Chapter 10
Suspension and steering

Contents

Degrees of difficulty

Easy, suitable for novice with little experience 

Fairly easy, suitable for beginner with some experience 

Fairly difficult, suitable for competent DIY mechanic 

Difficult, suitable for experienced DIY mechanic 

Very difficult, suitable for expert DIY or professional 

Specifications

Wheel alignment and steering angles

Front wheel toe setting:	
Pre-1990 models:	
Tolerance allowed before resetting required	3.0 mm toe-out to 3.0 mm toe-in (0°30' toe-out to 0°30' toe-in)
Adjustment setting (if required)	Parallel ± 1.0 mm (0° ± 0°10')
1990 models onward:	
All models except Turbo:	
Tolerance allowed before resetting required	4.5 mm toe-out to 0.5 mm toe-in (0°45' toe-out to 0°05' toe-in)
Adjustment setting (if required)	2.0 mm toe-out ± 1.0 mm (0°20' toe-out ± 0°10')
Turbo models:	
Tolerance allowed before resetting required	4.0 mm toe-out to parallel (0°40' toe-out to 0°0')
Adjustment setting (if required)	2.0 mm toe-out ± 1.0 mm (0°20' toe-out ± 0°10')

Roadwheels

Wheel types and sizes (dependent on model):	
Steel	13 x 4.5, 13 x 5, 13 x 5.5
Alloy	13 x 5.5, 14 x 5.5

Tyres

Tyre sizes (dependent on model)	135 R 13, 145 R 13, 155/70 R 13, 165/55 R 13, 165/65 R 13, 175/60 R 13, 185/55 R 14 or 185/60 R 13
Tyre pressures	See *"Weekly Checks"*

Torque wrench settings

	Nm	lbf ft
Front suspension		
Hub/driveshaft retaining nut	205 to 235	151 to 173
Lower arm balljoint-to-spindle carrier pinch bolt	48 to 60	35 to 44
Front suspension strut to spindle carrier pinch-bolt	80 to 90	59 to 66
Anti-roll bar link to front suspension strut nut	41 to 58	30 to 43
Anti-roll bar link to anti-roll bar nut	41 to 58	30 to 43
Anti-roll bar retaining clamp bolts to lower arm	20 to 28	15 to 21
Front suspension strut top-mount retaining nut	40 to 52	30 to 38
Front suspension strut spring retaining nut	52 to 65	38 to 48
Front suspension crossmember bolts (XR2i only)	80 to 90	59 to 66
Lower arm to lower arm mounting bracket 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°	
Rear suspension (all models except Courier)		
Rear hub bearing retaining nut	250 to 290	184 to 214
Rear drum/hub to axle flange bolts	56 to 76	41 to 56
Rear axle to body mounting bracket bolts	41 to 58	30 to 43
Rear axle trailing arm bush bolt*	58 to 79	43 to 58
Rear strut top-mount retaining nuts	28 to 40	20 to 30
Rear strut-to-axle mounting bolt	102 to 138	75 to 102
Rear strut spring retaining through-bolt	41 to 58	30 to 42
Anti-roll bar front mounting bolts	41 to 58	30 to 42
Anti-roll bar rear mounting bolts	88 to 113	65 to 83
Load-apportioning valve operating link to axle beam	21 to 28	15 to 21
Rear suspension (Courier models)		
Rear hub bearing retaining nut	250 to 290	184 to 214
Shock absorber upper mounting	102 to 138	75 to 102
Shock absorber lower mounting	70 to 97	52 to 72
Rear suspension mounting bracket bolts	70 to 97	52 to 72
Manual steering		
Steering gear to bulkhead	70 to 97	57 to 72
Track rod end balljoint to spindle carrier steering arm	25 to 30	18 to 22
Track rod locknut to track rod end balljoint	57 to 68	42 to 50
Steering wheel to column shaft bolt	45 to 55	33 to 40
Steering column mounting nuts	10 to 14	7 to 10
Steering column universal joint pinch-bolt	45 to 56	33 to 41
Power steering		
Steering wheel to column shaft bolt	50	37
Steering gear to bulkhead	84	62
Steering gear fluid pipe unions	31	23
Steering gear flexible coupling pinch-bolt	51	38
Track rod end balljoint to spindle carrier steering arm	26	19
Track rod locknut to track rod end balljoint	63	46
Steering pump mounting bolts	25	18
Steering pump pulley bolts	25	18
High pressure fluid pipe to pump union	65	48
High pressure fluid pipe coupling joint	17	13
Steering column mounting nuts	12	9
Roadwheel nuts		
All models	70 to 110	52 to 74

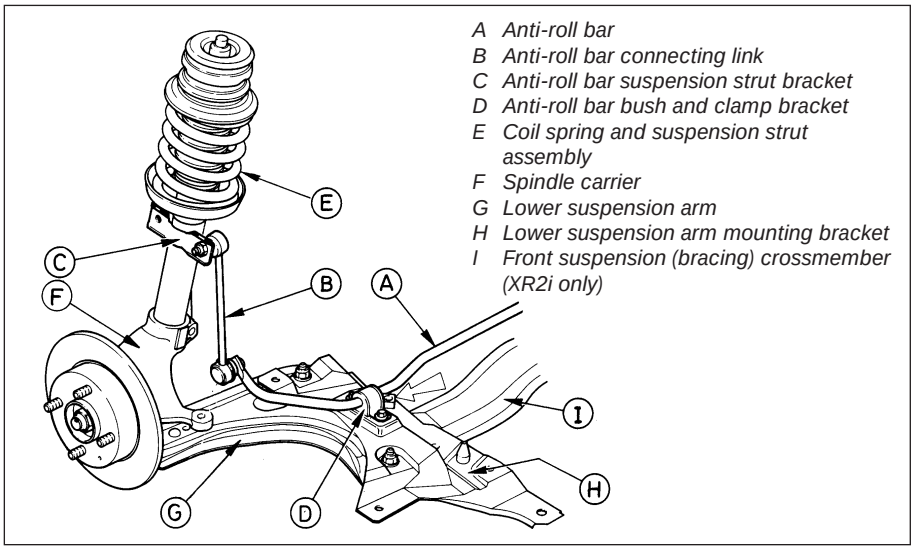
*Torque to be measured from the bolt head (not the nut)

1 General information

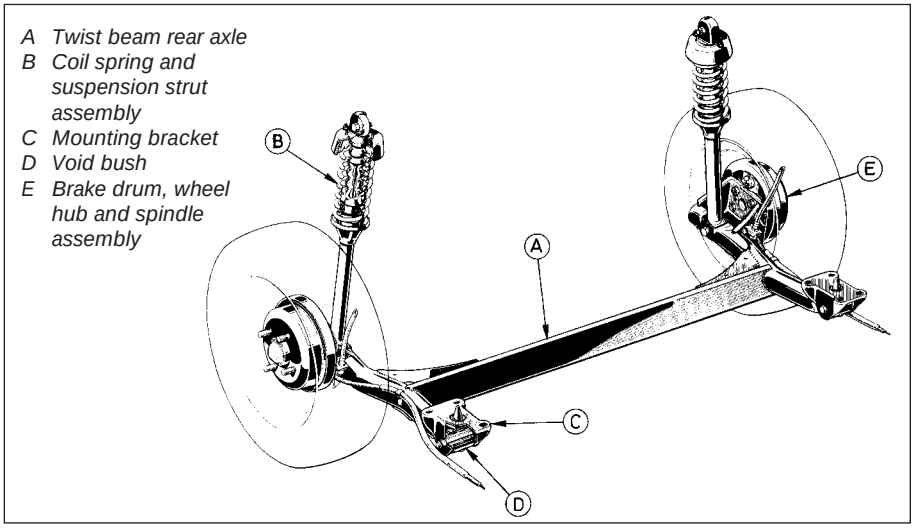
The front suspension is of independent type, achieved by the use of MacPherson struts **(see illustration)**. The struts, which incorporate coil springs and integral shock absorbers, are located at their upper mountings by rubber insulators and secured to the inner wing panels by cup seat mountings and locknuts. The lower end of each strut is bolted to the top of a cast spindle carrier. The spindle carriers house non-adjustable hub bearings as a variation of a proven design. The lower mountings of the spindle carriers are attached, via balljoints, to a pressed-steel lower arm assembly. The lower arm assembly consists of two sections. The lower arm mounting bracket is bolted securely to the underside of the vehicle, and has a locating peg and unique outer fixing bolt to ensure correct location. The A-shaped lower arm is attached to its mounting bracket by double vertical bushes and controls both lateral and fore and aft movement of the front wheels. The balljoints connecting the lower mountings of the spindle carriers to the lower arms are riveted to the lower arms, and are not available as separate service items. An anti-roll bar is fitted to high specification models and, additionally on the XR2i, a front suspension crossmember is fitted.

On all models except Courier, the rear suspension is semi-independent, with an inverted V-section beam welded between tubular trailing arms **(see illustration)**. This inverted V-section beam allows a limited torsional flexibility, giving each rear wheel a certain degree of independent movement, whilst maintaining optimum track and wheel camber control. This type of arrangement is called a "twist beam" rear axle. The axle is attached to the body by rubber void bushes, through brackets bolted to the underside of the vehicle. Each bracket has a conical locating peg to ensure accurate alignment of the axle assembly. The rear suspension struts, which are similar to the MacPherson struts used at the front, are mounted at their upper ends by nut and captive bolt fixings through the suspension turrets in the luggage compartment. At their lower ends, the struts are attached, close to the wheels, by bolts passed through the trailing arms and lower strut integral bushes. The rear wheel hub/brake drum unit and spindle on each side form an assembly which can be unbolted from the axle without disturbing the hub bearings. An anti-roll bar is fitted to the rear suspension on certain later models.

