

Chapter 9

Front and rear axles

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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



Specifications

Type

Front	Spiral bevel with enclosed CV joints and fully-floating halfshafts
Rear	Spiral bevel with fully-floating halfshafts
Differential ratio (front and rear)	3.54:1

Adjustment data

Hub endfloat (front and rear):	
Early models	0.013 to 0.100 mm
Later models	0.010 mm
Front halfshaft endfloat (later models only)	0.08 to 0.25 mm
Front swivel pin housing bearing preload	See text

Torque wrench settings

	Nm	lbf ft
Driving member retaining bolts (later models)*	65	48
Halfshaft flange retaining bolts	65	48
Hub adjusting nut:		
Early models	See text	
Later models:		
Stage 1	61	45
Fully slacken nut, then tighten to Stage 2	4	3
Hub locknut	100	74
Rear axle upper link balljoint nut	176	130
Roadwheel nuts	129	95
Stub axle bolts*	65	48
Swivel pin assembly-to-axle bolts*	73	54
Swivel pin housing oil seal retaining plate bolts	11	8
Swivel pin retaining bolts:		
Non-ABS models (upper and lower)*	78	58
ABS models:		
Upper pin bolts	65	48
Lower pin bolts*	25	18

*Use thread-locking fluid

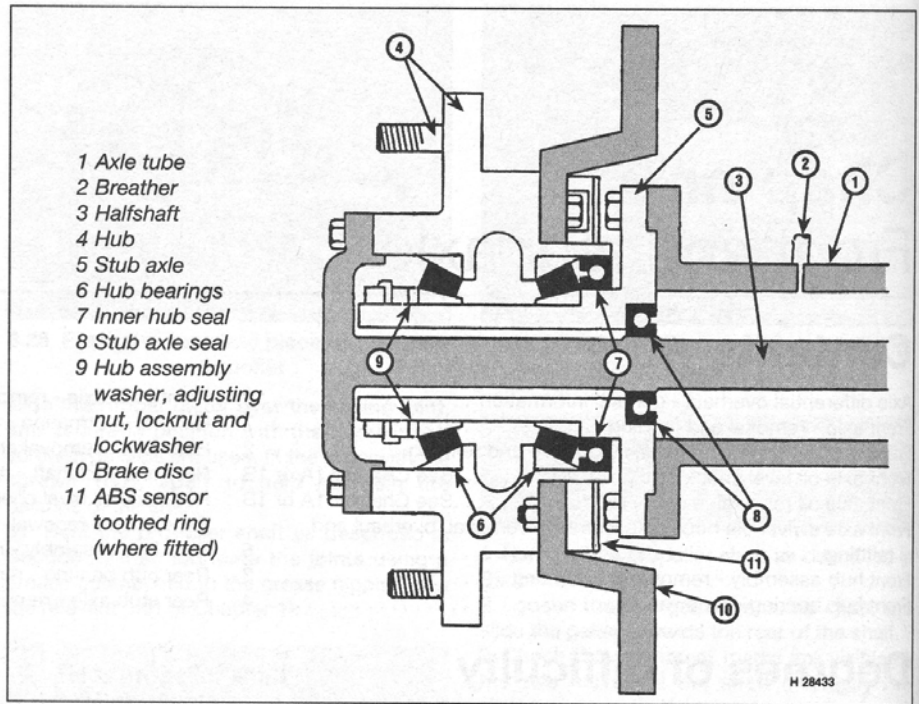
1 General information

Both the front and rear axles are of a similar design, comprising a one-piece steel casing, housing the differential assembly and two driveshafts (halfshafts). The rear shafts are of solid steel construction, the inner ends of which are splined into the differential assembly, while the outer ends are attached to the hubs (see illustration).

