






Chapter 11

Steering and suspension

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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

General

Suspension type:

Front	Independent, MacPherson struts and anti-roll bar
Rear	Independent, semi-trailing arms and anti-roll bar; ride height control optionally available

Steering type

Rack and pinion, power-assisted on some models

Front wheel alignment

Toe:

Setting value	2 ± 1 mm (0.08 ± 0.04 in) toe-in
Tolerance in service	0.5 mm (0.02 in) toe-out to 4.5 mm (0.18 in) toe-in

Castor :

SOHC and 2.8 litre models:

Standard, without ride height control	+ 1°51' ± 1°00'
Standard, with ride height control	+ 1°58' ± 1°00'
Heavy duty	+ 1°46' ± 1°00'

DOHC carburettor and low series fuel-injection models

DOHC high series models

2.4 litre:

low series models	+ 2°17' ± 1°00'
high series models	+ 2°50' ± 1°00'

2.9 litre models

+ 2°27' ± 1°00'

+ 2°26' ± 1°00'

+ 2°22' ± 1°00'

+ 2°50' ± 1°00'

+ 2°22' ± 1°00'

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Front wheel alignment (continued)

Camber :

SOHC and 2.8 litre models:	
Standard	0°23' ± 1°00'
Heavy duty	0°00' ± 1°00'
DOHC models	-0°17'
2.4 litre low series models	-0°27'
2.4 litre high series and 2.9 litre models	-0°21'
Tolerance:	
DOHC, 2.4 and 2.9 litre models:	1°00' to + 0°60'
Difference between left-hand and right-hand sides:	
SOHC and 2.8 litre models:	
Castor	1°00' maximum
Camber	1°15' maximum
DOHC, 2.4 and 2.9 litre models:	
Castor	1°00'
Camber	1°15'

Steering gear

Make:

Manual	Cam Gears
Power-assisted	Cam Gears or ZF
Power steering fluid type	ATF for Ford spec SQM-2C9010-A (Automatic Transmission Fluid)

Tyres

Tyre sizes	175 SR/TR/HR 14, 185/70 HR/TR/VR 14, 195/65 HR 15, 205/60 VR 15	
Tyre pressures:	Front	Rear
Normal load	1.8 bar (26 lbf/in ²)	1.8 bar (26 lbf/in ²)
Full load	2.1 bar (30 lbf/in ²)	2.9 bar (42 lbf/in ²)

Torque wrench settings

Steering

	Nm	lbf ft
Steering gear-to-crossmember bolts:		
Stage 1 (clamping)	45	33
Slacken, then Stage 2 (snug)	15	11
Stage 3	Tighten further 90°	Tighten further 90°
Track rod end balljoint nut	25 to 30	18 to 22
Track rod end locknut	57 to 68	42 to 50
Track rod inner balljoint nut	75	55
Intermediate shaft coupling pinch-bolts	20	15
Pinion retaining nut (manual steering)	70 to 100	52 to 74
Pinion shaft nut (power steering)	37 to 47	27 to 34
Slipper yoke plug (see text):		
Manual steering	4 to 5	3 to 4
Power steering	3 to 4	2 to 3
Steering wheel nut	45 to 55	33 to 41
Steering column mounting nuts	17 to 24	13 to 18
Steering column adjuster pivot nut	10 to 13	7 to 10
Steering pump bracket to block	52 to 64	38 to 47
Steering pump pulley hub bolt	10 to 12	7 to 9
Pressure hose to steering pump	26 to 31	19 to 23
Steering pump bracket-to-engine mounting	41 to 58	30 to 43
Steering pump to bracket (V6)	22 to 29	16 to 21

Front suspension

Hub nut	390 to 450	288 to 332
Lower arm balljoint nut	65 to 85	48 to 63
Top mount retaining nuts	20 to 24	15 to 18
Stub axle carrier pinch-bolt	80 to 90	59 to 66
Anti-roll bar clamps	70 to 90	52 to 66
Anti-roll bar to lower arms	70 to 110	52 to 81
Crossmember to frame	70 to 90	52 to 66
Suspension strut to turret	40 to 52	30 to 38
Lower arm pivot:		
Stage 1 (clamping)	45	33
Slacken, then Stage 2 (snug)	15	11
Stage 3	Tighten further 90°	Tighten further 90°

Torque wrench settings (continued)

	Nm	lbf ft
Rear suspension		
Driveshaft stub axle nut	250 to 290	180 to 210
Final drive mounting to floor	20 to 25	15 to 18
Final drive mounting to rear cover	40 to 50	30 to 37
Guide plate-to-floor bolts	41 to 51	30 to 38
Guide plate insulator bolt	69 to 88	51 to 65
Lower arm to crossmember	80 to 95	59 to 70
Brake anchor plate to lower arm	52 to 64	38 to 47
Anti-roll bar bracket bolts	20 to 25	15 to 18
Shock absorber mountings:		
Top	73 to 97	54 to 72
Bottom	68 to 92	50 to 68
Rear hub bolts	80 to 100	59 to 74
Wheels		
Wheel nuts (steel or alloy wheels)	70 to 100	52 to 74

1 General information

The steering gear is of rack-and-pinion type. Power assistance is standard on V6 models and optional on others. The power-assisted steering gear has a "variable ratio" effect which increases the steering ratio about the straight-ahead position: this provides quick lock-to-lock action without the penalty of over-responsiveness in open road driving.

The steering wheel is adjustable both up-and-down and fore-and-aft. Both steering column and shaft are designed to collapse under impact. The steering shaft is connected to the pinion by an intermediate shaft, which has a universal joint at its upper end and a flexible coupling at the lower end.

Front suspension is independent, of the MacPherson strut type, with coil springs and concentric telescopic shock absorbers. The struts are attached to the tops of the stub axle carriers, which are located at their lower ends by balljoints incorporated in the lower suspension arms. The lower suspension arms pivot at their inner ends, where they are attached to a central crossmember. The anti-roll bar is attached to the rear of the arms and serves to control fore-and-aft movement as well as reducing roll.

Suspension geometry has been designed to give good steering "feel", resistance to pulling caused by uneven braking effort or tyre deflation, and (in the case of manual steering) acceptably low steering wheel effort at parking speeds. Only toe is adjustable in service.

The rear suspension is also independent. It is of the semi-trailing arm type, with coil springs and separate telescopic shock absorbers. An optionally-available ride height control system keeps the rear suspension height constant, regardless of vehicle load.

Both front and rear wheel bearings are of a special taper-roller type and require no periodic adjustment in service.

2 Power steering fluid - level check and bleeding

1 Refer to Chapter 1, Section 35, to check the power steering fluid level.

2 If the fluid level falls so low that air enters the pump, or after component renewal, the system must be bled as follows.

3 Remove the reservoir filler cap. Top-up with clean fluid to the appropriate "cold" level. It is important that the fluid is free of air bubbles, so do not shake the container when topping-up, and pour the fluid slowly.

4 Disconnect the negative LT lead from the ignition coil. Have an assistant crank the engine on the starter in two second bursts, at the same time turning the steering wheel from lock to lock. Keep the reservoir topped up whilst this is going on.

5 When air bubbles no longer appear in the fluid, stop the cranking. Reconnect the coil negative lead and run the engine for a few seconds, then stop it and check the level again. Refit the filler cap.

6 Run the vehicle for a few miles to warm up the fluid and expel any remaining air, then stop the engine and make a final fluid level check.

3 Steering gear - removal and refitting**Manual steering**

1 Position the steering in the straight-ahead position, then remove the ignition key so that the steering is locked.

2 Slacken the front wheel nuts. Raise and support the front of the vehicle and remove the front wheels.

3 Remove the pinch-bolt and nut which secure the intermediate shaft flexible coupling to the pinion shaft (see illustration).

4 Slacken the track rod end locknuts by half a turn each (see illustration).

5 Remove the split pin from the track rod balljoint nuts. Unscrew the nuts, break the balljoint tapers using a separator tool and

disengage the track rod ends from the steering arms.