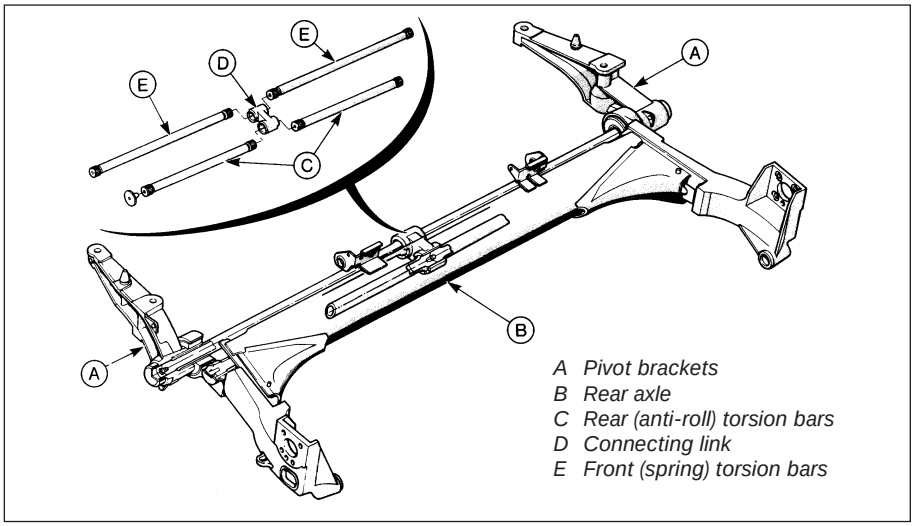
Courier models are fitted with a modified version of the twist beam rear axle, using linked torsion bars as springs and to provide anti-roll stabilisation **(see illustration)**. Separate shock absorbers are fitted to control suspension movement.



1.1 General view of front suspension components

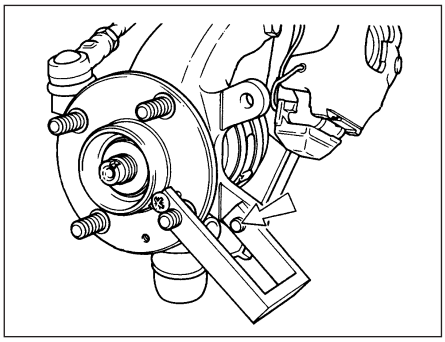


1.2 General view of rear suspension components (all models except Courier)



1.3 General view of rear suspension components (Courier models)

2.4 Disconnect the brake hose from the front suspension strut



2.7 Securing the hub to the spindle carrier using a home-made bracket

2.10 Remove the suspension strut-to-spindle carrier pinch bolt

On all models, the steering is of conventional rack-and-pinion type, incorporating a safety system of convoluted column tube and double universally-jointed lower steering shaft links.

The steering column tube is supported at its upper end by bracketry, and at its lower end by a nylon support bush. The steering shaft is supported within the column tube by two support bearings, one at either end of the tube.

The steering rack assembly is located on the bulkhead. Steering input is transmitted, via the steering shaft, to the pinion which meshes with the teeth on the rack.

The pinion transferring the steering input moves the rack within its housing tube, withdrawing and extending the track rods attached to either end of the rack by balljoints. This movement is transferred, by balljoints in the track rod ends, to the steering arms on the spindle carriers which direct the roadwheels.

From the 1994 model year onwards, power steering is available as standard or optional equipment on certain models.

2 Front spindle carrier - removal and refitting

Removal

Note: *A new hub/driveshaft retaining nut will be required for refitting.*

1 Remove the wheel trim from the front roadwheel on the side concerned, then using a small pin punch, peen back the locking portion of the front hub/driveshaft nut. Loosen off the nut about half-a-turn.

2 Loosen off the front roadwheel retaining nuts on the side concerned.

3 Chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). Remove the appropriate roadwheel, and unscrew and remove the hub/driveshaft retaining nut and washer.

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

5 Undo the two retaining bolts, and remove the brake caliper and anchor bracket from the spindle carrier. Support the caliper by suspending it from above, to prevent the hydraulic hose from being strained or distorted.

6 Remove the single screw securing the brake disc to the hub, and slide the disc off the wheel studs.

7 On pre-June 1990 models, fabricate a home-made bracket to secure the wheel hub and brake disc to the spindle carrier **(see illustration)**. Retain the bracket at one end with a wheel nut and at the other end with a brake caliper retaining bolt. This will prevent the hub and disc from becoming detached from the spindle carrier (with possible damage to the hub bearings) when the driveshaft is removed. On later models the hub is an interference fit in the bearing inner races and is unlikely to become detached.

8 Where an anti-roll bar is fitted, undo the nut securing the connecting link to the suspension strut bracket, and separate the link from the strut bracket.

9 Detach the track rod end balljoint from the steering arm on the side concerned as described in Section 28.

10 Remove the pinch-bolt securing the spindle carrier to the suspension strut **(see illustration)**.

11 Remove the Torx-head pinch-bolt and nut securing the lower suspension arm balljoint to the spindle carrier. Prise open the joint using a large screwdriver and detach the balljoint from the spindle carrier unit **(see illustrations)**.

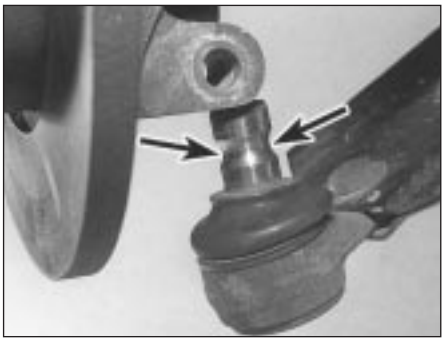
12 Using a small crowbar with a thin tip, or a stout screwdriver as an alternative, lever the spindle carrier slot to separate the spindle carrier from the suspension strut **(see illustration)**. Lower the spindle carrier slightly

2.11a Remove the lower arm-to-spindle carrier pinch bolt and nut . . .

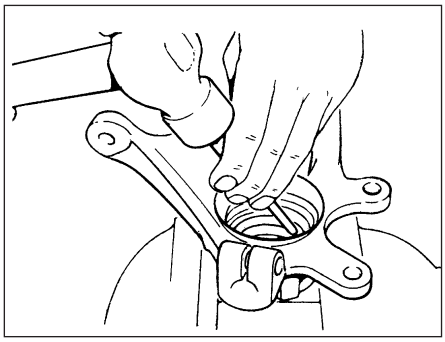
2.11b . . . prise open the joint . . .

2.11c . . . and detach the lower arm balljoint from the spindle carrier

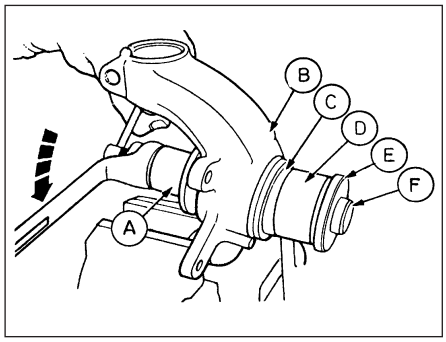
2.12 Separate the spindle carrier from the strut



2.17 Lower suspension arm balljoint showing annular groove (arrowed)



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



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

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

(tapping it down with a soft-faced mallet if necessary) and carefully pull it off the driveshaft, having supported the driveshaft to prevent damage to the CV joints - the driveshaft must not be bent at an angle greater than 20° from the horizontal. If the driveshaft is tight in the hub, lightly tap its outer end with a soft-faced hammer, or use a conventional puller and spacer to free it. Remove the dust sleeve from the inner rim groove of the spindle carrier.

Refitting

13 Fit the dust sleeve to its groove, then locate the spindle carrier over the driveshaft. Draw the driveshaft CV joint through the hub using the old retaining nut and washer.

14 Lever the spindle carrier slot open and refit the spindle carrier to the suspension strut. Remove the lever, refit the pinch-bolt and tighten it to the specified torque.

15 Fit a new hub/driveshaft nut and washer, and tighten the nut as much possible at this stage. As the nut is being tightened, rotate the hub to ensure that the bearings seat correctly.

16 Refit the track rod end balljoint to the steering arm on the spindle carrier, tighten the nut to the specified torque and insert a new split-pin to secure.

17 Reconnect the lower suspension arm balljoint to the spindle carrier, refit the pinch-bolt and nut, and tighten to the specified torque. Note that the bolt must locate in the annular groove on the ballstud **(see illustration)**.

18 Remove the bracket securing the hub to the spindle carrier (where applicable), refit the brake disc and tighten the single screw securing the disc to the hub.

19 Refit the brake caliper and anchor bracket to the spindle carrier, tightening the bolts to the specified torque (see Chapter 9).

20 Refit the bolt securing the brake hose bracket to the front suspension strut.

21 Where an anti-roll bar is fitted, refit the connecting link to the suspension strut bracket.

22 Refit the roadwheel, lower the vehicle to the ground, then tighten the hub nut to the specified torque. Using a pin punch, stake-lock the nut in the groove in the end of the axle stub.

23 Tighten the roadwheel nuts to the specified torque setting.

3 Front hub bearings - 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 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.*

Pre-June 1990 models

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

2 Remove the home-made bracket used to retain the hub in place and slide the hub out of the spindle carrier assembly.

3 Securely support the spindle carrier in a vice with its inner face uppermost.

4 Using a suitable punch, tap the outer bearing outer race at diametrically-opposed points and remove the bearing assembly 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 Turn the spindle carrier over and remove the inner bearing assembly in the same way.

