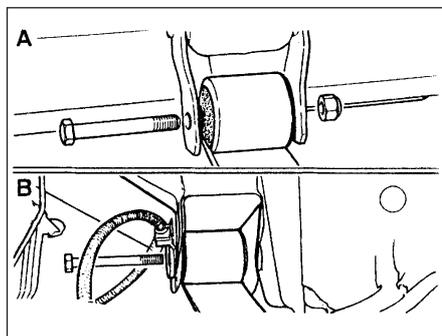
Removal

1 Chock the front wheels, then jack up the rear of the vehicle and support it on axle stands. To allow improved access, unbolt and remove the rear roadwheel on the side concerned.



18.3 Rear leaf spring, axle and associated components on Van models

- | | | |
|--------------------------|-----------------------------------|---------------------------------------|
| 1 Axle | 9 Rear shackle bushes | 15 Shock absorber lower mounting bolt |
| 2 Rear leaf spring | 10 U-bolt | 16 Shock absorber upper mounting bolt |
| 3 Shock absorber | 11 Front spring eye bush | 17 Bolt |
| 4 Bracket | 12 Rear spring eye bush | 18 Nut |
| 5 Counterplate | 13 Spring mounting (shackle) bolt | 19 Nut |
| 6 Bump stop | 14 Spring mounting (shackle) bolt | 20 Washer |
| 7 Shackle plate and stud | | |
| 8 Inboard shackle plate | | |



18.5 Leaf spring rear (A) and front (B) locations and securing bolts

- 2 With the rear of the vehicle supported on stands, move the jack under the rear axle. Raise it to support the weight of the axle, and to take the loading from the front and rear spring mountings.
- 3 Unscrew and remove the shock absorber lower mounting bolt, and detach the shock absorber from its mounting bracket (see illustration).
- 4 Unscrew and remove the spring-to-axle U-bolt retaining nuts, and remove the U-bolts. Remove the counterplate and the bump stop from the top of the spring.
- 5 Unscrew and remove the mounting bolt and nut from the rear spring shackle (see illustration).

6 Unscrew and remove the retaining nut or bolt (as applicable) from the front mounting. Withdraw the mounting bolt (noting the flat washer fitted under the bolt head), then lower the jack under the axle just enough to allow the spring to be removed. Carefully withdraw the spring from the vehicle.

Inspection

7 If the spring mounting (shackle) bolts are noticeably worn, they must be renewed. If the spring eye bushes are worn and in need of replacement, they can be withdrawn using a suitable drawbolt and spacer. New bushes can be pressed into position in the spring eye using a vice (or press).

8 If required, the rear spring shackle can be removed by unscrewing the retaining nut, removing the inboard shackle plate and withdrawing the outboard shackle plate complete with the upper shackle stud. The upper split type bushes must be renewed if they are worn.

Refitting

9 Refit the rear shackle, and initially hand-tighten the shackle bolt and nut.

10 Relocate the spring over the axle, align the front spring eye with the mounting, and insert the bolt. Loosely secure the bolt (and where applicable, the nut) at this stage.

11 Align the rear spring eye with the shackle at the rear, and loosely fit the mounting bolt and nut.

12 Locate the counterplate and bump stop on the top of the spring over the axle, then refit the U-bolts and fit the retaining nuts. The jack under the axle may need to be raised to enable the U-bolt assemblies to be relocated.

13 Reconnect the shock absorber to the rear axle, then tighten the various fixings to their specified torque wrench settings.

14 Refit the roadwheel, and lower the vehicle to the ground to complete.

19 Rear axle (Van models) - removal and refitting



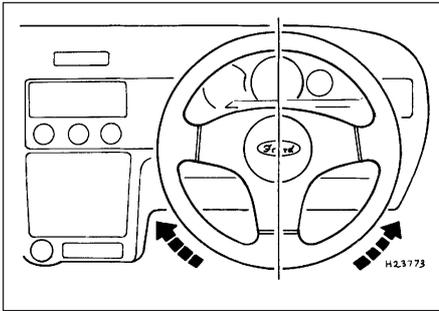
Removal

1 Chock the front wheels, then jack up the rear of the vehicle and support it on axle stands. To allow improved access, unbolt and remove the rear roadwheels.