6 Remove the two bolts which secure the steering gear to the crossmember. Lift out the steering gear.

7 Mark the positions of the track rod ends on the track rods, using paint or sticky tape, so that they can be refitted in approximately the same positions. Unscrew the track rod ends and locknuts.

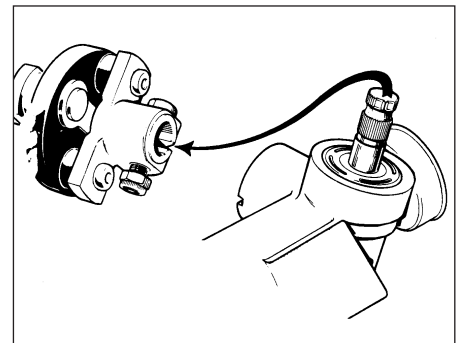
8 Commence refitting by screwing on the locknuts and track rod ends, observing the previously made position marks when applicable.

9 Bring the rack to the straight-ahead position. Do this by counting the number of turns of the pinion needed to go from lock to lock, then applying half that number of turns from full lock on one side.

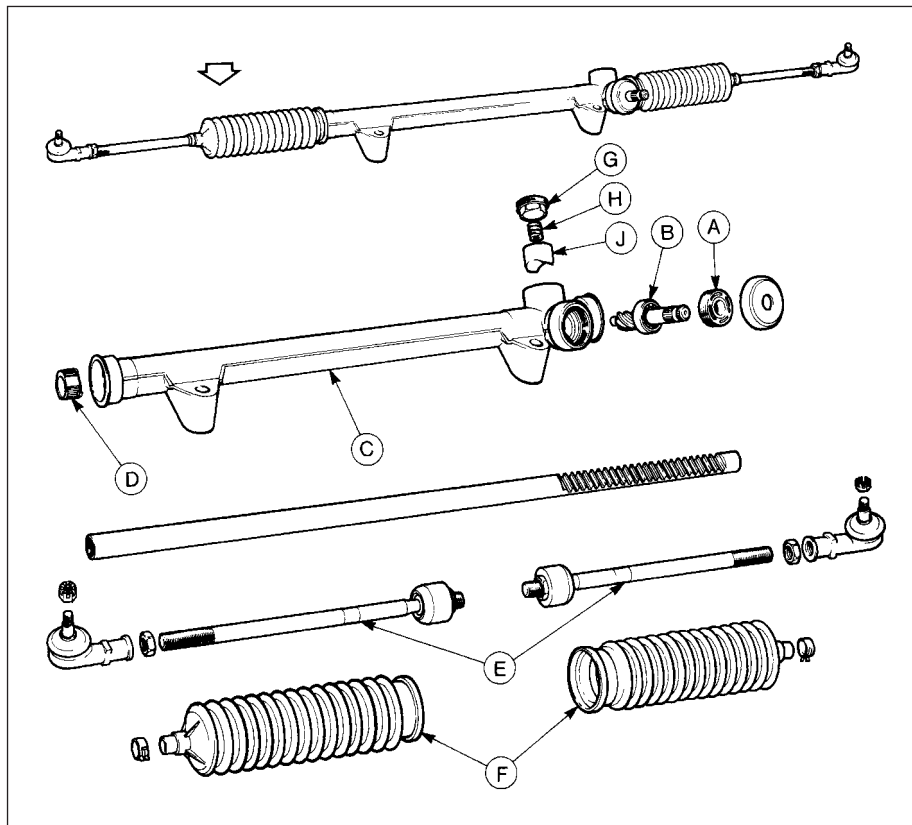
10 Offer the steering gear to the vehicle, engaging the flexible coupling and loosely fitting the securing bolts. Note that the master spline on the pinion shaft mates with the corresponding groove in the flexible coupling.

11 Tighten the two steering gear-to-crossmember bolts to the specified Stage 1 torque. Slacken the bolts and retighten to the Stage 2 torque. Finally tighten the bolts through the angle specified for Stage 3.

12 Make sure that the flexible coupling and pinion shaft are properly engaged, then fit the pinch-bolt and nut. Tighten the pinch-bolt to the specified torque.



3.3 Master spline and groove on pinion shaft and coupling



3.4 View of manual steering gear

- A Pinion nut
- B Pinion
- C Rack housing
- D Support bush
- E Track rods
- F Bellows
- G Slipper plug
- H Spring
- J Slipper

- 4 Fit the new bellows and secure with new clips. Make sure that the ends of the bellows are located in their grooves. Do not tighten the outer clip yet - leave it slack until toe has been checked after refitting.
- 5 Refit the track rod end locknut, followed by the track rod end itself.
- 6 Repeat on the other side of the vehicle if necessary.

5 Steering wheel - removal and refitting



Models before April 1992

- 1 Disconnect the battery negative lead.
- 2 Prise off the horn push pad from the centre of the steering wheel.
- 3 Remove the three screws which secure the horn switch plate. Withdraw the plate, disconnect its wires and remove it.
- 4 Engage the steering lock, then undo and remove the steering wheel nut. Unlock the steering again.
- 5 Mark the relationship of the wheel to the shaft, then pull the wheel off the shaft. Use a puller if it cannot be removed by hand. Do not use hammer blows, which may damage the collapsible parts of the column and shaft.
- 6 Recover the spacer from below the steering wheel (see illustration).
- 7 Refit by reversing the removal operations. Tighten the steering wheel nut to the specified torque.

Models from April 1992

- 8 The steering wheel can be removed and refitted as described above whilst ignoring the

- 13 Refit the track rod ends to the steering arms. Fit the balljoint nuts and tighten them to the specified torque, then secure with new split pins.
- 14 Nip up the track rod end locknuts, but do not tighten them fully yet.
- 15 Refit the front wheels and wheel nuts. Lower the vehicle and tighten the wheel nuts to the specified torque.
- 16 Check the toe setting as described in Section 19. When toe is correct, tighten the track rod end locknuts fully.

Power-assisted steering

- 17 Proceed as described for manual steering gear, but before removing the steering gear-to-crossmember bolts, remove the clamp plate bolt from the steering gear valve body (see illustration).



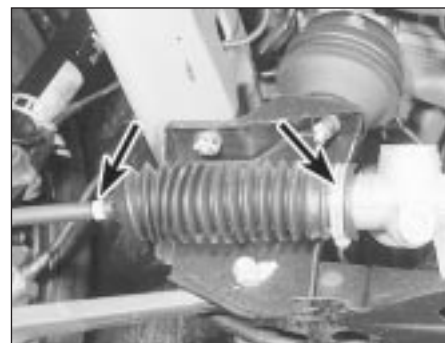
3.17 Clamp plate bolt (arrowed) is located between two fluid pipes

- 18 Pull the fluid pipes out of the valve body. Be prepared for fluid spillage. Plug or cap the open pipes and orifices.
- 19 The steering gear may now be removed.
- 20 Refit in the reverse order to removal, using new O-rings on the fluid pipes.
- 21 Bleed the steering gear hydraulic system on completion.

4 Steering rack bellows - renewal in vehicle



- 1 Remove the track rod end on the side concerned. Also remove the locknut.
- 2 Remove the bellows retaining clips and slide the bellows off the track rod (see illustration).
- 3 On manual steering racks, apply a smear of grease to the track rod



4.2 Steering rack bellows retaining clips (arrowed)



5.6 Spacer ring (arrowed) fits below steering wheel



7.8 Two of the three nuts (arrowed) which secure the column height adjuster

reference to horn switch plate retaining screws. Note that the wheel is retained by a bolt, not a nut as on earlier models. To gain access to the bolt, prise out the horn button and disconnect the wiring connectors.

6 Steering wheel - centralising

1 This operation is for correcting small errors in steering wheel centralisation - up to 60°. For larger errors, remove the steering wheel and make a rough correction by repositioning the wheel on refitting.