6 Thoroughly clean the bearing bore and hub, then secure the spindle carrier in the vice in an upright position.

7 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)**. Once the bearing has been installed, take care not to dislodge the inner race and seal.

8 Using the same method as for the outer bearing, draw in the new inner bearing assembly from the other side of the spindle carrier. Again, take care not to dislodge the inner race and seal once the bearing is in position.

9 Support the inner bearing inner race on a length of metal tube, and draw the hub fully into the bearings using the same tooling arrangement as before. It may even be possible to insert the hub using firm hand pressure only, but make sure that the inner bearing inner race is well supported.

10 Fit the home-made bracket to secure the hub into the spindle carrier, dismantling the service tools or equivalent as necessary. Ensure that the hub and spindle carrier do not become separated at any time, as this will displace the bearings seals and lead to premature bearing failure.

11 The assembly can now be refitted to the vehicle, as described in the previous Section.

June 1990 models onward

Note: *On these later models, the bearing's inner races are an interference fit on the hub. During removal of the hub from the spindle carrier, the outer bearing inner race will remain in position on the hub and a knife-edged bearing puller will be required to remove it.*

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

13 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.

14 Part of the inner race will remain on the hub, and this should be removed using a knife-edged puller.

15 Securely support the spindle carrier in a vice with its inner face uppermost.

4.2a Removing cap from front suspension strut top-mount retaining nut

4.2b Slackening the front suspension strut top-mount retaining nut whilst preventing the piston rod from turning

16 Using a suitable punch, tap the outer bearing outer race at diametrically-opposed points and remove the bearing assembly 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.
17 Turn the spindle carrier over and remove the inner bearing assembly in the same way.
18 Thoroughly clean the bearing bore and hub, then secure the spindle carrier in the vice in an upright position.
19 Draw 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 3.7)**. Once the bearing has been installed, take care not to dislodge the inner race and seal.
20 Using the same method as for the outer bearing, draw in the new inner bearing assembly from the other side of the spindle carrier. Again, take care not to dislodge the inner race and seal once the bearing is in position.
21 Using the same tooling arrangement as before, and with the metal tube or washers contacting the inner bearing inner race, draw the hub fully into the bearings. Alternatively, if a press is available, support the hub face down on the press bed and using a metal tube in contact with the inner bearing inner race, press the spindle carrier onto the hub.
22 Check that the hub spins freely in the bearings, then refit the spindle carrier as described in Section 2.

4 Front suspension strut - removal and refitting

Removal

1 Chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). Remove the appropriate front roadwheel.
2 Open and support the bonnet. Prise free the protective cap from the suspension strut top-mount retaining nut, then slacken the nut, but do not remove it at this stage **(see illustrations)**. Hold the strut piston rod with an Allen key to prevent the rod from turning as the nut is slackened.
3 Detach the front brake hose from the support bracket on the strut.
4 Where applicable, unbolt and detach the anti-roll bar connecting link from the strut bracket.
5 Undo the two bolts securing the front brake caliper anchor bracket to the spindle carrier. Slide the caliper assembly, complete with brake pads off the disc and spindle carrier and suspend the caliper within the wheelarch with a length of strong wire, to prevent the flexible brake hose from straining.
6 Unscrew and remove the strut-to-spindle carrier pinch-bolt.
7 Prise open the spindle carrier-to-strut joint using a stout screwdriver, and separate the carrier from the strut. Tap the carrier downwards using a soft-faced hammer to release it from the strut if necessary. Once the two components are separated, support the lower suspension arm to avoid straining the CV joints.
8 Support the weight of the strut underneath, and unscrew the previously slackened top-mount retaining nut and lift off the upper cup seat mounting. Lower the strut and remove it from under the wheel arch.

Refitting

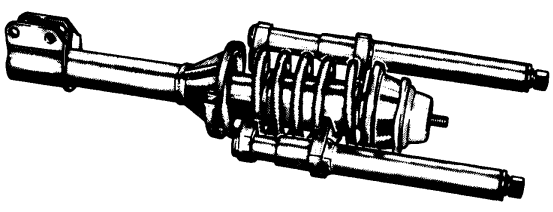
9 Locate the strut through the wheel arch and refit the upper cup seat mounting and top-mount retaining nut. Do not tighten the nut at this stage.
10 Apply leverage to the spindle carrier slot so that the spindle carrier can be refitted to the base of the suspension strut. Refit the suspension strut to spindle carrier pinch-bolt and tighten to the specified torque.
11 Tighten the suspension strut top-mount retaining nut to the specified torque, using an Allen key to prevent the piston rod from rotating. The final torque will have to be applied without the use of the Allen key unless a suitable open-ended torque wrench adapter is available. Refit the cap over the nut.
12 Refit the brake caliper assembly to the spindle carrier, and tighten the caliper anchor bracket bolts to the specified torque (see Chapter 9).
13 Refit the bolt to secure the brake hose bracket to the suspension strut, and fully tighten.
14 Remove the support from under the lower suspension arm.
15 Reconnect the anti-roll bar connecting link to the strut bracket, where applicable, tightening the nut to the specified torque.
16 Refit the roadwheel, remove the axle stands and lower the vehicle to the ground.
17 Tighten the roadwheel nuts according to the specified torque.

5 Front suspension strut - dismantling, examination and reassembly

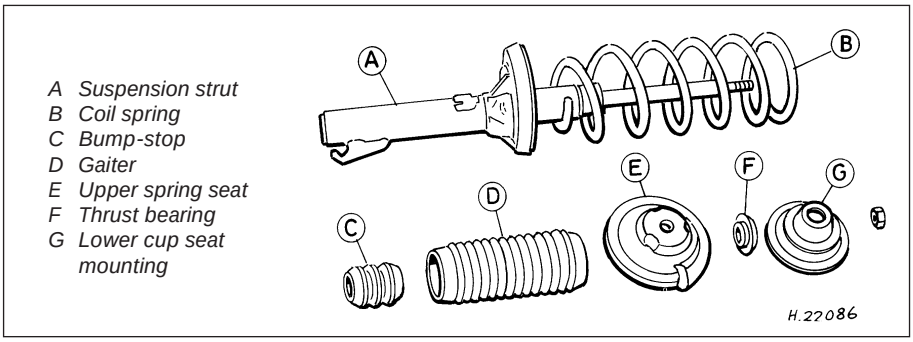
Warning: Before attempting to dismantle the suspension strut, a suitable tool to hold the coil spring in compression must be obtained. Adjustable coil spring compressors which can be positively secured to the spring coils are readily available, and are recommended for this operation. Any attempt to dismantle the strut without such a tool is likely to result in damage or personal injury.

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 Remove the spring retaining nut, then withdraw the lower cup seat mounting, thrust



5.2 Typical pair of coil spring compressors in use



5.3 Exploded view of front suspension strut assembly

5.9 Correct spring location in its lower seat

bearing, upper spring seat, gaiter and bump-stop from the piston rod **(see illustration)**.

4 The suspension strut and coil spring may now be separated. If a new suspension strut is to be fitted there is no need to release the coil spring from compression, but if a new coil spring is to be fitted, release the compressors gently until the spring is in its released state, then remove it.

Examination

5 With the strut assembly now completely dismantled, examine the mounting components for wear, damage or deformation. Renew any of the components as necessary.

6 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 corrosion. 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

7 If a new spring is to be fitted, engage the compressors as during removal, and compress the spring sufficiently to enable suspension strut reassembly.

8 Reunite the spring and suspension strut, and refit the bump-stop gaiter, spring seat, thrust bearing and lower cup seat mounting, renewing components as necessary. Refit the spring retaining nut and tighten to the specified torque.

9 Carefully release the spring tension, ensuring that the spring locates correctly into its upper and lower spring seats **(see illustration)**.

10 Remove the spring compressors.

11 The rubber insulator fitted to the top of the inner wing is a simple push fit, and is easily replaceable. Ensure when replacing this, that the lip sits evenly around the locating hole.

6 Front suspension anti-roll bar - removal and refitting

Removal

1 Chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). Remove the front roadwheels.

2 Remove the one-piece undertray where fitted, by turning its bayonet-type fasteners, and on XR2i models, remove the front suspension crossmember as described in Section 7.

3 Undo the nut securing the upper end of the anti-roll bar connecting link to the suspension strut bracket, and disconnect the link **(see illustration)**.

4 Undo the nut securing the lower end of the connecting link to the anti-roll bar, and remove the link.

5 Remove the two bolts securing the anti-roll bar brackets to each lower suspension arm mounting bracket **(see illustration)**, remove the anti-roll bar brackets and withdraw the anti-roll bar from the vehicle.

6 The rubber bushes locating the anti-roll bar can be removed by sliding them off over the link connections.

Refitting

7 Refitting is a reversal of the removal procedure, tightening the retaining nuts to the specified torque settings.

6.3 Anti-roll bar connecting link-to-strut connection

6.5 Anti-roll bar bracket and mounting bolts

7 Front suspension crossmember - removal and refitting

Note: *The front suspension crossmember is only fitted to XR2i models.*

Removal

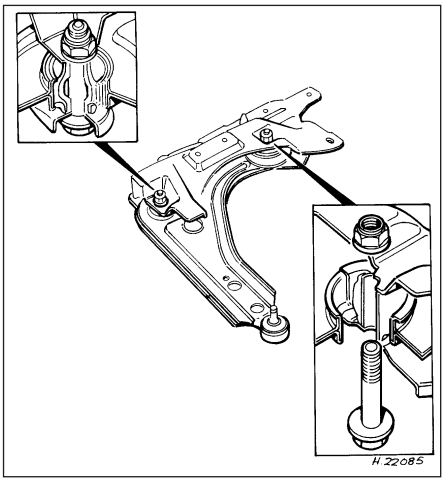
1 Chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). Remove the front roadwheels.