2 With the rear of the vehicle supported on stands, position a single jack centrally (or preferably, two jacks each side of centre) under the axle beam, and raise to take the weight of the axle - do not lift the vehicle.

3 Clamp the hydraulic hoses of the light-laden valve, to prevent excessive fluid loss and the ingress of air and dirt into the hydraulic system, then disconnect the hydraulic lines to the light-laden valve and remove the clips.

4 Refer to Chapter 9 for details, and remove



20.2 Steering wheel alignment - centralised within a tolerance of 30° each side of vertical

the brake drum/hubs and then the backplate from the rear axle on each side. The backplates may be left attached to the axle, but it will still be necessary to detach the wheel cylinder brake line, and also to disconnect and withdraw the handbrake cable from each rear brake backplate. As each assembly is removed, keep them separated, and mark them to identify the right- and left-hand assemblies. Note that they are "handed", and must not be confused or they could be incorrectly refitted later.

5 Unscrew and remove the shock absorber lower fixing bolts, and detach them from the rear axle.

6 Unscrew and remove the axle-to-leaf spring U-bolt retaining nuts, remove the U-bolts, then carefully lower the axle and remove it from under the vehicle.

Refitting

7 Refitting is a reversal of the removal procedure, but note the following:

- a) Reconnect the axle to the spring, reconnect the U-bolts and the shock absorbers to the axle on each side, and then tighten the retaining bolts to the specified torque wrench settings.
- b) Refer to the appropriate Sections in Chapter 9 to refit the brake backplate and brake assemblies, and ensure that they are correctly located according to side.
- c) Ensure that all brake fluid line connections are clean before reconnecting them. Refer



20.3 Remove the outer horn pad from the centre of the steering wheel

to the appropriate Sections in Chapter 9 for specific details on reconnecting the brake lines, bleeding the brake hydraulic system, and reconnecting the handbrake cable. Details of handbrake adjustment will be found in Chapter 1.

20 Steering wheel - removal and refitting

Removal

Models without air bag

- 1 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1).
- 2 Turn the ignition key to release the steering lock, then set the front roadwheels in the straightahead position. With the steering centralised, the steering wheel should be positioned as shown (see illustration). Move the ignition key to the OFF position.
- 3 Prise free the outer pad from the centre of the steering wheel (see illustration).
- 4 Prise free the inner horn pad (see illustration), then note the connections and detach the horn wiring at the spade connectors (these differ in size to ensure correct refitting). Once the wiring is free, withdraw the inner horn pad. As it is withdrawn, note that it has a directional arrow mark which points up when the steering wheel is in the straightahead position.



20.4 Prise free the inner horn pad and detach the wires . . .

5 Unscrew the retaining bolt from the centre of the steering wheel, then gripping the wheel each side, pull and withdraw it from the column shaft (see illustrations).

6 If the wheel is reluctant to budge, give it a sharp tap on the underside of the spoke (as near to the hub as possible) with the palm of your hand.

Models with air bag



Warning: On models equipped with an air bag system, refer to the safety precautions in Section 27 of Chapter 12 before starting work.

7 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1).



Warning: Before proceeding, wait a minimum of 15 minutes, as a precaution against accidental firing of the air bag. This period ensures that any stored energy in the back-up capacitor is dissipated.

8 Undo the two screws, and remove the steering column upper shroud.

9 Turn the steering wheel as necessary so that one of the air bag module retaining bolts becomes accessible from the rear of the steering wheel. Undo the bolt, then turn the steering wheel again until the second bolt is accessible. Undo this bolt also.