2 Drive the vehicle in a straight line on a level surface. Note the angle by which the steering wheel deviates from the desired straight-ahead position.

3 Raise the front of the vehicle by driving it onto ramps, or with a jack and axle stands (see "Jacking").

4 Slacken both track rod end locknuts. Also slacken the steering rack bellows outer clips.

5 Make alignment marks between each track rod end and its rod, so that the amount of rotation applied can be accurately determined.

6 Turn both track rods **in the same direction** to correct the steering wheel position. As a rough guide, 19° of track rod rotation will change the steering wheel position by 1°. To correct error at the steering wheel, rotate both track rods anti-clockwise (viewed from the left-hand side of the vehicle), and the reverse to correct as anti-clockwise errors. *Both track rods must be rotated by the same amount.*

7 Tighten the bellows clips and the track rod end locknuts when adjustment is correct. Lower the vehicle.

7 Steering column - removal and refitting

1 Disconnect the battery negative lead.

2 Position the steering in the straight-ahead position.

3 Remove the steering wheel. This is not essential, but will improve access.

4 Working under the bonnet, disconnect the intermediate shaft universal joint from the steering column shaft.

HAYNES **HiNT** *Make alignment marks between the two shafts for reference when reassembling.*

5 Remove the steering column shrouds and disconnect the switch multi-plugs. Do not forget the ignition/starter switch.

6 Disconnect the bonnet release cable from the operating lever on the underside of the column.

7 Prise out the driver's side air vent. Remove the under-dash insulation and trim panel on the driver's side, unclipping the bulb failure module, where applicable.

8 Remove the three nuts which secure the column height adjuster to the mounting bracket (see illustration). Remove the column assembly by drawing it into the vehicle. Do not drop it or otherwise mistreat it if it is to be re-used.

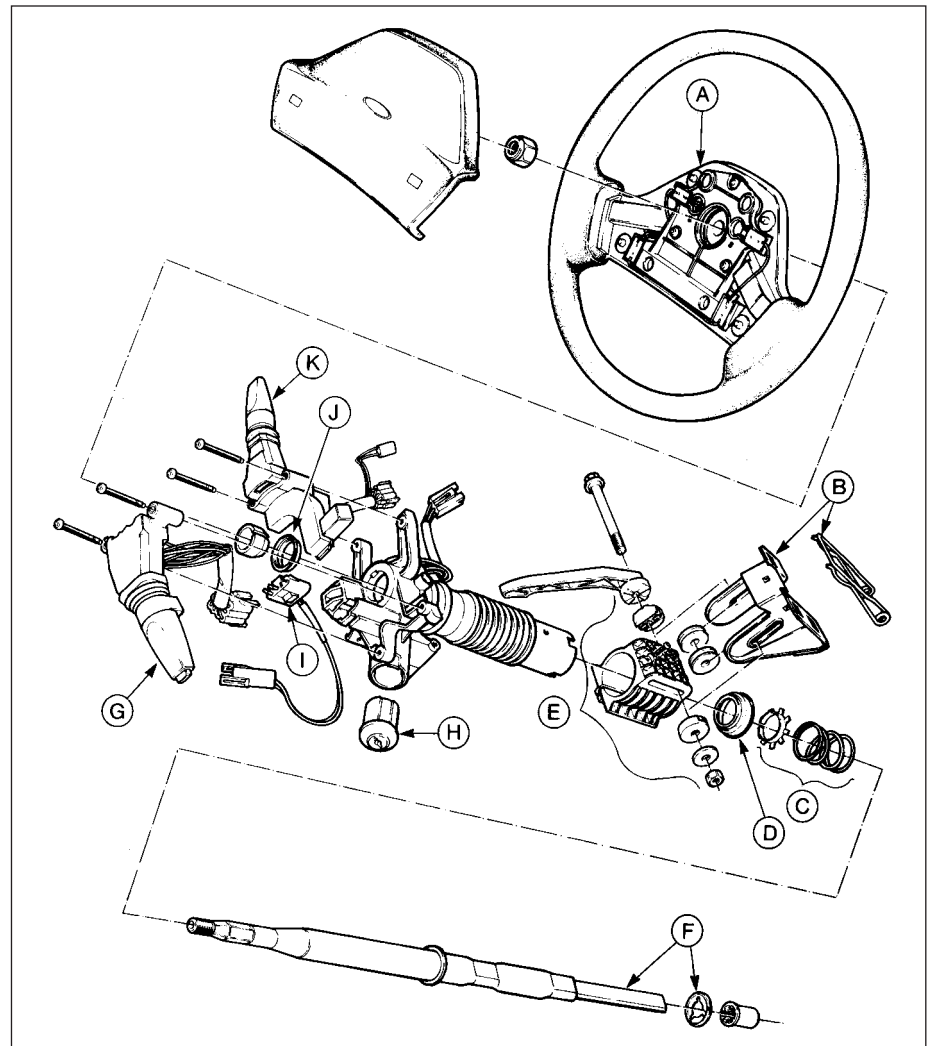
9 When refitting, have an assistant guide the column shaft into the intermediate shaft universal joint. Secure the column with the three nuts inside the vehicle and adjust it to the minimum length position, then tighten the coupling pinch-bolt.

10 Complete refitting by reversing the removal operations.

8 Steering column lock - removal and refitting

1 Remove the steering column (see illustration).

2 Insert the key into the lock and turn it to position 1. (If the lock has failed so that the key will not enter, destructive methods will have to be used.)



8.1 View of steering wheel and column

A Steering wheel

B Mounting bracket and spring

C Thrust washer and spring

D Lower bearing

E Height adjuster

F Column shaft and spire washer

G Multi-function switch

H Ignition/steering lock

I Horn brush unit

J Upper bearing

K Multi-function switch



8.3 Depress the column lock locking button

- 3 Depress the locking button with a small screwdriver. Draw the lock barrel out of its housing using the key (see illustration).
- 4 Refit by reversing the removal operations.

9 Steering intermediate shaft and flexible coupling - removal and refitting

- 1 The intermediate shaft and flexible coupling are not available separately, and so must be renewed as a unit.
- 2 Disconnect the battery negative lead.
- 3 Position the steering straight-ahead.
- 4 Remove the pinch-bolts which secure the upper and lower ends of the intermediate shaft. Free the universal joint from the column shaft, then pull the flexible coupling off the pinion shaft.
- 5 When refitting, engage the master spline on the pinion shaft with the groove in the flexible coupling.
- 6 Tighten the pinch-bolts to the specified torque.
- 7 Reconnect the battery.

10 Power steering pump drivebelt - removal, refitting and tensioning

Refer to Chapter 1, Section 21.

11 Power steering pump - removal and refitting

All engines except DOHC

- 1 Disconnect the battery negative lead.
- 2 Wipe clean around the unions, then disconnect the high pressure and return pipes from the pump and the reservoir. Be prepared for fluid spillage; take steps to keep fluid out of the alternator.
- 3 Remove the pump drivebelt(s).
- 4 Remove the pump mounting, pivot and adjustment bolts (as applicable) and lift the pump from the engine (see illustration).
- 5 If a new pump is to be fitted, recover the pulley and mounting plate from the old pump.

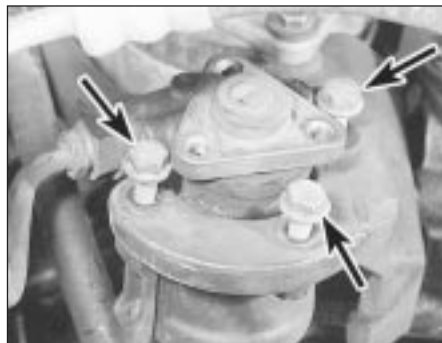


11.4 Steering pump pivot bolt (arrowed) - V6 model shown

- 6 Refit by reversing the removal operations. Adjust the drivebelt tension on completion and bleed the steering hydraulic system.