2 Remove the one-piece undertray where fitted, by turning its bayonet-type fasteners.

3 The crossmember, which serves as an additional bracing component, is located between the lower suspension arm mounting brackets, and is secured to these brackets by four bolts. To remove it, simply undo the four bolts and lower it from the vehicle.

Refitting

4 Refitting is the reverse sequence to removal, ensuring that the bolts are tightened to the specified torque.

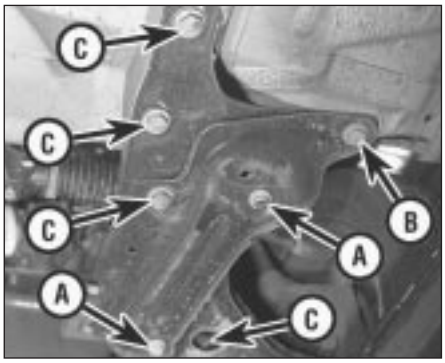


8.6 Lower suspension arm arrangement in its mounting bracket

8 Front suspension lower arm - removal and refitting

Removal

1 Chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). Remove the appropriate front roadwheel.
2 Remove the one-piece undertray (where fitted), by turning its bayonet-type fasteners.
3 If lower arm mounting brackets are to be removed on XR2i models, remove the front suspension crossmember as described in the previous Section.
4 Unscrew and remove the lower arm balljoint-to-spindle carrier pinch-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.
5 Where an anti-roll bar is fitted, undo the two bolts and remove the clamp bracket.
6 To remove the lower arm from its mounting bracket, undo the two bolts that pass through the vertical bushes, remove the bolts and pull the arm clear **(see illustration)**. Note that new bolts will be required for refitting.
7 The lower arm mounting brackets are each retained by five bolts. To remove a mounting bracket, undo the five bolts and lower it from the vehicle.
8 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.



8.10 Lower suspension arm and mounting bracket arrangement

A Arm-to-mounting bracket bolts
B Special "shouldered" locating bolt
C Mounting bracket retaining bolts

Refitting

9 Insert the lower arm into its mounting bracket and fit the two bolts that pass through the vertical bushes finger tight only at this stage.
10 Fit the lower arm mounting bracket to the vehicle, ensuring that the locating dowel is correctly located in its recess. One of the five bolts securing the mounting bracket has a locating shoulder and a larger thread diameter, and this should be fitted first to ensure correct alignment of the mounting bracket to the vehicle **(see illustration)**. Refit the other four bolts and tighten all five to the specified torque.
11 Refit the anti-roll bar bracket and front suspension crossmember, as applicable, in accordance with the relevant Sections of this Chapter.
12 Locate the lower suspension arm balljoint into the spindle carrier assembly then fit and tighten the pinch-bolt and nut to the specified torque. Note that the bolt must locate to the annular groove on the balljoint spindle.
13 Refit the roadwheel, remove the axle stands and lower the vehicle to the ground.
14 Tighten the wheel nuts to the specified torque.
15 Tighten the lower arm-to-lower arm mounting bracket bolts, that pass through the vertical bushes, by the torque-to-yield method as follows. Note that the weight of the vehicle must be on the roadwheels for these procedures and new bolts must be used. Tighten the bolts to the Stage 1 torque setting given in the Specifications, then back off to zero torque (Stage 2). Retighten to the Stage 3 torque setting, then tighten further through the angle specified for Stage 4, using an angle-tightening gauge. It is vitally important that these procedures are followed and that the bolts are not subjected to further rotation which could result in them failing. The torque-to-yield method must be followed every time that these bolts are disturbed.
16 Raise the front of the vehicle again and support it securely on axle stands to refit the one-piece undertray (where applicable).

9 Rear hub bearings - renewal

1 Chock the front wheels then jack up the rear of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). Remove the appropriate rear roadwheel.
2 Check that the handbrake is 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.
3 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.
4 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.*
5 Withdraw the brake drum/hub from the spindle of the rear stub axle **(see illustration)**.

9.3 Removing the outer grease cap from the hub centre

9.4 Undoing the hub bearing retaining nut

9.5 Slide off the wheel hub/brake drum unit

9.6 Prise the grease retainer from the hub bore

9.7 Removing a bearing cone from the hub bore

9.8 Removing bearing cups

6 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 **(see illustration)**.
7 Remove the inner and outer bearing cones from the bore of the hub **(see illustration)**.
8 To remove the bearing cups from the hub, drive them out using a suitable punch. 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.
9 Clean the bore and spindle thoroughly before reassembly.
10 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.
11 Pack the inner bearing cone with the specified grease, and insert it into its cup in the hub.
12 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.
13 Pack the outer bearing cone with the specified grease, and fit it into position in its cup.
14 The brake drum/hub 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 setting whilst simultaneously rotating the assembly to ensure that the bearings are correctly seated.
15 Carefully tap the new hub grease cap into position in a progressive manner around its outer edge until it is fully fitted.
16 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 setting.

10 Rear strut (all models except Courier) - removal and refitting

Removal

1 Chock the front wheels then jack up the rear of the car and support it on axle stands (see *"Jacking and Vehicle Support"*).
2 On ABS-equipped models, unscrew the retaining nuts and detach the load-apportioning valve connecting links from the axle beam.
3 Support the relevant trailing arm of the axle assembly and unscrew and remove the securing bolt from the strut-to-axle mounting **(see illustration)**.
4 Prise free the protective cap from the top of the strut 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 Lower the trailing arm slightly to allow the lower suspension strut mounting to clear its axle location, and withdraw the suspension strut from the vehicle.

Refitting

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

10.3 Lower suspension strut-to-axle mounting bolt

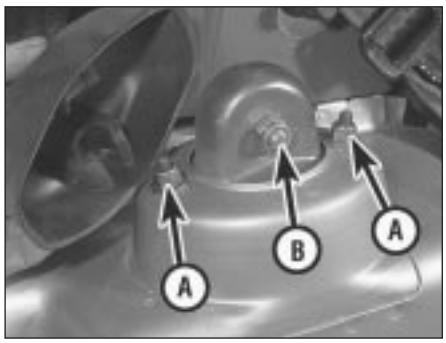
a) With the suspension strut located to its upper mounting, tighten the retaining nuts to the specified torque.
b) When reconnecting the suspension strut to the lower mounting, hand-tighten the retaining bolt, then lower the vehicle so that it is standing on its wheels before fully tightening the bolt to its specified torque.

11 Rear strut (all models except Courier) - dismantling, examination and reassembly

Warning: Before attempting to dismantle the suspension strut, a suitable tool to hold the coil spring in compression must be obtained. Adjustable coil spring compressors which can be positively secured to the spring coils are readily available, and are recommended for this operation. Any attempt to dismantle the strut without such a tool is likely to result in damage or personal injury.

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.



10.4 Suspension strut top-mount nuts (A), and spring retaining through-bolt fixing (B)

3 Unscrew and remove the upper mounting through-bolt and nut.
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 the mounting components for wear, damage or deformation. 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 deterioration of the mountings. 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.
b) When reassembled, check that the upper and lower spring tails are correctly engaged with their spring seats before removing the spring compressor.

12 Rear axle (all models except Courier) - removal and refitting

Removal

1 Chock the front wheels then jack up the rear of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). Remove the rear roadwheels.
2 Refer to Chapter 9 for details, and disconnect the handbrake cable equaliser from the primary cable. Remove the handbrake rear cable from its adjuster and its fixed body locations.
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 nuts and detach the ABS load-apportioning valve operating links from the axle beam. Do not remove the load-apportioning valve (see Chapter 9).
5 Locate suitable jacks or axle stands under the axle beam to support its weight (not to lift it), then unscrew the four mounting bracket bolts each side.
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.

Refitting

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

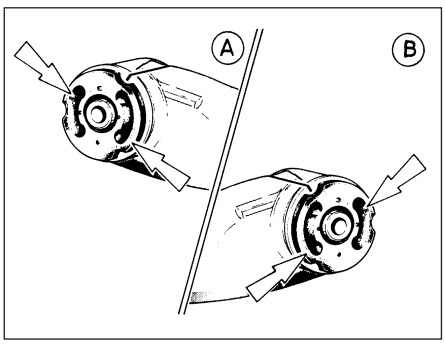
a) Reconnect the axle at the front floor mountings first, and tighten the retaining bolts to the specified torque.
b) Reconnect the axle to the suspension struts, but do not fully retighten the securing bolts until after the vehicle is lowered to the ground and is standing on its wheels.
c) Ensure that 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.
d) When the vehicle is lowered and is standing on its wheels, tighten the suspension fastenings to their specified torque settings.

13 Rear axle pivot bushes (all models except Courier) - renewal

Note: *Two different types of pivot bushes have been fitted during the course of Fiesta production. It is understood that once stocks of the early type are exhausted, only the latter type will be supplied by Ford parts dealers. If renewing pivot bushes on a pre-April 1990 model, and only the later type bushes are available, fit the new bushes as described from paragraph 15 onward.*

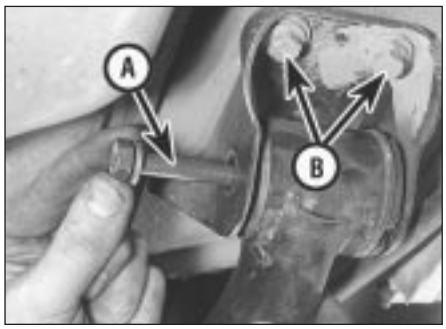
Pre-April 1990 models

1 Chock the front wheels then jack up the rear of the car and support it on axle stands (see *"Jacking and Vehicle Support"*).