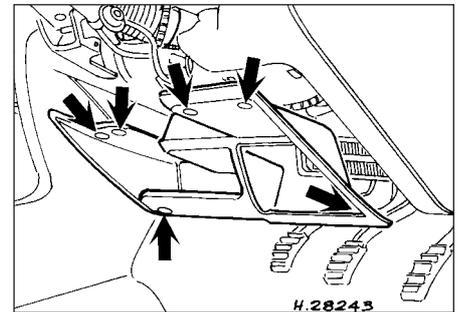
10 Withdraw the air bag module from the steering wheel far enough to access the wiring multi-plug. Some force may be needed to free the module from the additional steering wheel spoke retainers.



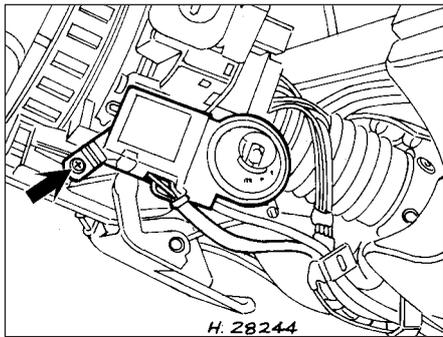
20.5A . . . unscrew the retaining bolt . . .



20.5B . . . and withdraw the steering wheel



20.13 Undo the screws (arrowed) and withdraw the detachable lower fascia panel from beneath the steering column



20.14 Undo the screw (arrowed) and withdraw the Passive Anti-Theft System (PATS) transceiver from the ignition switch/steering lock barrel

11 Disconnect the multi-plug from the rear of the module, and remove the module from the vehicle.



Warning: Position the air bag module in a safe place, with the mechanism facing downwards as a precaution against accidental operation.

12 Undo the four screws, and remove the steering column lower shroud.

13 Undo the screws and withdraw the detachable lower fascia panel from beneath the steering column (see illustration).

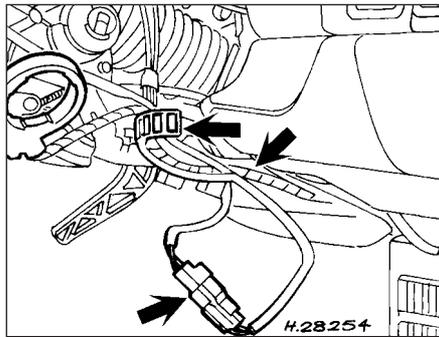
14 Where applicable, undo the single screw and withdraw the Passive Anti-Theft



21.3B . . . and lower steering column shrouds



21.6 Detach the bonnet release cable from the lever



20.15 Release the steering column wiring harness and multi-plug as indicated

System (PATS) transceiver from the ignition switch/steering lock barrel (see illustration).

15 Release the steering column wiring harness from the retaining clips, and disconnect the air bag module wiring harness multi-plug (see illustration).

16 Turn the steering wheel so that the roadwheels are in the straightahead position, then remove the ignition key to lock the steering.

17 Unscrew the retaining bolt from the centre of the steering wheel, then insert the ignition key and turn it to position "I". Grip the steering wheel each side, then pull and withdraw it from the column shaft. If the wheel is reluctant to budge, give it a sharp tap on the underside of the spoke (as near to the hub as possible) with the palm of your hand.

Refitting

All models

18 Refit in the reverse order of removal. Ensure that the indicator stalk is set in its central (off) position, to avoid damaging it with the tag of the wheel as it is pushed down the shaft. Make sure that the wheel is centralised, as noted on removal. Turn the ignition key so that it is in position "I" (steering unlocked). Tighten the retaining bolt to the specified torque setting.



21.7 Steering column-to-pinion shaft coupling and clamp bolt



21.3A Remove the upper . . .