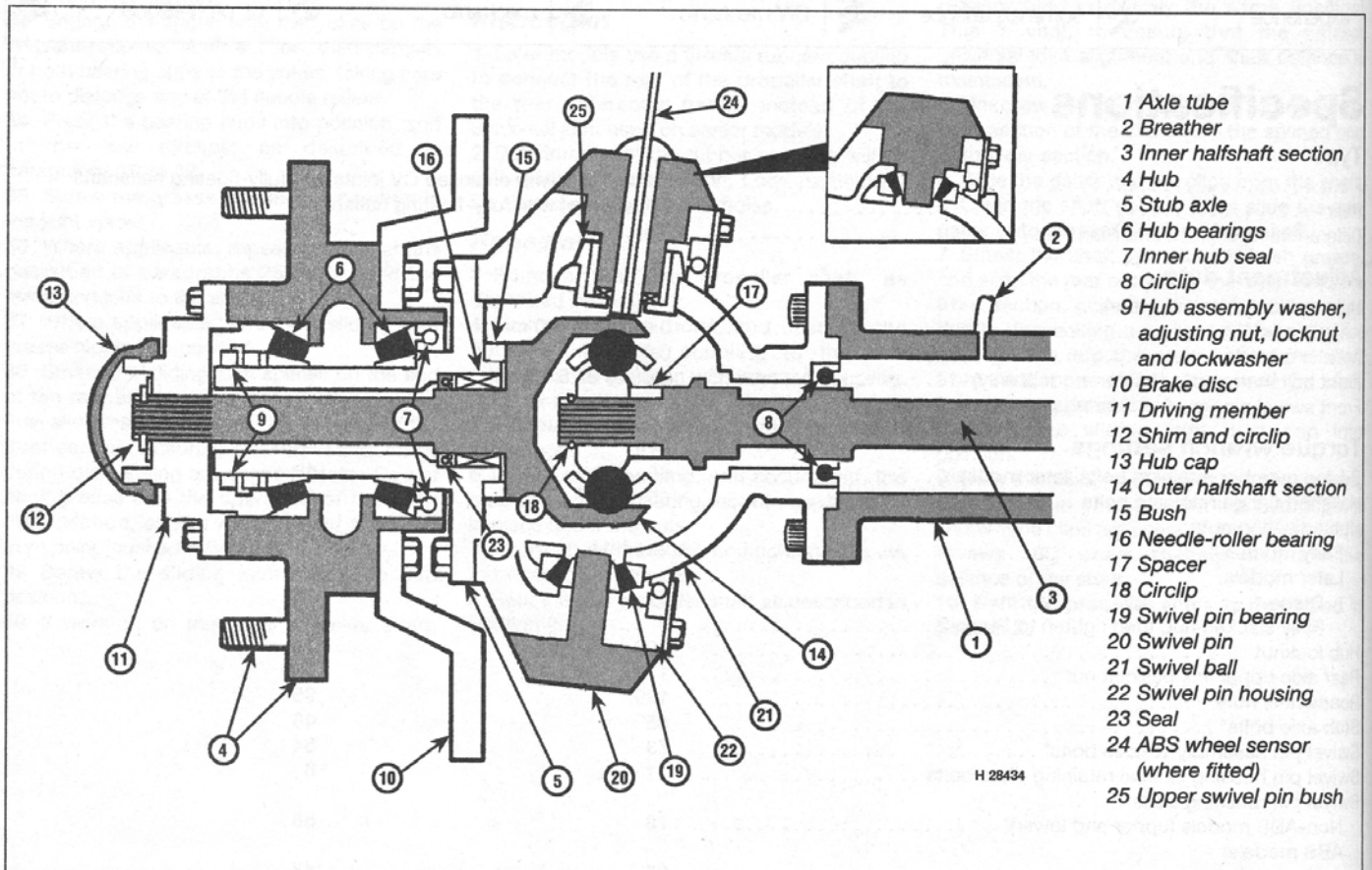
To enable the front wheels to turn from lock-to-lock while being driven, the front halfshafts incorporate a CV joint on their outer ends. The CV joint runs inside an oil-filled swivel pin housing, the swivel pins being located in tapered roller bearings (see illustration).

Refer to Chapter 11 for details of axle attachment and suspension details.

Throughout this Chapter, it is often necessary to identify models by their VIN number. Refer to *Vehicle identification numbers* at the end of this manual for information on VIN numbers.



1.1 Cross-sectional view of rear axle hub and associated components



1.2 Cross-sectional view of front axle hub and associated components - later model with ABS (inset shows non-ABS upper swivel pin arrangement)

2 Front axle halfshaft - removal, inspection and refitting



Note: Refer to Vehicle identification numbers at the end of this manual for information on VIN numbers.

Removal - early models (up to VIN JA032850)

1 Apply the handbrake, and loosen the nuts on the relevant front roadwheel. Jack up the front of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*). Remove the relevant front roadwheel. Proceed as described under the relevant sub-heading.

Halfshaft outer section

2 Drain the swivel pin housing oil as described in the relevant part of Chapter 1, or be prepared for some oil spillage as the shaft is removed.

3 Slacken and remove the five bolts and washers securing the halfshaft to the centre of the hub, and withdraw the outer shaft from the centre of the hub assembly. Recover the gasket from the halfshaft flange, and discard it.