DOHC engines

- 7 The pump is mounted on a bracket on the front right-hand side of the cylinder block. To improve access to the pump, firmly apply the handbrake then jack up the front of the car and support it securely on axle stands (see "Jacking").
- 8 Place a suitable container under the pump, unscrew the fluid pipe unions, and drain the fluid.
- 9 Remove the drivebelt with reference to Chapter 1.
- 10 Prevent the pulley from rotating using a strap wrench (which can be improvised using an old drivebelt and a large socket and wrench), and unscrew the three pulley securing bolts (see illustration). Withdraw the pulley.
- 11 Unscrew the three pump securing bolts from the front of the pump bracket, and the single bolt from the rear of the bracket, and withdraw the pump (see illustration).
- 12 Refitting is a reversal of removal, bearing in mind the following points:
 - a) Reconnect the fluid unions using new O-rings.
 - b) On completion, top-up and bleed the power steering fluid circuit.



11.11 . . . for access to the front pump securing bolts (arrowed)



11.10 Unbolt the power steering pump pulley . . .

12 Power steering hoses - removal and refitting

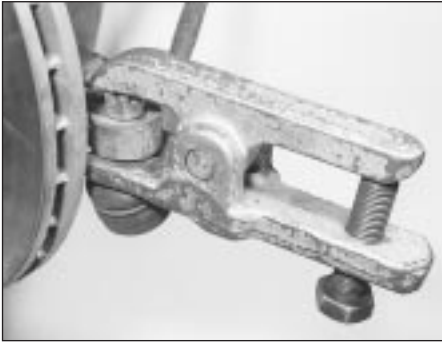
- 1 Disconnect the battery negative lead.
- 2 Clean around the hose unions on the steering gear. Remove the single securing bolt, withdraw the hoses and catch the fluid which will drain from the reservoir.
- 3 Clean around the hose unions on the pump. Disconnect the unions and remove the hoses.
- 4 Refit in the reverse order to removal, using new O-rings.
- 5 Top-up the steering fluid and bleed the system.

13 Track rod end - removal and refitting

- 1 Slacken the front wheel nuts, raise and support the vehicle and remove the front wheel on the side concerned.
- 2 Slacken the track rod end locknut by half a turn.
- 3 Remove the split pin from the track rod end balljoint nut. Unscrew the nut a few turns (see illustration).
- 4 Break the balljoint taper with a proprietary balljoint separator (see illustration). Remove the separator and the nut and disengage the track rod end from the steering arm.
- 5 Unscrew the track rod end from the track rod, being careful not to disturb the locknut.



13.3 Track rod end balljoint nut unscrewed



13.4 Using a balljoint separator

6 When refitting, screw the track rod end onto the track rod as far as the locknut, then back it off half a turn.

7 Insert the ball-pin into the steering arm. Tighten the balljoint nut to the specified torque and secure with a new split pin. Nip up the track rod end locknut, but do not tighten it fully yet.

8 Refit the roadwheel, lower the vehicle and tighten the wheel nuts to the specified torque.

9 Check the toe setting as described in the following Section. (This may not be strictly necessary if the same track rod end has been refitted, but is certainly advisable if any components have been renewed.)

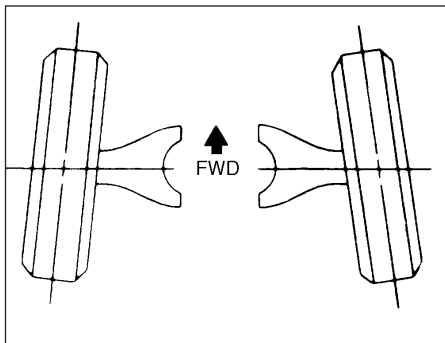
10 Tighten the track rod end locknut when toe is correct.

14 Front wheel alignment - checking and adjusting



1 Front wheel alignment is defined by camber, castor, steering axis inclination and toe setting. The first three factors are determined in production; only toe can be adjusted in service. Incorrect toe will cause rapid tyre wear (see illustration).

2 Toe is defined as the amount by which the distance between the front wheels, measured at hub height, differs from the front edges to the rear edges. If the distance between the front edges is less than that at the rear, the wheels are said to toe-in; the opposite case is known as toe-out.



14.1 Front wheel toe-in (greatly exaggerated)

3 To measure toe, it will be necessary to obtain or make a tracking gauge. These are available in motor accessory shops, or one can be made from a length of rigid pipe or bar with some kind of threaded adjustment facility at one end. Many tyre specialists will also check toe free, or for a nominal sum.

4 Before measuring toe, check that all steering and suspension components are undamaged and that tyre pressures are correct. The vehicle must be at approximately kerb weight, with the spare wheel and jack in their normal positions and any abnormal loads removed.

5 Park the vehicle on level ground and bounce it a few times to settle the suspension.

6 Use the tracking gauge to measure the distance between the inside faces of the front wheel rims, at hub height, at the rear of the front wheels. Record this distance; call it measurement A.

7 Push the vehicle forwards or backwards so that the wheels rotate exactly 180° (half a turn). Measure the distance between the front wheel rims again, this time at the front of the wheels. Record this distance; call it measurement B.

8 Subtract measurement B from measurement A. If the answer is positive it is the amount of toe-in; if negative it is the amount of toe-out. Permissible values are given in the Specifications.

9 If adjustment is necessary loosen the track rod end locknuts and the outer bellows clips, then rotate each track rod by equal amounts until the setting is correct. Hold the track rod ends in their horizontal position with a spanner while making the adjustment.

10 Tighten the locknuts and outer bellows clips.

11 Provided the track rods have been adjusted by equal amounts the steering wheel should be central when moving straight-ahead. The amount of visible thread on each track rod should also be equal.

15 Front suspension crossmember - removal and refitting



1 Disconnect the battery negative lead.

2 Raise and securely support the front of the vehicle.

3 Remove the suspension lower arm pivot nuts and bolts (see illustration). Disengage the arms from the crossmember.

4 Disconnect the steering column shaft from the intermediate shaft universal joint.

5 Remove the two bolts which secure the steering gear to the crossmember. Draw the steering gear forwards so that it is clear of the crossmember and support it by wiring it to the frame rails.

6 It is now necessary to support the engine, preferably from above, using a hoist or an adjustable support bar resting on the wings or suspension turrets. Alternatively a jack and some wooden blocks may be used from

below, but this is bound to obstruct access to some extent.

7 Remove the engine mounting lower securing nuts. Raise the engine until the mountings are just clear of the crossmember.

8 Release the brake pipe clips from the crossmember and slide the brake pipes from their slots. Be careful not to strain the pipes.

9 Support the crossmember and remove its four securing bolts. Lower the crossmember and remove it from the vehicle.

10 Commence refitting by offering the crossmember to the frame rails. Insert the four securing bolts and tighten them to the specified torque.

11 Secure the brake pipes to the crossmember.

12 Refit the steering gear to the crossmember. Tighten its securing bolts to the specified torque.

13 Insert the suspension arms into the crossmember and secure them with the pivot bolts and nuts. Do not tighten the nuts and bolts yet, just nip them up.

14 Lower the engine onto the crossmember. Make sure that the engine mountings locate correctly into the holes in the crossmember. Tighten the engine mounting nuts. The engine support bar or hoist can now be removed.

15 Reconnect the steering column shaft to the intermediate shaft. Tighten the pinch-bolt to the specified torque.

16 Lower the vehicle onto its wheels, then tighten the lower arm pivot bolts to the specified torque.

17 Reconnect the battery.

16 Front stub axle carrier - removal and refitting



1 Slacken the front wheel nuts. Raise and support the front of the vehicle and remove the front wheel.

2 Separate the track rod end from the steering arm.

3 Unbolt the brake caliper, pull it off the disc and tie it up out of the way. Do not allow it to hang by its hose.

4 Remove the split pin from the suspension lower arm balljoint nut. Slacken the nut a few



15.3 Front suspension lower arm pivot bolt

11•8 Steering and suspension

times, then use a proprietary balljoint separator to break the taper (see illustration).