21 Steering column - removal and refitting



Removal

- 1 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1).
- 2 Remove the steering wheel as described in the previous Section.
- 3 Remove the screws and withdraw the steering column upper and lower shrouds (see illustrations).
- 4 Remove the multi-function switch assembly from the column, with reference to Chapter 12.
- 5 Disconnect the ignition switch multi-plug, and release the wiring from the wiring loom guide.
- 6 Detach the bonnet release cable from the lever, then remove the lever from the column (see illustration).
- 7 Unscrew and remove the clamp bolt securing the steering column to the pinion shaft (see illustration).
- 8 Loosen off the column lower retaining nuts, then unscrew and remove the upper retaining nuts (see illustration). Remove the steering column from the vehicle.

Refitting

9 Refitting is a reversal of the removal procedure, but note the following:



21.8 Steering column upper retaining nut (on the left-hand side of the column)


22.3 Releasing the steering lock

- a) Tighten the respective retaining bolts to their specified torque settings.
- b) Check that the steering is centralised with the wheels in the straightahead position before refitting the steering wheel as described in Section 20.
- c) Refit the steering wheel before securing the steering column coupling to the pinion shaft with the clamp bolt.
- d) Ensure that the wiring connections are securely made. On completion, check for satisfactory operation of the steering, the column switches and the horn.

22 Steering column - dismantling and reassembly

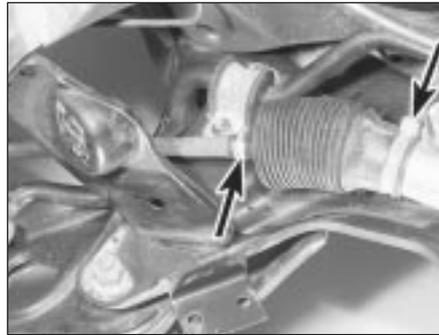


Dismantling

- 1 Remove the steering column as described in the previous Section, then securely locate it in a vice fitted with protective jaws.
- 2 Remove the upper thrust bearing tolerance ring from the column, then withdraw the column shaft from the column tube.
- 3 Insert the ignition key into the lock/switch, and turn it to the "I" position. Now use a small screwdriver or a suitable rod to depress the plunger in the side of the barrel, and simultaneously pull on the key to withdraw the lock/switch from the column (see illustration).
- 4 Withdraw the spring from the column shaft.
- 5 Prise free the lower and upper thrust bearings from the column tube and the lock/switch body.
- 6 To remove the steering column height adjuster (where fitted) unscrew the through-bolt and locknut, remove the handle and lockplates, then remove the adjuster from the column.
- 7 If any part of the steering column (and in particular, the universal joints) is found to be excessively worn, or if any part of the column assembly has been damaged, it must be renewed; no repairs are possible.

Reassembly

- 8 Reassembly is a reversal of the dismantling procedure, but note the following points:

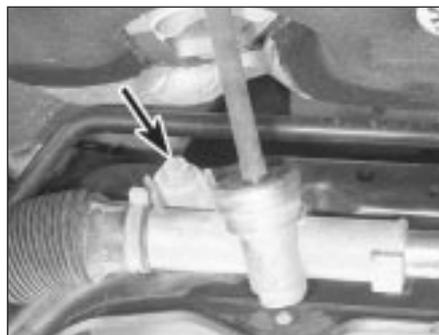

23.2 Steering gear gaiter and retaining clips (arrowed)

- a) When refitting the height adjuster, coat the threads of the through-bolt with Loctite, and locate the handle in the locked position. Tighten the retaining bolt and nut securely.
- b) Take care when fitting the lower thrust bearing into the column tube and the upper bearing to the steering lock/ignition switch body.
- c) When fitting the steering column lock/ignition switch, ensure that the key is in the "I" position. As the switch/lock is fitted into its barrel, it may be necessary to move the key clockwise and anti-clockwise slightly, to enable the housing drive to align with the barrel and fully engage.
- d) When assembling the column shaft to the tube, ensure that the upper thrust bearing tolerance ring is fitted with its tapered face towards the bearing.