Constant velocity joint and halfshaft inner section

4 Remove the stub axle as described in Section 5.

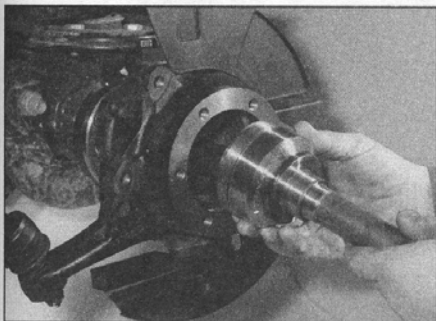
5 Remove the constant velocity joint and spacer from the end of the halfshaft inner section, then withdraw the halfshaft inner section from the axle, and slide the bush off the end of the shaft.

Removal - later models (from VIN JA032851)

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

7 Remove the stub axle as described in Section 5. Pull the halfshaft assembly out from the axle (see illustration).

8 Clamp the inner section of the shaft in a vice with soft jaws then, using a soft-faced



2.7 Removing the halfshaft assembly - later models

mallet, tap the constant velocity joint off the end of the inner shaft.

9 Remove the circlip from the end of the inner shaft, and slide off the spacer. Discard the circlip; a new one must be used on refitting.

Inspection - early models (up to VIN JA032850)

Halfshaft outer section

10 Inspect the halfshaft splines and hub flange for signs of wear or damage, and renew if necessary.

Constant velocity joint and halfshaft inner section

11 Thoroughly clean all components using paraffin, or a suitable solvent, and dry thoroughly. Carry out a visual inspection as follows.

12 Inspect the halfshaft inner sections for signs of wear or damage, paying particular attention to its splines. Check the bush for signs of wear or damage, and renew worn components as necessary.

13 Move the constant velocity joint inner member from side to side, to expose each ball in turn at the top of its track. Examine the balls for cracks, flat spots or signs of surface pitting.

14 Inspect the ball tracks on the inner and outer members. If the tracks have widened, the balls will no longer be a tight fit. At the same time, check the ball cage windows for wear or cracking between the windows.

15 If the constant velocity joint assembly shows signs of wear or damage, it must be renewed.

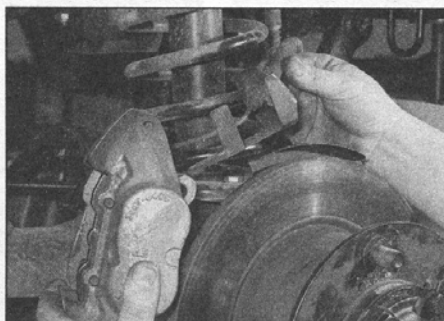
Inspection - later models (from VIN JA032851)

16 Proceed as described above in paragraphs 11 to 15. Note that the constant velocity joint circlip must be renewed whenever it is disturbed.

Refitting - early models (up to VIN JA032850)

Halfshaft outer section

17 Ensure that the halfshaft and hub mating surfaces are clean and dry, and fit a new gasket.



3.3 Slide the brake caliper assembly off the disc, and tie it to the coil spring to prevent straining the brake hose

18 Slide the halfshaft outer section into position, then refit its retaining bolts and washers, tightening them to the specified torque setting.

19 Top-up/refill the swivel pin housing with oil as described in the relevant part of Chapter 1.

Constant velocity joint and halfshaft inner section

20 Lubricate the bush with a smear of oil, and slide it onto halfshaft inner section.

21 Insert the halfshaft inner section into the axle, aligning its splines with those of the differential sunwheel.

22 Check that the halfshaft inner section is correctly located, and fit the spacer to the shaft.

23 Fit the constant velocity joint to the halfshaft, making sure that it is fitted the correct way around.

24 Refit the stub axle as described in Section 5.

Refitting - later models (from VIN JA032851)

25 Slide the spacer onto the inner shaft, and fit a new circlip, making sure that it is correctly located in the shaft groove.

26 Locate the constant velocity joint on inner shaft splines, and tap it onto the driveshaft until the circlip engages in its groove. Make sure that the joint is securely retained by the circlip.