5 Use a stout piece of wood to lever the lower arm downwards and free the balljoint from the stub axle carrier.

6 Remove the ABS wheel sensor from its hole.

7 Remove the spring clip from one of the wheel studs and pull the brake disc off the hub.

8 Remove the stub axle carrier pinch-bolt. Spread the stub axle carrier by carefully introducing a chisel or blunt instrument into its slot. Draw the stub axle carrier off the suspension strut and remove it.

9 Refit by reversing the removal operations, noting the following points:

- a) Tighten all fastenings to the specified torque
- b) Use new split pins, when applicable
- c) Renew the wheel sensor O-ring if necessary; clean the sensor and its bore, and smear them with wheel bearing grease

17 Front wheel bearings - renewal



Models before August 1989

1 Remove the stub axle carrier as described in the previous Section.

2 Screw the wheel nuts onto the studs to protect the threads. Clamp the stub axle carrier in a vice by means of the studs and nuts; do not overtighten.

3 Remove the dust cap from the hub nut, carefully levering it free (see illustration). A new cap and a new hub nut will be required for reassembly.

4 Undo the hub nut. This nut is very tight. The right-hand hub nut has a left-hand thread, therefore it is undone in a clockwise direction.

5 Remove the ABS rotor from below the hub nut.

6 Lift the carrier off the stub axle, tapping it with a mallet if necessary to free it. Remove the bearing inner race from the carrier.

7 Prise the oil seal out of the carrier and recover the bearing outer race.



17.3 Removing the dust cap from the stub axle carrier to expose the hub nut



16.4 Slackening the front suspension lower arm balljoint nut

8 Drive the bearing tracks out of the stub axle carrier using a blunt drift and a hammer. Be careful not to mark the bearing seats.

9 Clean all old grease and debris from the stub axle carrier.

10 New bearing components are matched in production and must only be fitted as a set. Only the manufacturer's approved components should be used in order to obtain the required long service life and freedom from adjustment.

11 Drive the new bearing tracks into the carrier, preferably using a suitable diameter tube to seat them. Make sure the tracks are fully seated.

12 Work some clean grease into the bearing races. Use high melting-point lithium-based grease (to Ford spec. SAMIC-9111A or equivalent). Make sure all the spaces between the rollers are filled; do not pack grease into the space between the inner and outer bearings however.

13 Fit the bearing outer race. Grease the lips of a new oil seal and fit it to the stub axle carrier, lips facing inwards. Seat the seal with a pipe or large socket and a mallet.

14 Offer the carrier to the stub axle, tapping it home if necessary. Fit the bearing inner race over the stub axle.

15 Refit the ABS rotor, dished face uppermost.

16 Fit a new hub nut (left-hand thread on the right-hand hub) and tighten it to the specified torque.



17.17 Seating the new dust cap

17 Fit a new dust cap and seat it by tapping round the rim (see illustration).

18 Refit the stub axle carrier.

Models from August 1989

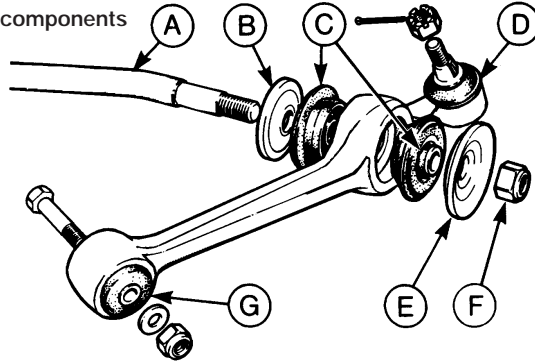
19 Modified front wheel bearing assemblies were fitted to all models after 1989. The modified bearings are of similar design, but are interference fit type bearings. This was to reduce the amount of endfloat present at the wheel hub and to improve bearing preload tolerances. This was achieved by increasing the diameter of the stub axle, thus causing the axle to be an interference fit in the bearing. Note that the modified bearings can be fitted to earlier models which were originally equipped with non-interference fit front wheel bearings. **Note:** Due to the design of the interference fit bearings, a suitable heavy duty bearing puller and a hydraulic press and several suitable mandrels will be required to remove the original bearing and install the new one.

20 Interference fit front wheel bearings can be removed and refitted as described above, noting the following points.

- a) It will be necessary to press or draw the stub axle out of the carrier using a hydraulic press or a suitable bearing puller.
- b) Draw the outer bearing off the stub axle using a suitable bearing puller.
- c) Press new bearing tracks into the hub carrier using a suitable tubular spacer which bears only on the tracks outer edge.
- d) Pack the new outer bearing with Ford grease (SAM-1C9111-A) and press the bearing into the carrier.
- e) Press a new seal into position in the carrier and pack all cavities with the specified grease.
- f) Position the hub carrier over the stub axle and press the carrier onto the axle using a suitable tubular spacer which bears only on the bearing track outer edge.
- g) Pack the new inner bearing with the specified grease then press the bearing onto the stub axle, using a suitable tubular spacer, whilst rotating the hub carrier to ensure that the bearing is correctly seated.
- h) Whilst tightening the hub nut to the specified torque, rotate the hub carrier to ensure that the bearing preload is correct and bearings are correctly seated. Once the nut is tightened to the specified torque, rotate the hub carrier 20 times to settle the bearings in position then recheck that the hub nut is tightened to the specified torque. Pack the inner bearing with the specified grease and fit a new dust cap.

18.2 Front suspension lower arm components

- A Anti-roll bar
- B Rear dished washer and cover
- C Bushes
- D Balljoint
- E Front dished washer and cover
- F Locknut
- G Pivot bush

**18 Front suspension lower arm - removal, overhaul and refitting**

- 1 Raise the vehicle on ramps or on a hoist, so that the weight is still on the wheels.
- 2 Remove the lower arm pivot nut and bolt (see illustration).
- 3 Remove the anti-roll bar end nut, dished washer and plastic cover. Note which way round these components are fitted.
- 4 Now raise and support the vehicle so that the front wheels are off the ground.
- 5 Remove the split pin from the lower arm balljoint nut. Back off the nut a few turns, break the taper with a balljoint separator, then remove the nut and free the balljoint from the stub axle carrier.
- 6 Pull the lower arm off the anti-roll bar and remove it.
- 7 If the balljoint is defective, the whole arm must be renewed. The dust boot can be renewed separately if required.
- 8 The anti-roll bar bushes (compliance bushes) can be removed by cutting off their flanges with a chisel, then pressing or tapping out the remains. Fit new bushes by tapping them home with a tube or socket.
- 9 The pivot bush can be pressed out using a bench vice and a couple of large sockets or suitable pieces of tube. The new pivot bush should be lubricated with soap or glycerine (not oil or grease) before being fitted in a similar fashion. Do not keep the new bush compressed in the tube for longer than necessary, in case it becomes permanently distorted.
- 10 Commence refitting by offering the arm to the anti-roll bar. Make sure that the shallow dished washer and the plastic cover are fitted on the inboard side of the bar (furthest from the nut).
- 11 Refit the balljoint to the stub axle carrier. Tighten the castellated nut to the specified torque and secure it with a new split pin.
- 12 Fit the pivot end of the arm into the crossmember and secure it with the pivot nut and bolt. Jacking the vehicle up or down to vary the loading on the wheels may help to get the holes lined up. Do not tighten the pivot nut and bolt yet.
- 13 Lower the vehicle back onto its wheels.

14 Fit the deep dished washer and the plastic cover over the end of the anti-roll bar. Fit the nut and tighten it to the specified torque.