23 Steering gear rubber gaiters - renewal



- 1 Remove the track rod end balljoint and its locknut from the track rod as described in Section 28.
- 2 Release the clip(s), and slide the gaiter off the rack-and-pinion housing and track rod (see illustration).
- 3 Scrape off all grease from the old gaiter, and apply to the track rod inner joint. Wipe


24.3A Steering gear retaining bolt (arrowed) to the subframe on the right-hand side

clean the seating areas on the rack-and-pinion housing and track rod.

- 4 Slide the new gaiter onto the housing and track rod, and tighten the clip(s).

- 5 Refit the track rod end balljoint as described in Section 28.

24 Steering gear (manual steering) - removal and refitting



Removal

- 1 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1).
- 2 Refer to Section 10 for details, and remove the subframe from the vehicle as described. Note that complete removal of the subframe may not be necessary if it is carefully lowered to allow access to the steering gear for its separation and withdrawal.
- 3 Unscrew and remove the two steering gear-to-subframe retaining bolts, then withdraw the assembly from the vehicle (see illustrations).

Refitting

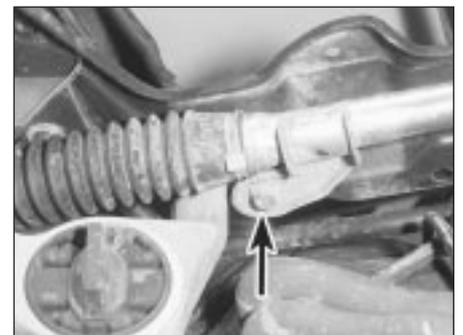
- 4 Refit the steering gear to the subframe in the reverse order of removal, and tighten the retaining bolts to the specified torque setting.
- 5 Refer to Section 10 for the relevant details on refitting the subframe assembly to the vehicle.

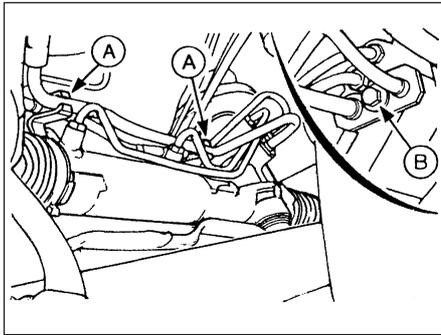
25 Steering gear (power-assisted steering) - removal and refitting



Removal

- 1 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1).
- 2 Refer to Section 10 and proceed as described in paragraphs 1 to 12 inclusive, then proceed as follows.
- 3 Undo the retaining screws, and detach the clips securing the power steering hydraulic pressure pipes to the steering gear.
- 4 Position a suitable container under the hydraulic pipe connections to the steering


24.3B Steering gear retaining bolt (arrowed) to the subframe on the left-hand side



25.4 Power steering gear and hydraulic pipe connections

- A Hydraulic pipe locating clips
- B Valve clamp plate bolt

gear. Unscrew the bolt securing the hydraulic valve clamp plate to the valve body on the steering rack, then detach the pipes from the valve body. Withdraw the pipes from the steering gear, and drain the hydraulic fluid into the container (see illustration).

5 Plug the exposed ends of the hydraulic line connections, to prevent the ingress of dirt and further fluid loss. Note that new O-ring seals will be needed for the pressure and return hose connections when reconnecting.

6 Locate suitable jacks or blocks under the subframe to support it, then unscrew and remove the eight subframe fixing bolts (see illustration 10.14). Lower the support jacks or blocks, and withdraw the subframe. As it is lowered, disengage the steering gear shaft from the column. Note that complete removal of the subframe from the vehicle may not be necessary if it is carefully lowered to allow access to the steering gear for its separation and withdrawal.

7 Unscrew and remove the two steering gear-to-subframe retaining bolts, then withdraw the from the vehicle.

Refitting

8 Refit the steering gear to the subframe in the reverse order of removal, and tighten the retaining bolts to the specified torque setting.