27 Insert the halfshaft inner section into the axle, aligning its splines with those of the differential sunwheel.

28 Check that the halfshaft inner section is correctly located, then refit the stub axle as described in Section 5.

3 Front hub assembly - removal and refitting



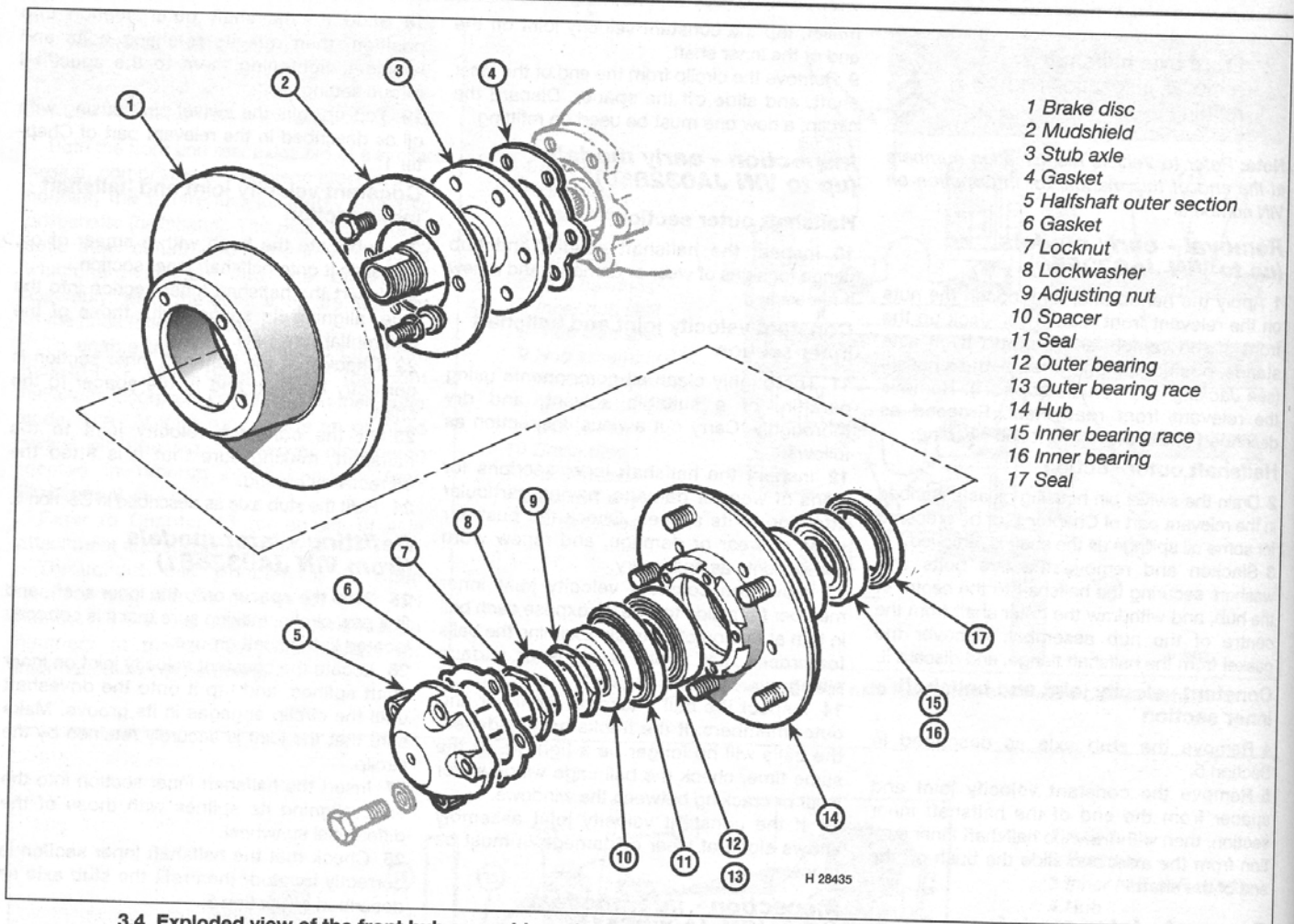
Note: Refer to Vehicle identification numbers at the end of this manual for information on VIN numbers.

Removal

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

2 Undo the (upper swivel pin) bolts securing the brake hose retaining bracket to the swivel housing, position the bracket clear of the housing, then refit the bolts to prevent oil leakage.

3 Slacken and remove the two retaining bolts securing the brake caliper in position. Slide the caliper assembly off the disc and, using a piece of wire or string, tie the caliper to the front suspension coil spring, to avoid placing any strain on the hydraulic brake hose (see illustration). Refit the upper swivel pin bolts,



3.4 Exploded view of the front hub assembly and associated components - early models (up to VIN JA032850)

tighten them by hand only, then proceed as described under the relevant sub-heading.