15 Tighten the lower arm pivot nut and bolt to the specified torque.

19 Front anti-roll bar - removal and refitting

- 1 Raise the vehicle on ramps or a hoist, so that the weight is still on the wheels.
- 2 Unbolt the two anti-roll bar clamps (see illustration).
- 3 Now raise and support the vehicle with the wheels free.
- 4 Remove the two nuts which hold the ends of the anti-roll bar to the lower arms. Recover the plastic covers and deep dished washers.
- 5 Remove one lower arm pivot nut and bolt. Prise the lower arm out of the crossmember and work the anti-roll bar free from it.
- 6 Pull the anti-roll bar out of the other lower arm and remove it. Recover the other compliance bush covers and washers.
- 7 Refit by reversing the removal operations, but do not finally tighten any fastenings until the weight of the vehicle is back on the wheels. Tighten in the following order:
 - a) Anti-roll bar clamps
 - b) Anti-roll bar-to lower arm nuts
 - c) Lower arm pivot nut and bolt
- 8 Make sure that the anti-roll bar clamp bushes are not twisted on completion.

20 Front anti-roll bar bushes - renewal**Compliance bushes**

1 These are described in Section 18. It is not strictly necessary to remove the lower arms to renew these bushes, though obviously access is not good with the arms installed.

Clamp bushes

- 2 Although it is possible to remove and refit the clamp bushes without removing the anti-roll bar, since the bushes are split, this is not recommended by the makers.
- 3 Remove the anti-roll bar as described in the previous Section.

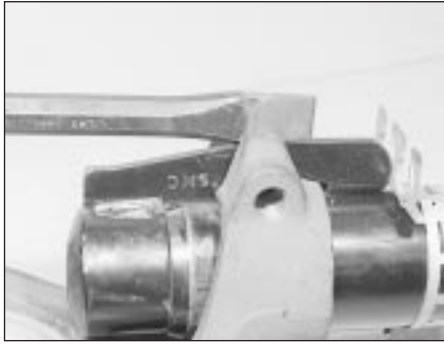
**19.2 A front anti-roll bar clamp**

- 4 Slide the clamp bushes off the anti-roll bar, if necessary prising them open a little first.
- 5 Lubricate the new bushes with glycerine or soap and slide them into position with the split facing forwards.
- 6 Refit the anti-roll bar.

21 Front suspension strut - removal and refitting

- 1 Slacken the front wheel nuts, raise and support the vehicle and remove the front wheel.
- 2 Disconnect the battery negative lead.
- 3 Unbolt the brake caliper and suspend it nearby so that the flexible hose is not strained.
- 4 Remove the ABS sensor from the stub axle carrier.
- 5 Separate the track rod end and suspension lower arm balljoints from the stub axle carrier.
- 6 Unclip the ABS/brake pad wear wiring from the strut.
- 7 Remove the dust cover from the top of the strut.
- 8 Have an assistant support the strut. Remove the three nuts which secure the strut to the turret (see illustration). Do not undo the centre nut.
- 9 Lower the strut out of the turret and remove it.
- 10 Refit by reversing the removal operations. Do not fully tighten the strut-to-turret nuts until the weight of the vehicle is back on its wheels.

**21.8 Two of the three nuts (arrowed) securing the suspension strut to the turret**



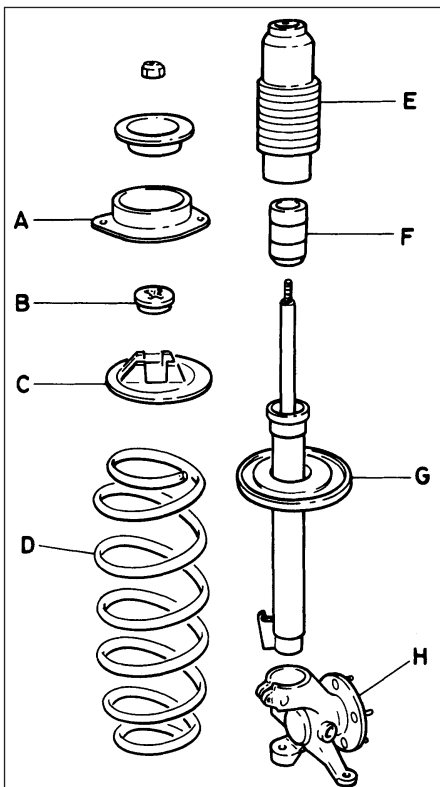
22.2 Spreading the stub axle carrier clamp

22 Front suspension strut - dismantling and reassembly



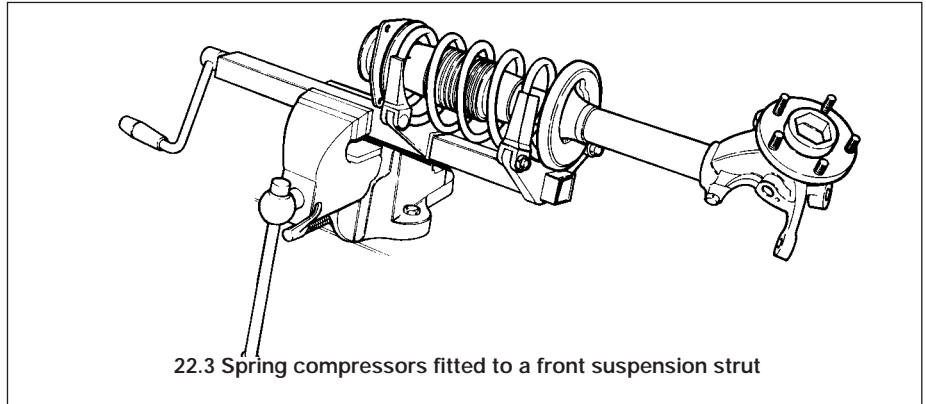
Warning: Spring compressors of adequate rating must be used for this job. The use of makeshift or inadequate equipment may result in damage and personal injury.

1 With the strut removed, clamp it in a vice with protected jaws.



22.5 Front suspension strut components

- | | |
|---------------------|--|
| A Top mount | F Bump stop |
| B Bearing | G Shock absorber and spring lower seat |
| C Spring upper seat | H Stub axle |
| D Spring | |
| E Gaiter | |



22.3 Spring compressors fitted to a front suspension strut

2 Remove the stub axle carrier pinch-bolts. Spread the carrier by carefully introducing a chisel or blunt screwdriver into the crack, then slide it off the strut (see illustration).

3 Fit spring compressors to the strut. Compress the spring until it is no longer tensioning the strut. Make sure that the compressors are secure (see illustration).

4 Hold the piston rod with a hexagon key and remove the piston rod nut. Also remove the dished retainer.

5 Remove the top mount, the bearing and the spring upper seat (see illustration).

6 Carefully lift off the compressed spring. Place it where it will not be knocked or jarred.

7 Remove the shock absorber gaiter and bump stop.

8 Examine all components for wear and damage and renew as necessary. The shock absorber must be renewed if it is leaking, or if it shows uneven resistance when "worked" with its lower end clamped in a vice. In theory springs and shock absorbers should be renewed in pairs in order to maintain balanced handling characteristics.

9 Commence reassembly by sliding the bump stop onto the shock absorber piston rod. Refit the gaiter.

10 Make sure that the spring seats are clean, then fit the compressed spring to the lower seat.

11 Refit the spring upper seat, the bearing (small hole upwards) and the top mount.

12 Refit the dished retainer and the piston rod nut. Hold the piston rod and tighten the nut.

13 Carefully release the spring compressors. Make sure that the ends of the spring are correctly located in the spring seats.

14 Spread the stub axle carrier again. Slide it onto the strut, remove the spreader and refit the pinch-bolt. Tighten the pinch-bolt to the specified torque.

15 Refit the strut to the vehicle.

23 Rear suspension and final drive assembly - removal and refitting



Models before 1987

1 Raise the rear of the vehicle and support it securely under the frame rails.

2 Remove the exhaust system.

3 Remove the propeller shaft.

4 Release the handbrake cable from the equaliser yoke by removing the circlip from the handbrake lever pin. Release the cable from its floor brackets.