9 Refer to Section 10 for the relevant details, and refit the subframe assembly to the vehicle. When the subframe is loosely in position, remove the temporary plugs from the hydraulic fluid lines, and check that the connections are clean. Fit new O-ring seals to the pressure and return hoses, then reconnect the hydraulic lines to the steering gear. Check that the hydraulic lines and fixings are secure, then continue refitting the steering gear and subframe as described in Section 10.

10 On completion, top up the power steering fluid reservoir and bleed the system as described in Section 27. Check for any signs of fluid leakage from the system hoses and connections. Finally check and adjust the front wheel alignment as described in Section 29.



26.2 Remove the drivebelt upper guard from the top of the power steering pump on Zetec engines

26 Power-assisted steering pump - removal and refitting

Removal

1 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1).

2 On Zetec engine models, undo the two bolts and remove the drivebelt upper guard from the top of the pump (see illustration).

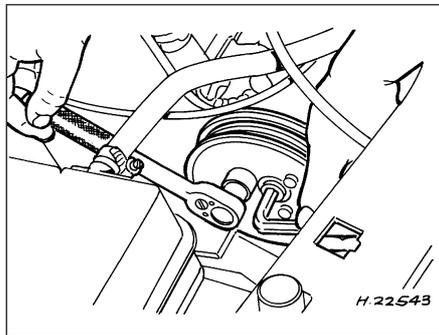
3 Apply the handbrake, then raise and support the front of the vehicle on axle stands.

4 Undo the retaining screws, and remove the drivebelt lower guard from the underbody.

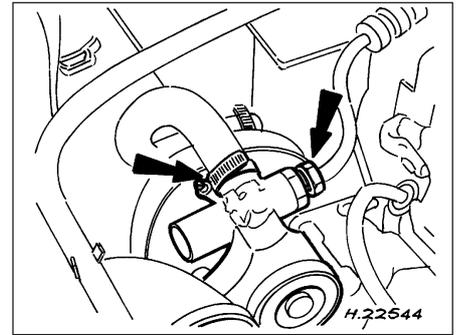
5 Loosen off the drivebelt tension by turning the tension adjustment bolt in a clockwise direction. Noting the routing of the belt around the pulleys, disengage the drivebelt from the power steering pump pulley.

6 Position a suitable container beneath the power steering pump, then unscrew and detach the fluid pressure and return hoses from the pump (see illustration). As they are detached from the pump, allow the fluid to drain from the hoses (and the pump) into the container. Plug the exposed ends of the hydraulic hoses and the pump connections, to prevent the ingress of dirt and excessive fluid loss.

7 Insert a 9 mm Allen key into the centre of the pump drive spindle to prevent it from turning, then unscrew and remove the three



26.7 Power steering pump pulley removal



26.6 Power steering pump and hose connections on the CVH engine

pump pulley retaining bolts (see illustration). Withdraw the pulley from the pump.

8 Unscrew the four retaining bolts shown (see illustration) and withdraw the pump from the vehicle.

Refitting

9 Refitting is a reversal of removal, but tighten all nuts and bolts to the specified torque. Remove the plugs from the pipes, and ensure that the pipes are located correctly so that they do not foul any surrounding components.

10 Refit the drivebelt as described in Chapter 1.

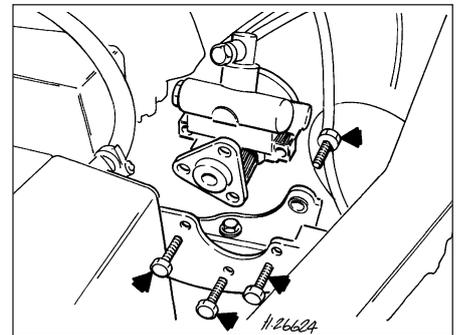
11 On completion, fill the power steering system with the specified fluid up to the maximum level mark, and bleed the system as described in Section 27. Check for any signs of fluid leakage from the system hoses and connections.