Early models (up to VIN JA032850)

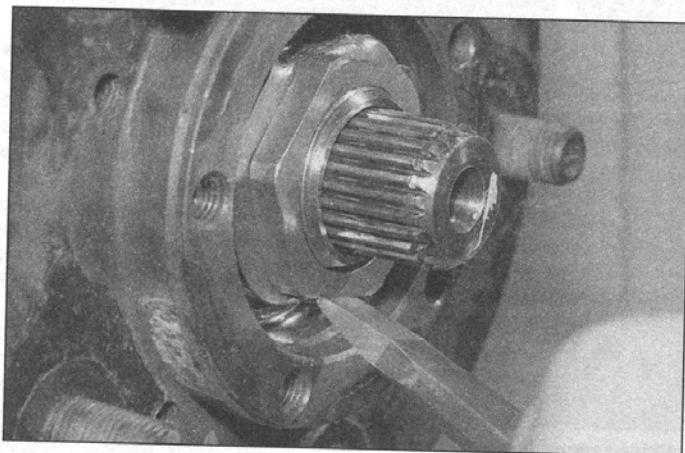
4 Remove the halfshaft outer section as described in Section 2 (see illustration).

5 Using a hammer and suitable chisel, bend back the lockwasher tab from the hub locknut's flat (see illustration).

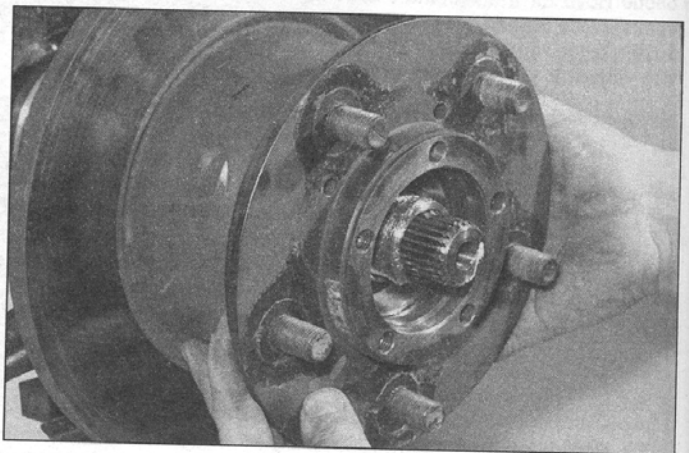
6 Slacken and remove the hub locknut, and slide off the lockwasher. Discard the lockwasher - a new one must be used on refitting.

7 Unscrew the hub adjusting nut, then slide off the spacer, noting which way around it is fitted.

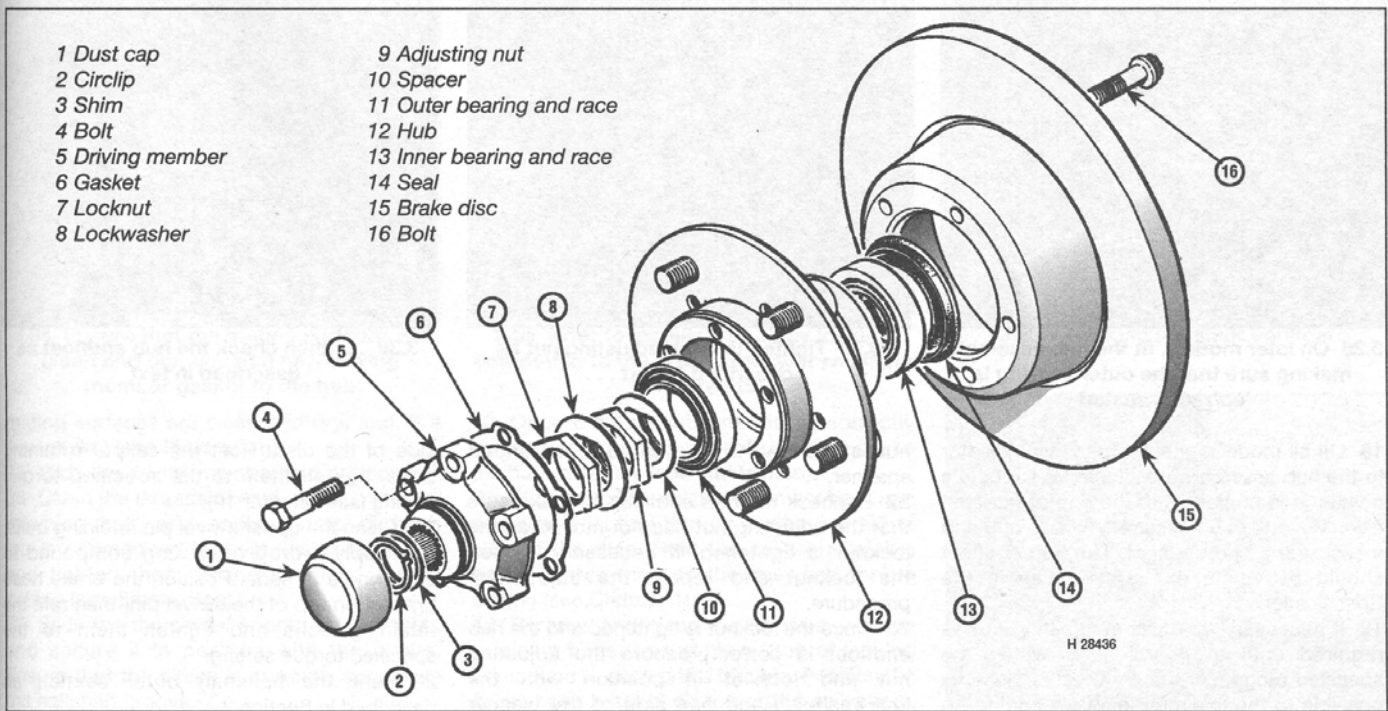
8 Slide the hub assembly off the stub axle (see illustration).