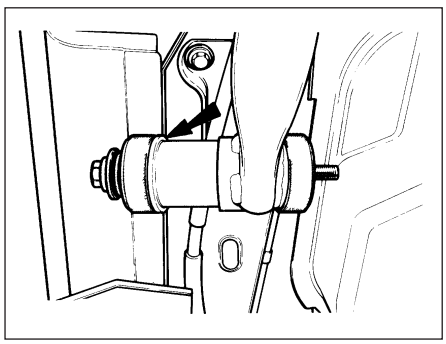
13.8a Correct pivot bush positioning in trailing arm

A Left-hand side B Right-hand side



13.4 Pivot bush bolt (A) and body mounting bracket bolts (B)

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).
3 On ABS-equipped models, undo the retaining nuts and detach the ABS load-apportioning valve operating links from the axle beam. Do not remove the load-apportioning valve (see Chapter 9).
4 Unscrew the nuts, withdraw the pivot bolts, then lower the rear axle so that the bushes are clear of their mounting brackets **(see illustration)**. Take care not to allow the brake pipes to become distorted and stretched - if necessary, disconnect the hydraulic lines (see Chapter 9 for details).
5 Undo the four body mounting bracket bolts and remove the brackets.
6 Using a soft-faced hammer and a suitable punch or drift, drive the bushes from their locations, taking care not to raise any burrs on the trailing arm eyes.
7 To fit the new bushes, obtain a steel tube of a diameter slightly less than that of the bush location in the axle, various flat washers and a long bolt and nut.
8 Place the new bush in position in its axle location with the bush collar nearest to the outer edge of the vehicle. The bush must be installed with its voids positioned as shown **(see illustration)**. Using the steel tube, washers, long bolt and nut, draw the bush inwards towards the centre of the vehicle **(see illustration)**. Care should be taken to avoid damage to the bush and to obtain correct

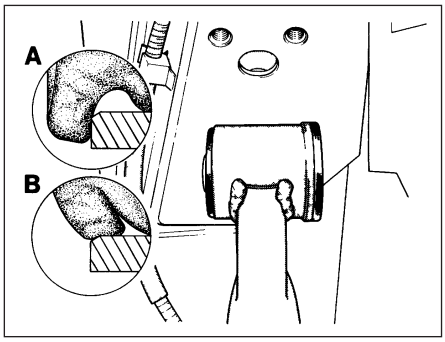


13.8b Fitting pivot bush with its collar (arrowed) towards the outer edge of the vehicle

positioning of the voids. Install the bush on the other side in the same way.
9 With the new bushes in position, refit the body mounting brackets loosely to the trailing arms - do not fully tighten the pivot bolts at this stage. Final tightening is carried out with the vehicle standing on its roadwheels.
10 Raise the axle assembly so that the conical locating pegs on the body mounting brackets engage in their body locations. Refit the body mounting bracket bolts and tighten to the specified torque.
11 On ABS equipped models, reconnect the load-apportioning valve operating links to the rear axle beam
12 If the flexible brake hoses were disconnected during this operation, reconnect them and bleed the brake hydraulic system (see Chapter 9).
13 Lower the vehicle to the ground.
14 Fully tighten the bush pivot bolt nuts to the specified torque.

April 1990 models onward

15 As mentioned in the note at the start of this Section, all later models are fitted with revised bushes which use 12 mm (thread size) pivot bolts. If the later type bushes are to be fitted to a pre-April 1990 model, two corresponding bolts and nuts must be obtained at the same time, and either the body mounting brackets must be replaced by the corresponding modified items, or the holes in the original brackets must be opened out (to 12.5 mm) to suit the new bolts.
16 Carry out the operations described in paragraphs 1 to 4 above.
17 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 trailing arm.
18 Clean the bush eye in the trailing arm; lubricate it, and the new bush, with a soapy solution (washing-up liquid, for example) prior to installation.
19 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 **(see illustration)**.
20 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.
21 Carry out the operations described in paragraphs 11 to 14 above.



13.19 Pivot bush renewal (April 1990 models onwards) - correct engagement of bush lip on rear axle

A New bush, installed correctly
B New bush, installed incorrectly

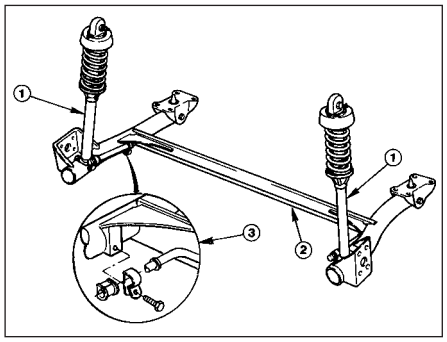
14 Rear suspension anti-roll bar (all models except Courier) - removal and refitting

Removal

1 Chock the front wheels then jack up the rear of the car and support it on axle stands (see *"Jacking and Vehicle Support"*).
2 Undo the front clamp bolt from each end of the bar, then support the bar and undo the rear bolt at each end; withdraw the bar **(see illustration)**.
3 Prise open the clamps to release the rubber bushes, if required. Fit the new bushes using soapy water as a lubricant.

Refitting

4 On refitting, offer up the bar and align first the front clamp on each side, refitting the bolts loosely.
5 Align and refit the rear clamp on each side; again, tighten the bolts only loosely.



14.2 Rear suspension anti-roll bar

1 Rear suspension strut
2 Anti-roll bar
3 Inset showing (front) mounting clamp

6 Lower the vehicle to the ground, rock it to settle the suspension, then tighten the clamp bolts to the specified torque settings.

15 Rear suspension components (Courier models) - general

Although it is possible to remove the rear suspension torsion bars and stabiliser bar independently of the complete rear axle assembly, it is essential to have certain special tools available to complete the work successfully.

Due to the complexity of the tasks, and the requirement for special tools to accurately set the suspension geometry and vehicle ride height on refitting, the removal and refitting of individual rear suspension components is considered to be beyond the scope of DIY work and should be entrusted to a Ford dealer.

Procedures for removal and refitting of the rear shock absorbers, and the complete rear suspension assembly are given in Sections 16 and 17 respectively.

16 Rear shock absorber (Courier models) - removal, examination and refitting

Removal

1 Chock the front wheels then jack up the rear of the car and support it on axle stands (see *"Jacking and Vehicle Support"*).
2 Support the relevant trailing arm of the suspension assembly and unscrew the upper mounting bolt and nut, followed by the lower bolt. Withdraw the shock absorber from under the vehicle **(see illustrations)**.

Examination

3 Examine the shock absorber body for signs of fluid leakage or damage and check the

16.2a Removing a shock absorber upper mounting . . .

16.2b . . . and lower mounting on Courier models

mountings for signs of wear. Test the operation of the unit, 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, the shock absorber should be renewed. Note that if either unit is to be renewed, it is good practice to renew both together as a matched pair.

Refitting

4 Locate the unit in position and refit the mounting bolts and nut. Do not fully tighten the mountings at this stage.
5 Lower the vehicle to the ground and rock it to settle the suspension. Raise the vehicle again, as necessary, until the shock absorber is at an angle of 50° ± 5° to the horizontal. With the shock absorber in this position, tighten the upper and lower mountings to the specified torque.

17 Rear suspension assembly (Courier models) - removal and refitting

Removal

1 Chock the front wheels then jack up the rear of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). Remove the rear roadwheels.
2 Refer to Chapter 9 for details, and disconnect the handbrake cable equaliser from the primary cable. Remove the handbrake rear cable from its adjuster and its fixed body locations. Release the exhaust system mountings as necessary to allow the handbrake cable to be withdrawn over the rear of the exhaust.
3 Disconnect the rear brake flexible hydraulic brake hoses from their rigid line connections **(see illustration)**. Clamp the hoses before disconnecting them, to minimise the fluid loss and air entry into the hydraulic system (see Chapter 9 for details).
4 Detach the light-laden valve linkage from the bracket on the suspension assembly.
5 Locate suitable jacks under the suspension assembly to support its weight (not to lift it).
6 Unscrew the shock absorber lower mounting bolts on each side.
7 Unscrew the two mounting bracket bolts each side **(see illustration)**, check that all associated fittings are clear, then lower the suspension assembly and remove it from under the vehicle.

Refitting

8 Refitting is a reversal of the removal procedure, but note the following:
a) Refit the front mounting brackets first, and tighten the retaining bolts to the specified torque.
b) Reconnect the shock absorber lower mountings, but do not fully retighten the securing bolts until after the vehicle is lowered to the ground and is standing on its wheels.
c) 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, adjusting the light laden valve, and reconnecting and adjusting the handbrake cable.
d) Once the vehicle is standing on its wheels, raise it again, as necessary, until the shock absorbers are at an angle of 50° ± 5° to the horizontal. With the shock absorbers in this position, tighten the lower mountings to the specified torque.

18 Rear suspension ride height (Courier models) - adjustment

Checking of the ride height requires the use of Ford special tools to accurately compress the suspension to a pre-determined value. Further special tools are then required to reposition the torsion bars to the new setting.

This operation should be entrusted to a Ford dealer, as it is not possible to carry out the procedure accurately without the use of the appropriate tools.

19 Steering wheel - removal and refitting

Removal

Models without air bag

1 Drive the vehicle in a straight line onto a level surface, so that the roadwheels are pointing straight ahead.
2 Carefully prise the motif from the centre of the steering wheel **(see illustration)**.
3 Mark the relative positions of the steering wheel and steering column shaft.
4 Unscrew the retaining bolt from the centre of the steering wheel, then insert the ignition key and turn it to position "I". Grip the wheel each side, then pull and withdraw it from the column shaft.