27 Power-assisted steering system - bleeding

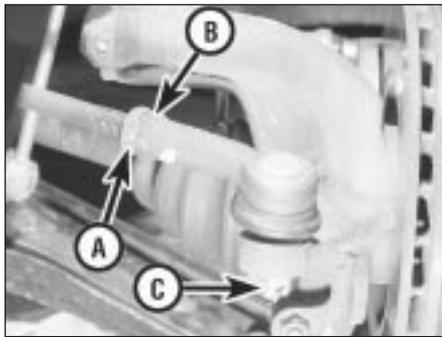
1 This will normally only be required if any part of the hydraulic system has been disconnected.

2 Remove the fluid reservoir filler cap, and top-up the fluid level to the "max-cold" mark using only the specified fluid (refer to "Lubricants, fluids and capacities" at the beginning of this manual).

3 Start the engine and allow it to idle, slowly



26.8 Power steering pump and securing bolts



28.2 Track rod end balljoint showing the locknut (A) retaining flats (B) and the balljoint-to-spindle carrier arm retaining nut and split pin (C)

moving the steering from lock-to-lock several times to purge out the air, then top-up the level in the fluid reservoir. Add the fluid slowly, to prevent the possibility of aeration of the fluid in the circuit.

4 Switch the engine off, then recheck the fluid level in the reservoir, and further top-up if necessary. Finally check the system hoses and connections for any signs of fluid leaks, which if found, must be rectified.

28 Track rod end balljoint - removal and refitting



Removal

1 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands. Remove the appropriate front roadwheel.

2 Using a suitable spanner, slacken the track rod end balljoint locknut on the track rod by a quarter of a turn (see illustration). Hold the balljoint stationary with another spanner engaged with the flats at its inner end to prevent it from turning.

3 Extract the split pin, then loosen off the retaining nut. If the balljoint is to be renewed, the nut can be fully removed. If the existing balljoint is to be reconnected, the nut should be slackened off a couple of turns only at first, and left in position to protect the joint threads as the joint is separated from the spindle carrier. To release the tapered shank of the joint from the spindle carrier, use a balljoint separator tool as shown (see illustration). If the joint is to be re-used, take care not to damage the rubber dust cover when using a separator tool.

4 Count the number of exposed threads visible on the inner section of the track rod, and record this figure.

5 Unscrew the balljoint from the track rod, counting the number of turns necessary to remove it.

Refitting

6 Screw the balljoint into the track rod the



28.3 Balljoint separator tool in position. Note that the nut should be left loosely in position when the thread of the joint is to be protected for re-use

number of turns noted during removal until the balljoint just contacts the locknut. Now tighten the locknut while holding the balljoint.

7 Engage the shank of the balljoint with the spindle carrier arm, and refit the locknut. Tighten the locknut to the specified torque. If the balljoint shank turns while the locknut is being tightened, lever down on the top of the balljoint with a stout bar. The tapered fit of the shank will lock it and prevent rotation as the nut is tightened.

8 Refit the roadwheel, and lower the vehicle to the ground.

9 Finally check and if necessary adjust the front wheel alignment with reference to Section 29.

29 Wheel alignment and steering angles - general information



1 Accurate front wheel alignment is essential to provide positive steering and prevent excessive tyre wear. Before considering the steering/suspension geometry, check that the tyres are correctly inflated, that the front wheels are not buckled, and that the steering linkage and suspension joints are in good order, without slackness or wear.