5 Disconnect the brake flexible hoses from the rear brake pipes.

6 Disconnect the ABS and brake pad wear sensor wires (as applicable). Free the wires from the suspension lower arms.

7 Unbolt the two anti-roll bar brackets from the floors.

8 Disconnect the ride height control sensor and the shock absorber air lines, when so equipped.

9 Lower the vehicle onto its wheels in order to load the rear springs a little. Place a jack under the final drive unit and support it.

10 Unbolt and remove the two guide plates (see illustrations). The centre bolt on each plate is retained by a lockwasher which must be released first.

11 Unbolt the final drive unit rear mounting from the floor.

12 Remove the luggage area side trim, then remove the rear shock absorber upper mounting bolts.

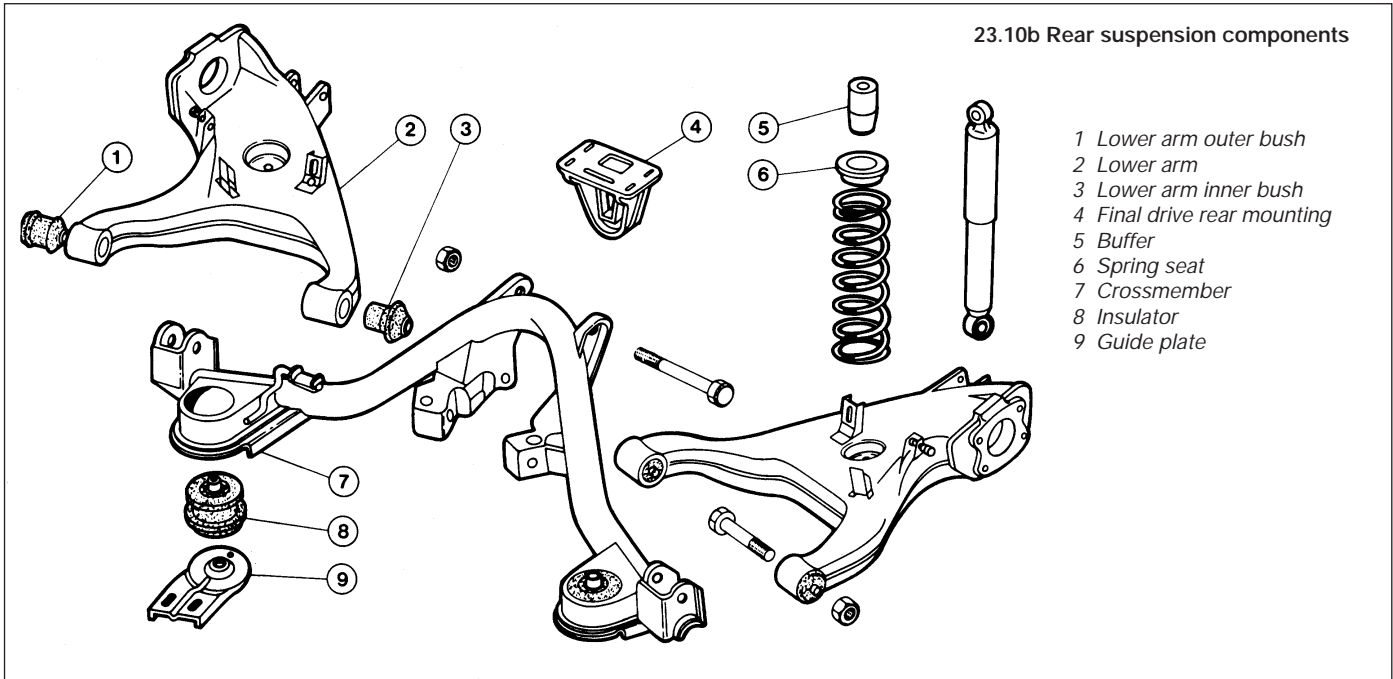
13 Raise and support the rear of the vehicle again. Withdraw the rear suspension and final drive assembly.

14 Refit by reversing the removal operations. Tighten all fastenings to the specified torque, when known. When applicable use new O-rings on the ride height control line unions.



23.10a One of the rear suspension guide plates

23.10b Rear suspension components



15 Bleed the brake hydraulic system and adjust the handbrake on completion.

Models from 1987

16 From 1987, the tab washer which secures the guide plate centre bolt on each side has been deleted. A self-locking bolt and plain washer are used instead.

17 The new bolt and washer should be fitted to earlier models if the old bolt has been removed for any reason. The tab washer should be discarded.

18 The tightening torque for the new bolt remains the same as that given for the original.

24 Rear hub - removal and refitting

- 1 Remove the wheel trim. Apply the handbrake and chock the front wheels.
- 2 Slacken the driveshaft stub axle. This nut is very tight. The left-hand nut has a **left-hand** thread, therefore it is undone **clockwise**.
- 3 Remove the brake disc.
- 4 Remove the driveshaft stub axle.
- 5 Remove the four bolts which secure the hub. Pull the hub off the driveshaft stub, leaving the disc splash shield loose.
- 6 Refit by reversing the removal operations. Carry out the final tightening of the driveshaft stub nut with the wheels on the ground.

25 Rear wheel bearings - renewal

- 1 Remove the rear hub as described in the previous Section (**see illustration**).
- 2 Prise out both oil seals from the hub. Recover the bearing races.
- 3 Drive the bearing tracks out of the hub with a hammer and a blunt drift.

4 Clean grease and debris from the hub and clean up any burrs or nicks.

5 Fit the new bearing tracks, pressing them in squarely with the help of a piece of pipe or tube.

6 Thoroughly grease the bearing races and pack the lips of the oil seals with grease.

7 Fit the races and the oil seals, lips inwards. Seat the oil seals with a mallet and the pipe or tube.

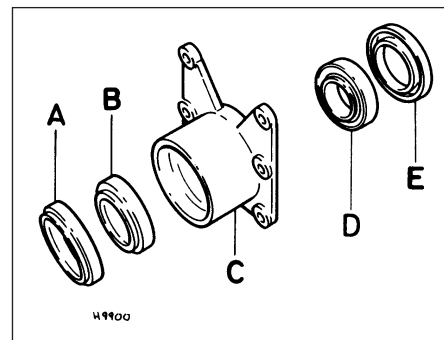
8 Refit the rear hub.

26 Wheel stud - renewal

1 This procedure is only specified by the manufacturers as applying to the rear wheels, but there is no reason to believe that it will not work on the front.

2 Remove the rear wheel, brake caliper and brake disc.

3 Drive the wheel stud out of the hub flange.



25.1 Rear hub components

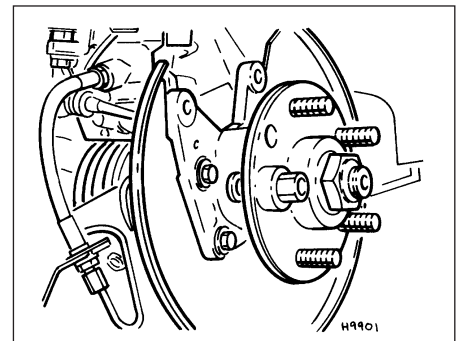
- | | |
|------------------|------------------|
| A Outer oil seal | D Inner bearing |
| B Outer bearing | E Inner oil seal |
| C Hub | |

4 Insert the new stud from the inboard side of the flange. Engage the splines by hand pressure, then draw the stud into place with a wheel nut and progressively thicker spacers (**see illustration**).

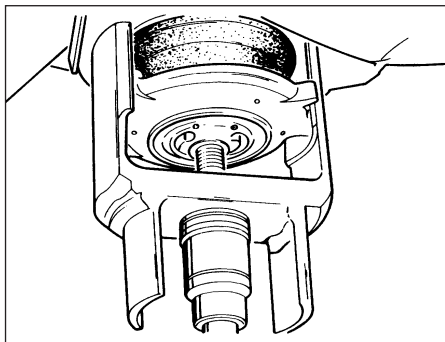
5 Refit the brake disc, caliper and wheel.