HAYNES HiNT
If the wheel is tight, tap it up near the centre, using the palm of your hand, or twist it from side to side, whilst pulling upwards to release it from the shaft splines.

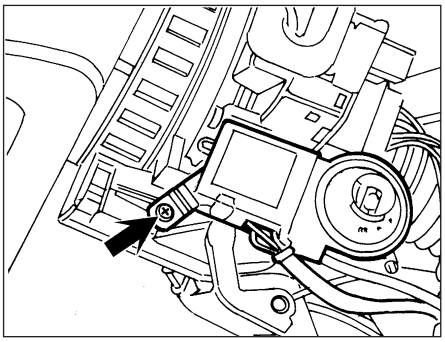
Models with air bag

Warning: Handle the air bag with extreme care as a precaution against personal injury, and always hold it with the cover facing away from your body. If in doubt concerning any proposed work involving the air bag or its control circuitry, consult a Ford dealer or other qualified specialist.
5 Disconnect the battery negative (earth) lead (refer to Chapter 5A, 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.
6 Undo the screws, and remove the steering column lower shroud.
7 Undo the two external screws and the two internal screws and remove the steering column upper shroud.

17.3 Brake hose and rigid pipe connection on Courier rear suspension assembly

17.7 Courier rear suspension pivot brackets locate on dowels in underbody

19.2 Removing the motif from the steering wheel



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

8 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.

9 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.

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

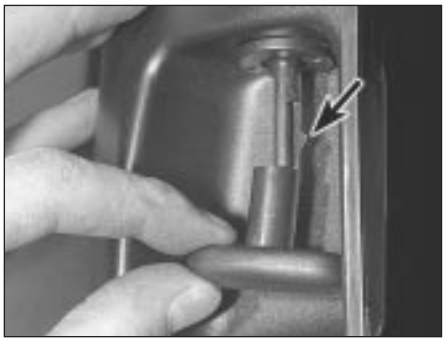
Warning: Position the air bag module in a safe place, with the mechanism facing downwards as a precaution against accidental operation.

11 Release the wiring harness from the side of the steering column and disconnect the air bag module wiring multi-plug (yellow lead).

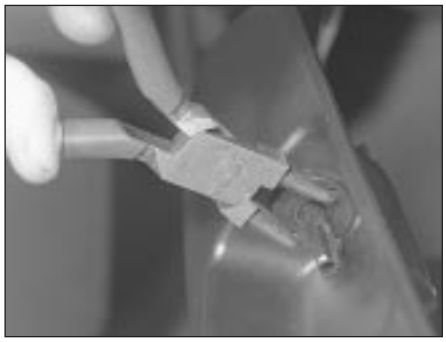
12 Where applicable, undo the single screw and withdraw the Passive Anti-Theft System (PATS) transceiver from the ignition switch/steering lock barrel **(see illustration)**.

13 Turn the steering wheel so that the roadwheels are in the straight-ahead position, then remove the ignition key to lock the steering.

14 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.



20.2 Manual choke control knob and its locating lug (arrowed)



20.3 Removing the manual choke control assembly retaining collar

Refitting

All models

15 Refit in the reverse order of removal. Make sure that the wheel is centralised, as noted on removal and turn the ignition key so that it is in position "I" (steering unlocked). Tighten the retaining bolt to the specified torque setting.

20 Steering column (manual steering) - removal and refitting

Removal

Models without air bag

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

2 Remove the manual choke control knob, where fitted, by depressing the lug securing it, and pulling it from its shaft **(see illustration)**. The lug is found on the side of the control knob shank.

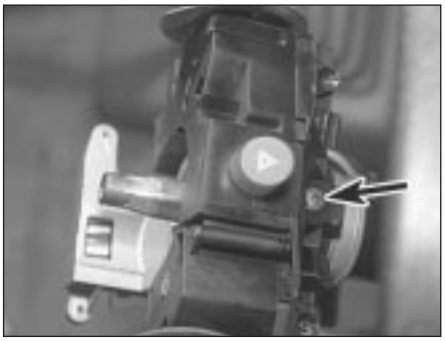
3 Remove the lower steering column shroud by undoing its four retaining screws, then detach the choke warning light switch/pull control assembly from the lower shroud by unscrewing its retaining collar (bayonet-type fixing), using a suitable tool to locate in the collar recesses **(see illustration)**.

4 Remove the two screws securing the upper steering column shroud from above, and the two screws securing it from below, the latter accessible only with the lower shroud removed.

5 Disconnect the wiring multi-plugs from the steering column multi-function switch assembly, then remove the single screw securing the multi-function switch assembly to the steering column lock housing. This retaining screw is located directly forward of the hazard warning light switch **(see illustration)**. Remove the multi-function switch assembly.

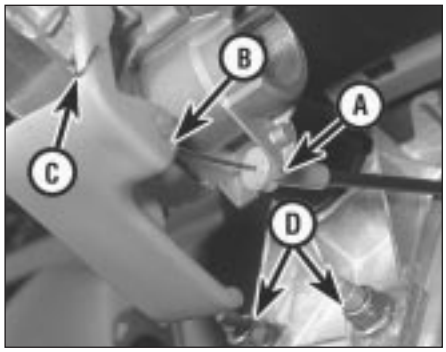
6 Disconnect the ignition switch wiring multi-plug connector and remove the loom plate from its location on the left-hand side of the steering column **(see illustration)**.

7 Unclip the bonnet release cable abutment from its location in the steering column lock housing, then detach the cable from the bonnet release lever by aligning the cable core with the slot on the release lever and withdrawing it through that slot. Detach the spring from the release lever arms, then disengage the arms from the steering column lock housing and remove the bonnet release lever **(see illustration)**.



20.5 Steering column multi-function switch retaining screw (arrowed) (steering wheel removed for clarity)

20.6 Removing ignition loom plate from steering column lock housing (steering wheel removed for clarity)



20.7 Bonnet release lever and cable

A Bonnet release cable abutment
B Bonnet release cable slot on release lever
C Bonnet release lever return spring
D Steering column to mounting bracket retaining nuts

20.9 Pinch-bolt securing lower steering shaft universal joint to pinion splined shaft (arrowed)

8 Remove the nuts securing the steering column mounting bracket.
9 Remove the pinch-bolt securing the lower steering shaft universal joint to the steering rack pinion splined shaft, located at the rear of the engine compartment **(see illustration)**, and separate the two as far as possible.
10 Pull the steering column assembly from its bulkhead location and withdraw it from the vehicle, ensuring that the lower steering shaft universal joint and the steering rack pinion splined shaft separate fully. The effort required to remove the column assembly may be quite high, due to the close tolerance of the lower column tube support bush in its location.

Models with air bag

Warning: Handle the air bag with extreme care as a precaution against personal injury, and always hold it with the cover facing away from your body. If in doubt concerning any proposed work involving the air bag or its control circuitry, consult a Ford dealer or other qualified specialist.

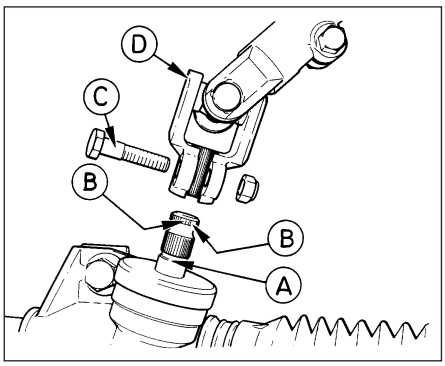
11 Disconnect the battery negative (earth) lead (refer to Chapter 5A, Section 1).

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.

12 Undo the screws, and remove the steering column lower shroud.
13 Undo the two external screws and the two internal screws and remove the steering column upper shroud.
14 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.
15 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.
16 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.

17 Turn the steering wheel so that the roadwheels are in the straight-ahead position, then remove the ignition key to lock the steering.
18 Release the wiring harness from the side of the steering column and disconnect the air bag module wiring multi-plug (yellow lead).
19 Disconnect the wiring multi-plugs from the steering column multi-function switch assembly.
20 Disconnect the ignition switch wiring multi-plug connector and remove the loom plate from its location on the left-hand side of the steering column.
21 Where applicable, undo the single screw and withdraw the Passive Anti-Theft System (PATS) transceiver from the ignition switch/steering lock barrel **(see illustration 19.12)**.
22 Unclip the bonnet release cable abutment from its location in the steering column lock housing, then detach the cable from the bonnet release lever by aligning the cable core with the slot on the release lever and withdrawing it through that slot. Detach the spring from the release lever arms, then disengage the arms from the steering column lock housing and remove the bonnet release lever.
23 Remove the nuts securing the steering column mounting bracket.
24 Remove the pinch-bolt securing the lower steering shaft universal joint to the steering rack pinion splined shaft, located at the rear of the engine compartment, and separate the two as far as possible.
25 Pull the steering column assembly from its bulkhead location and withdraw it from the vehicle, ensuring that the lower steering shaft universal joint and the steering rack pinion splined shaft separate fully. The effort required to remove the column assembly may be quite high, due to the close tolerance of the lower column tube support bush in its location.



20.29 Steering rack-to-column engagement

A Steering rack pinion splined shaft
B Annular groove to ensure correct location of pinch-bolt
C Pinch-bolt
D Lower steering shaft universal joint

Refitting

All models

26 Ensure that the roadwheels are in the straight-ahead position. With the help of an assistant, insert the steering column assembly into the vehicle so that the lower steering shaft universal joint and the pinion splined shaft on the steering rack locate correctly, with the steering wheel centralized. Loosely refit the pinch-bolt to secure. Ensure that the steering shaft bulkhead seal seats correctly in its location.
27 With the column assembly located loosely in position, refit the nuts securing it to its mounting bracket, taking care to ensure that the lower column tube support bush seats correctly as the nuts are tightened to the specified torque.
28 Refit the steering column ancillary components, reversing the removal procedure given in paragraphs 2 to 7 (for models without air bag) or 12 to 22 (for models with air bag).
29 Tighten the pinch-bolt securing the lower steering shaft universal joint to the pinion splined shaft to the specified torque. Ensure that the pinch-bolt sits in the annular groove on the pinion splined shaft **(see illustration)**.
30 Reconnect the battery negative lead.