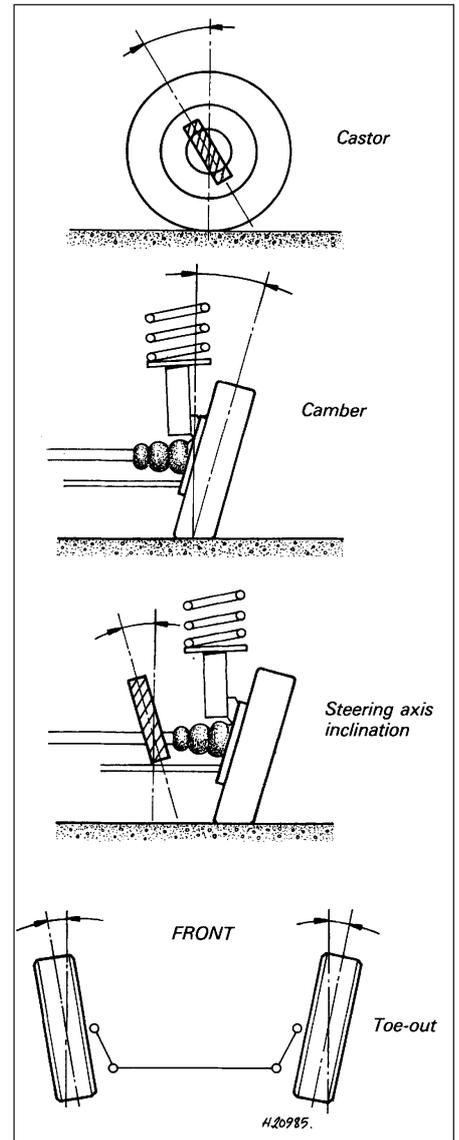
2 Wheel alignment consists of four factors (see illustration):

Camber is the angle at which the front wheels are set from the vertical when viewed from the front of the vehicle. "Positive camber" is the amount (in degrees) that the wheels are tilted outward at the top of the vertical.

Castor is the angle between the steering axis and a vertical line when viewed from each side of the car. "Positive castor" is when the steering axis is inclined rearward at the top.

Steering axis inclination is the angle (when viewed from the front of the vehicle) between the vertical and an imaginary line drawn through the suspension strut upper mounting and the lower suspension arm balljoint.

Toe setting is the amount by which the distance between the front inside edges of the



29.2 Wheel alignment and steering angles

roadwheels (measured at hub height) differs from the diametrically-opposite distance measured between the rear inside edges of the front roadwheels.

3 With the exception of the toe setting, all other steering angles are set during manufacture, and no adjustment is possible. It can be assumed, therefore, that unless the vehicle has suffered accident damage, all the preset steering angles will be correct. Should there be some doubt about their accuracy, it will be necessary to seek the help of a Ford dealer, as special gauges are needed to check the steering angles.

4 Two methods are available to the home mechanic for checking the toe setting. One method is to use a gauge to measure the distance between the front and rear inside edges of the roadwheels. The other method is to use a scuff plate, in which each front wheel is rolled across a movable plate which

10•18 Suspension and steering systems

records any deviation, or scuff, of the tyre from the straight-ahead position as it moves across the plate. Relatively inexpensive equipment of both types is available from accessory outlets to enable these checks, and subsequent adjustments to be carried out at home.

5 If, after checking the toe setting using whichever method is preferable, it is found that adjustment is necessary, proceed as follows.

6 Turn the steering wheel onto full left lock, and record the number of exposed threads on

the right-hand steering track rod. Now turn the steering onto full right lock, and record the number of threads on the left-hand side. If there are the same number of threads visible on both sides, then subsequent adjustment can be made equally on both sides. If there are more threads visible on one side than the other, it will be necessary to compensate for this during adjustment. *After adjustment, there must be the same number of threads visible on each track rod. This is most important.*

7 To alter the toe setting, slacken the

locknut securing the track rod end balljoint to the track rod, and turn the track rod using a self-grip wrench to achieve the desired setting. When viewed from the side of the car, turning the track rod clockwise will increase the toe-in, turning it anti-clockwise will increase the toe-out. Only turn the track rods by a quarter of a turn each time, and then recheck the setting using the gauges, or scuff plate.

8 After adjustment, tighten the locknuts and check that the steering gear rubber gaiter has not been twisted by turning the track rods.