27 Rear spring - removal and refitting

- 1 Raise and support the rear of the vehicle.
- 2 Unbolt the driveshaft outboard flange from the stub. It is secured by six Torx screws.
- 3 Disconnect the anti-roll bar from the link rod by prising it free. On models with ride height control, also disconnect the height sensor from the anti-roll bar link rod.
- 4 Free the brake pipe and flexible hose from the brackets next to the spring. If it is the left-hand spring which is being removed, also unbolt the brake pipe T-piece from the floor.
- 5 Raise a jack under the rear suspension lower arm to load the spring.
- 6 Unbolt the shock absorber from the lower arm.



26.4 Fitting a new wheel stud using a nut and spacer



28.4 Drawing out an insulator with the special tool

- 7 Unbolt the guide plate from the body on the side concerned.
- 8 Carefully lower the jack until the spring is no longer under tension. Remove the spring and the rubber buffer.
- 9 Refit by reversing the removal operations, tightening all fastenings to the specified torque when known.

28 Rear crossmember insulator - removal and refitting



Note: Ford tool No 15-014, or locally made equivalent, will be required for this job.

- 1 Raise and support the rear of the vehicle.
- 2 Flatten the lockwasher which secures the guide plate centre bolt. Remove the centre bolt and the two bolts which hold the guide plate to the floor; remove the guide plate.
- 3 Wedge a piece of wood between the crossmember and the floor.
- 4 Draw the insulator out with the special tool (see illustration).
- 5 Smear the new insulator with glycerine or liquid soap, then press it in as follows.
- 6 Use the special tool spindle or other long M12 bolt. Screw a nut up to the bolt head, then fit a plain washer and the insulator onto the bolt. Pass the bolt through the hole in the crossmember and screw it into the floor, then press the insulator home by winding the nut and washer up the bolt.
- 7 Remove the installation tool and the wood.
- 8 Refit the guide plate, tightening the bolts to the specified torque. Secure the centre bolt with the lockwasher.
- 9 Lower the vehicle.

29 Rear suspension lower arm - removal and refitting



- 1 Remove the rear hub.
- 2 Disconnect both rear brake flexible hoses from the brake pipes. Free the brake pipes from the brackets on the lower arms.
- 3 Unclip the handbrake cable from the lower arm.
- 4 Remove the rear spring.
- 5 Remove the lower arm-to-crossmember bolts. Withdraw the lower arm.



30.2 Rear anti-roll bar link rod

- 6 Renew the rubber bushes if wished, using lengths of tube or sockets and a vice, or large nuts and bolts. Lubricate the new bushes with glycerine or liquid soap.
- 7 Refit by reversing the removal operations, tightening the lower arm-to-crossmember bolts with the weight of the vehicle back on its wheels. Bleed the brake hydraulic system on completion.

30 Rear anti-roll bar - removal and refitting



- 1 Raise and support the rear of the vehicle.
- 2 Separate the anti-roll bar from the link rods on each side by prising them free (see illustration).
- 3 Unbolt the two anti-roll bar brackets. Remove the bar, brackets and bushes (see illustration).
- 4 Refit by reversing the removal operations. Tighten the bracket bolts to the specified torque.

31 Rear shock absorber - removal and refitting



- 1 Working inside the vehicle, remove the luggage area side trim to gain access to the shock absorber top mounting.
- 2 Raise and support the rear of the vehicle. Raise a jack under the rear suspension lower arm to take the load off the shock absorber.



31.4 Undoing a rear shock absorber top mounting



30.3 A rear anti-roll bar bracket - bolt arrowed

- 3 On models with ride height control, disconnect the air line from the shock absorber.
- 4 Unbolt the shock absorber top mounting (see illustration).
- 5 Unbolt the shock absorber lower mounting (see illustration). Pull the shock absorber out of the lower mounting bracket and remove it.
- 6 Refit by reversing the removal operations. Tighten the shock absorber mountings to the specified torque. On models with ride height control, use new O-rings on the air line union.

32 Ride height control system - general information

The ride height control system is an optional extra, designed to keep the rear suspension height constant regardless of vehicle load. This is obviously useful if heavy loads are often carried, or if the vehicle is used for towing.

The main components of the system are a height sensor, a compressor and two special rear shock absorbers. The compressor supplies air to the shock absorbers, so "pumping up" the rear suspension, when so commanded by the height sensor. Other components include the connecting pipes, electrical wiring and a compressor relay. The relay is mounted behind the glovebox.

Variations in vehicle height are not recognised by the system for approximately 20 seconds, in order to prevent responses to temporary changes such as those induced by



31.5 Undoing a rear shock absorber lower mounting

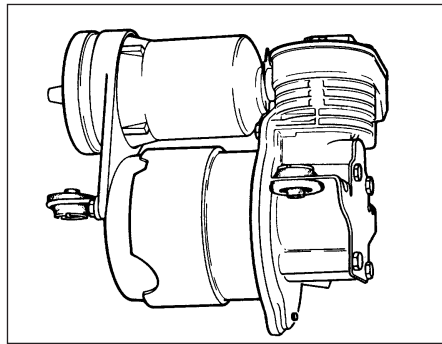
cornering or braking. Control circuitry also prevents the compressor being energised for more than five minutes continuously, as could otherwise happen if the system sprang a leak.

No repairs to individual components are possible. Apparent control faults should be referred to a Ford dealer before embarking on an expensive programme of testing by substitution. Always use new O-rings on the pipe unions once they have been disturbed.

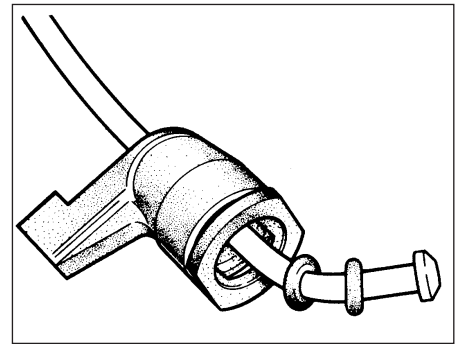
33 Ride height control compressor - removal and refitting



- 1 Disconnect the battery negative lead.
- 2 Raise and support the front of the vehicle.
- 3 Remove the compressor cover (front left-hand side of engine) which is secured by four screws.
- 4 Disconnect the air pipe and the power supply leads from the compressor (**see illustration**).
- 5 Remove the three bolts which secure the compressor to the bracket. Withdraw the compressor, at the same time disconnecting the suction line and the control multi-plug.
- 6 Refit by reversing the removal operations; use new O-rings on the air pipe union (**see illustration**).



33.4 Ride height control compressor

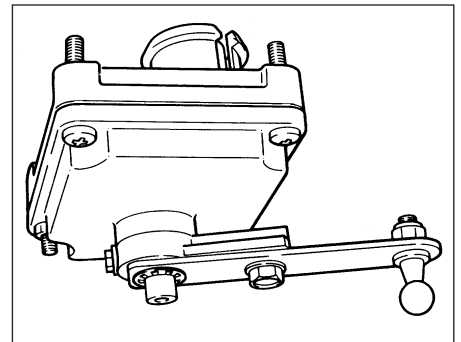


33.6 Detail of ride height control pipe union

34 Ride height control sensor - removal and refitting



- 1 Disconnect the battery negative lead.
- 2 Raise and support the rear of the vehicle to gain access to the sensor, located to the right of the rear crossmember (**see illustration**).
- 3 Unclip the linkage balljoint from the sensor.
- 4 Disconnect the sensor multi-plug.
- 5 Unbolt the sensor from the floor and remove it.
- 6 Do not attempt to adjust the sensor by altering the position of the control arm.
- 7 Refit by reversing the removal operations.



34.2 Ride height control height sensor