21 Steering column (power steering) - removal and refitting

Removal

Warning: Handle the air bag with extreme care as a precaution against personal injury, and always hold it with the cover facing away from your body. If in doubt concerning any proposed work involving the air bag or its control circuitry, consult a Ford dealer or other qualified specialist.

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

2 Undo the screws, and remove the steering column lower shroud.
3 Undo the two external screws and the two internal screws and remove the steering column upper shroud.
4 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.

5 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.

6 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.

7 Turn the steering wheel so that the roadwheels are in the straight-ahead position, then remove the ignition key to lock the steering.

8 Release the wiring harness from the side of the steering column and disconnect the air bag module wiring multi-plug (yellow lead).

9 Disconnect the wiring multi-plugs from the steering column multi-function switch assembly.

10 Disconnect the ignition switch wiring multi-plug connector and remove the loom plate from its location on the left-hand side of the steering column.

11 Undo the single screw and withdraw the Passive Anti-Theft System (PATS) transceiver from the ignition switch/steering lock barrel **(see illustration 19.12)**.

12 Unclip the bonnet release cable abutment from its location in the steering column lock housing, then detach the cable from the bonnet release lever by aligning the cable core with the slot on the release lever and withdrawing it through that slot. Detach the spring from the release lever arms, then disengage the arms from the steering column lock housing and remove the bonnet release lever.

13 Remove the C-clip at the base of the steering column shaft, below the universal joint.

14 Remove the nuts securing the steering column mounting bracket.

15 Pull the steering column assembly from its bulkhead location and withdraw it from the vehicle, ensuring that the steering column shaft and flexible coupling separate fully.

Refitting

16 Ensure that the roadwheels are in the straight-ahead position and the steering column is locked. With the help of an assistant, insert the steering column assembly into the vehicle so that the steering column shaft engages with the flexible coupling.

17 Refit the steering column shaft C-clip.

18 With the column assembly located loosely in position, refit and tighten the nuts securing it to its mounting bracket.

19 Refit the steering column ancillary components, reversing the removal procedure given in paragraphs 2 to 12.

20 Reconnect the battery negative lead.

22 Steering gear rubber gaiters - renewal

1 Remove the track rod end balljoint as described in Section 28.

2 Remove the one-piece undertray where fitted, by turning its bayonet-type fasteners, and on XR2i models, remove the front suspension crossmember as described in Section 7.

3 Count the number of exposed threads visible, from the end of the track rod to the track rod end balljoint locknut, and record this figure. Now unscrew the locknut from the track rod.

4 Release the clip(s), and slide the gaiter off the rack-and-pinion housing and track rod.

5 Scrape off all grease from the old gaiter, and apply to the track rod inner joint. Wipe clean the seating areas on the rack-and-pinion housing and track rod.

6 Slide the new gaiter onto the housing and track rod, and secure with the retaining clips. Ensure that the narrow neck locates correctly in the track rod groove.

7 Screw the track rod end balljoint locknut back onto the track rod until the same number of threads, as counted on removal, are visible.

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

9 Refit the front suspension crossmember and one-piece undertray, as applicable.

23 Steering gear (manual steering) - removal and refitting

Removal

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

2 Chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). Remove the front roadwheels.

3 Remove the one-piece undertray where fitted, by turning its bayonet-type fasteners, and on XR2i models, remove the front suspension crossmember as described in Section 7.

4 Remove the pinch-bolt securing the pinion splined shaft to the lower steering shaft universal joints, located at the rear of the engine compartment.

5 Separate the track rod end balljoints from the steering arms, as described in Section 28.

6 Remove the lower brake servo support bracket bolt.

7 Remove the other bolt securing the steering rack assembly to the bulkhead, then withdraw it from the right-hand side of the vehicle, taking care to disengage the pinion splined shaft from the lower steering shaft universal joint as the assembly is moved.

Refitting

8 Centralize the rack and steering wheel, then engage the pinion splined shaft to the lower steering shaft universal joint.

9 Refit the steering rack assembly mounting bolts to the bulkhead and tighten to the specified torque, ensuring that the servo support bracket is correctly held.

10 Refit the pinion splined shaft-to-lower steering shaft universal joint pinch-bolt and nut and tighten to the specified torque, ensuring that the pinch-bolt locates to the annular groove as the pinion splined shaft.

11 Refit the track rod end balljoints to the steering arms, as detailed in Section 28. As long as the track rod end-to-track rod relative positions have not been disturbed, it will not be necessary to reset the front wheel alignment.

12 Refit the front suspension crossmember and one-piece undertray, as applicable.

13 Refit the roadwheels, then lower the vehicle to the ground. Tighten the roadwheel nuts to the specified torque with the vehicle on its wheels.

24 Steering gear (power steering) - removal and refitting

Removal

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

2 Chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). Remove the front roadwheels.

3 Remove the one-piece undertray where fitted, by turning its bayonet-type fasteners, and on XR2i models, remove the front suspension crossmember as described in Section 7.

4 Remove the pinch-bolt securing the pinion splined shaft to the lower steering shaft flexible coupling, located at the rear of the engine compartment.

5 Undo the retaining screws, and detach the clips securing the power steering hydraulic pressure pipes to the steering gear.

6 Position a suitable container under the hydraulic pipe connections to the steering gear. Unscrew the pipe unions, then detach the pipes from the valve body. Withdraw the pipes from the steering gear, and drain the hydraulic fluid into the container.

7 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.

8 Slacken the upper bolts securing the steering gear support brackets. On left-hand

drive models, remove the brace from the stud on the left-hand side of the steering gear.
9 Undo the two bolts securing the support brackets to the steering gear and move the brackets and swing the brackets clear.
10 Unhook the steering gear from the apertures in the bulkhead and remove the assembly from the right-hand wheel arch. Ensure that the pressure check valve does not fall out of the pressure port in the valve body as the steering gear is removed.

Refitting

11 Centralize the steering gear and steering wheel, then engage the pinion splined shaft to the lower steering shaft flexible coupling.
12 Hook the steering gear into the apertures in the bulkhead then align the support brackets and refit the two bolts. Tighten the support bracket upper bolts and support bracket-to-steering gear bolts to the specified torque.
13 On left-hand drive models, refit the brace to the stud on the left-hand side of the steering gear.
14 Fit new O-ring seals to the pressure and return hoses, then reconnect the hydraulic lines to the steering gear. Secure the pipes with the retaining clips.
15 Refit the pinion splined shaft-to-lower steering shaft flexible coupling pinch-bolt and nut and tighten to the specified torque.
16 Refit the track rod end balljoints to the steering arms, as detailed in Section 28. As long as the track rod end-to-track rod relative positions have not been disturbed, it will not be necessary to reset the front wheel alignment.
17 Refit the front suspension crossmember and one-piece undertray, as applicable.
18 Refit the roadwheels, then lower the vehicle to the ground. Tighten the roadwheel nuts with the vehicle on its wheels to the specified torque.
19 On completion, bleed the power steering hydraulic system as described in Section 27. Check for any signs of fluid leakage from the system hoses and connections.

25 Power steering pump - removal and refitting

Removal

HCS engine models

1 Disconnect the battery negative (earth) lead (refer to Chapter 5A, Section 1).
2 Chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). Remove the front roadwheel.
3 Remove the auxiliary drivebelt as described in Chapter 1.
4 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 pump pulley retaining bolts. Withdraw the pulley from the pump.
5 Position a suitable container beneath the power steering pump, then unscrew and detach the fluid high pressure pipe and fluid return hose from the pump. As they are detached from the pump, allow the fluid to drain from the pipe and hose (and the pump) into the container. Plug the exposed ends of the pipe, hose and the pump connections, to prevent the ingress of dirt and excessive fluid loss.
6 Unscrew the four retaining bolts (three from the front and one from the rear) and withdraw the pump from the vehicle.

PTE engine models

7 Disconnect the battery negative (earth) lead (refer to Chapter 5A, Section 1).
8 Refer to the relevant Part of Chapter 4 and remove the air cleaner assembly and air inlet components as necessary for access to the pump.
9 Chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). Remove the front roadwheel.
10 Refer to Chapter 1 and drain the cooling system.
11 Refer to Chapter 1 and remove the auxiliary drivebelt.
12 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 pump pulley retaining bolts. Refit the roadwheel, lower the vehicle and withdraw the pump pulley from above.
13 Disconnect the cooling system hoses as necessary to gain access to the power steering pump.
14 Disconnect the pressure switch multi-plug from the pressure switch located in the fluid high pressure pipe.
15 Position a suitable container beneath the power steering pump, then disconnect the high pressure pipe at the union located part way along the pipe. Allow the fluid to drain from the pipe into the container.
16 Disconnect the high pressure pipe clamp bracket and the fluid return hose from the pump. Allow the fluid to drain into the container then plug the exposed ends of the pipe, hose and the pump connections, to prevent the ingress of dirt and excessive fluid loss.
17 Unscrew the pump mounting bolt located at the rear of the pump and remove the pipe clamp bracket.
18 Unscrew the three pump mounting bolts located at the front of the pump and remove the pump, complete with high pressure pipe, from the vehicle.
19 If required, the high pressure pipe can be removed from the pump after unscrewing the union nut.

Zetec engine models

Note: *For this operation, the engine will need to be supported from above to allow removal of the right-hand engine mounting, and also to allow the vehicle to be raised for work underneath, and lowered for work from above. A proprietary engine support bar (or home-made alternative) fitted in the front wing drain channel each side is ideal for this purpose, but care must be taken not to damage the wings or their paintwork.*
20 Disconnect the battery negative (earth) lead (refer to Chapter 5A, Section 1).
21 Suitably support the right-hand side of the engine (see the note at the beginning of this sub-Section) so that all the load is removed from the engine mounting.
22 Remove the right-hand engine mounting as described in Chapter 2C.
23 Refer to Chapter 1 and drain the cooling system.
24 Chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). Remove the front roadwheel.
25 Undo the retaining screws, and remove the drivebelt lower guard from the underbody.
26 Refer to Chapter 11 and remove the wheel arch liner.
27 Refer to Chapter 1 and remove the auxiliary drivebelt.
28 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 pump pulley retaining bolts. Refit the roadwheel, lower the vehicle and withdraw the pump pulley from above.
29 Refer to Chapter 12 and remove the right-hand headlight unit.
30 Refit the roadwheel and lower the vehicle to the ground.
31 Position a suitable container beneath the power steering fluid reservoir, then disconnect the fluid return hose from the reservoir. Allow the fluid to drain from the hose and reservoir into the container.
32 Plug the exposed ends of the hose and the reservoir, to prevent the ingress of dirt and excessive fluid loss.
33 Remove the high pressure pipe clamp brackets from the engine then disconnect the high pressure pipe at the union located over the camshaft cover. Place absorbent rags under the union as it is disconnected to collect any escaping fluid. Plug the disconnected pipe ends to prevent the ingress of dirt and excessive fluid loss.
34 Disconnect the cooling system hoses as necessary to gain access to the power steering pump.
35 Unscrew the two pump mounting bolts located at the rear of the pump.
36 Unscrew the two pump mounting bolts located at the front of the pump and remove the pump, complete with high pressure pipe and fluid return hose, upwards and out of the engine compartment.
37 If required, the high pressure pipe and fluid return hose can be removed from the pump after unscrewing the union nut or slackening the hose clip as applicable.

Refitting

All models

38 Refitting is a reversal of removal, bearing in mind the following points:

a) Tighten all nuts and bolts to the specified torque. Remove the plugs from the disconnected pipes, hoses and unions and ensure that the pipes are located correctly so that they do not foul any surrounding components.

b) Refit the auxiliary drivebelt as described in Chapter 1.

c) Where drained, refill the cooling system as described in Chapter 1.

d) Refit or reconnect any additional components removed for access as described in the relevant Sections and Chapters of this manual.

e) On completion, bleed the power steering hydraulic system as described in Section 27. Check for any signs of fluid leakage from the system hoses and connections.

26 Power steering fluid cooler - removal and refitting

Removal

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

2 Position a suitable container beneath the power steering fluid cooler hose connections, then disconnect the hoses at the quick-fit couplings on the fluid cooler. Allow the fluid to drain from the hose and reservoir into the container.

3 Plug the exposed ends of the hose and the reservoir, to prevent the ingress of dirt and excessive fluid loss.

4 Refer to Chapter 11 and remove the bonnet lock assembly and the front bumper.

5 Undo the bolts securing the cooler side support bracket and the bonnet lock stay, and remove the fluid cooler and bonnet lock stay as an assembly.

6 Undo the two bolts and remove the stay from the fluid cooler.

Refitting

7 Refitting is a reversal of removal. On completion, bleed the power steering hydraulic system as described in Section 27.

27 Power steering hydraulic system - bleeding

1 Following any operation in which the power steering fluid lines have been disconnected, the power steering system must be bled to remove any trapped air.

2 With the front wheel in the straight-ahead position, check the power steering fluid level in the reservoir and, if low, top-up with fresh fluid to the "MAX" or "MAX COLD" level mark. Pour the fluid slowly to prevent air bubbles forming, and use only the specified fluid (refer to *"Lubricants, fluids and tyre pressures"*).

3 Start the engine and allow it to idle. Check the hoses and connections for leaks.

4 Stop the engine and recheck the fluid level. Add more, if necessary, up to the "MAX" or "MAX COLD" level mark.

5 Start the engine again, allow it to idle, then bleed the system by slowly moving the steering from lock-to-lock several times. This should purge the system of all internal air. However, if air remains in the system (indicated by the steering operation being very noisy), leave the vehicle overnight and repeat the procedure again the next day.

6 If air still remains in the system, it may be necessary to resort to the Ford method of bleeding, which uses a vacuum pump and a modified reservoir filler cap to which the pump can be connected. Turn the steering to the right until it is near the stop, then fit the vacuum pump to the fluid reservoir, and apply 0.51 bars of vacuum. Maintain the vacuum for a minimum of 5 minutes, then repeat the procedure with the steering turned to the left.

7 Keep the fluid level topped-up throughout the bleeding procedure; note that the fluid temperature increases, the level will rise.

8 On completion, switch the engine off, and return the wheels to the straight-ahead position.

28 Track rod end balljoint - removal and refitting

Removal

1 Chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and Vehicle Support"*). 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 only **(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 Unscrew the balljoint from the track rod, counting the number of turns necessary to remove it.

Refitting

5 Screw the balljoint into the track rod the number of turns noted during removal until the balljoint just contacts the locknut. Now tighten the locknut while holding the balljoint.

6 Engage the shank of the balljoint with the spindle carrier arm, and refit the retaining nut. Tighten the nut to the specified torque and secure with a new split pin.

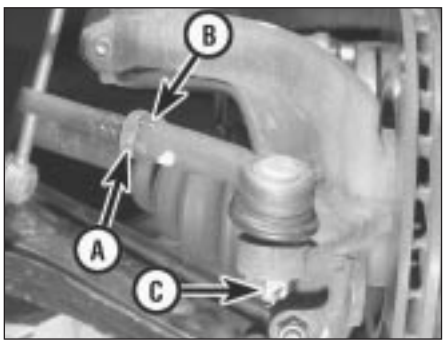
7 Refit the roadwheel, and lower the vehicle to the ground.

8 Finally, have the front wheel toe setting checked (see Section 29).

29 Wheel alignment and steering angles - general information

General

1 A car's steering and suspension geometry is defined in four basic settings - all angles are expressed in degrees (toe settings are also expressed as a measurement); the relevant settings are camber, castor, steering axis inclination, and toe-setting. With the exception of front wheel toe-setting, none of these settings are adjustable.



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)

28.3 Balljoint separator tool in position. Note that the nut should be left loosely in position to protect the thread for re-use

Front wheel toe setting - checking and adjustment

2 Due to the special measuring equipment necessary to accurately check the wheel alignment, and the skill required to use it properly, checking and adjustment is best left to a Ford dealer or similar expert. Note that most tyre-fitting shops now possess sophisticated checking equipment. The following is provided as a guide, should the owner decide to carry out a DIY check.

3 The front wheel toe setting is checked by measuring the distance between the front and rear inside edges of the roadwheel rims. Proprietary toe measurement gauges are available from motor accessory shops. Adjustment is made by screwing the track rods in or out of their track rod end balljoints, to alter the effective length of the track rod assemblies.

4 For **accurate** checking, the vehicle **must** be at the kerb weight, ie unladen and with a full tank of fuel.

5 Before starting work, check the tyre pressures and tread wear, the condition of the hub bearings, the steering wheel free play, and the condition of the front suspension components (see Chapter 1). Correct any faults found.

6 Park the vehicle on level ground, check that the front roadwheels are in the straight-ahead position, then rock the rear and front ends to settle the suspension. Release the handbrake, and roll the vehicle backwards 1 metre, then forwards again, to relieve any stresses in the steering and suspension components.

7 Measure the distance between the front edges of the wheel rims and the rear edges of the rims. Subtract the smallest measurement from the largest, and check that the result is within the specified range.

8 If adjustment is necessary, apply the handbrake, then jack up the front of the vehicle and support it securely on axle stands (see *"Jacking and Vehicle Support"*). Turn the steering wheel onto full-left lock, and record the number of exposed threads on the right-hand 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 should 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. **Note:** *It is most important that after adjustment, the same number of threads are visible on each track rod.*

9 First clean the track rod end; if they are corroded, apply penetrating fluid before starting adjustment. Release the rubber gaiter outboard clips (where necessary), and peel back the gaiter; apply a smear of grease to the inside of the gaiter, so that both are free, and will not be twisted or strained as their respective track rods are rotated.

10 Use a straight-edge and a scriber or similar to mark the relationship of each track rod to its track rod end balljoint, then, holding each track rod in turn, unscrew its locknut fully.

11 Alter the length of the track rods, bearing in mind the note made in paragraph 8. Screw them into or out of the track rod end balljoints, rotating the track rods using a self-grip wrench. Shortening the track rods (screwing them into their track rod end balljoints) will reduce toe-in/increase toe-out.

12 When the setting is correct, hold the track rods and securely tighten the track rod end balljoint locknuts. Count the exposed threads to check the length of both track rods. If they are not the same, then the adjustment has not been made equally, and problems will be encountered with tyre scrubbing in turns; also, the steering wheel spokes will no longer be horizontal when the wheels are in the straight-ahead position.

13 If the track rod lengths are the same, lower the vehicle to the ground and re-check the toe setting; re-adjust if necessary. When the setting is correct, securely tighten the track rod end balljoint locknuts. Ensure that the rubber gaiters are seated correctly, and are not twisted or strained, and secure them in position with new retaining clips (where necessary).