3.5 Using a hammer and suitable chisel, bend back the lockwasher from the locknut's flat



3.8 Removing the front hub assembly



3.9 Exploded view of the front hub assembly and associated components - later models (from VIN JA032851)

Later models (from VIN JA032851)

- 9 Lever off the dust cap from the centre of the hub assembly (see illustration).
- 10 Using circlip pliers, remove the circlip from the end of the halfshaft, then slide off the thrustwasher(s) (see illustrations).
- 11 Slacken and remove the five retaining bolts, then slide the driving member off the end of the halfshaft (see illustration). Remove the member gasket and discard it - a new gasket must be used on refitting.
- 12 Remove the hub assembly as described above in paragraphs 5 to 8, taking care not to allow the outer bearing to fall out of the hub assembly.

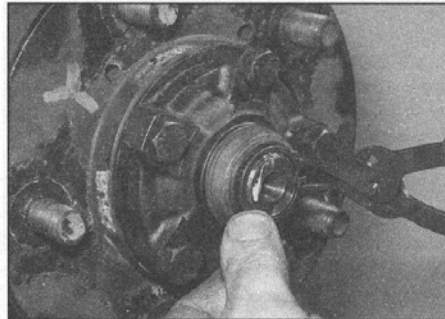
Refitting

Early models (up to VIN JA032850)

- 13 Apply a smear of lithium-based grease to the lips of the hub oil seals.
- 14 Carefully slide the hub assembly onto the

- stub axle, taking care not to damage the oil seal lips.
- 15 Slide the spacer onto the stub axle, ensuring that it is fitted the correct way around (see illustration).
- 16 Fit the hub adjusting nut, tightening it by hand only (see illustration).

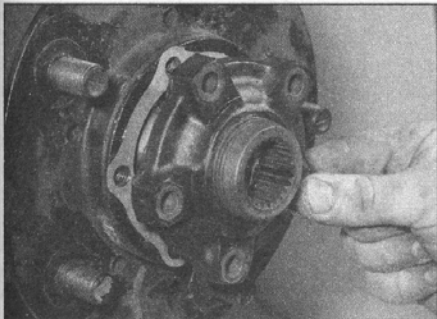
- 17 If a new hub/bearing has been installed, tighten the hub adjusting nut whilst rotating the hub to settle the bearings in position. Tighten the nut until all free play is removed from the bearings, then slacken it by a quarter of a turn; this will settle the bearings in position.



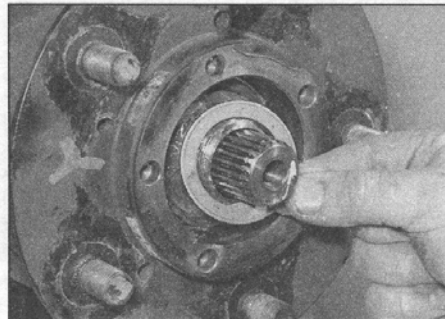
3.10a On later models, remove the circlip from the end of the halfshaft . . .



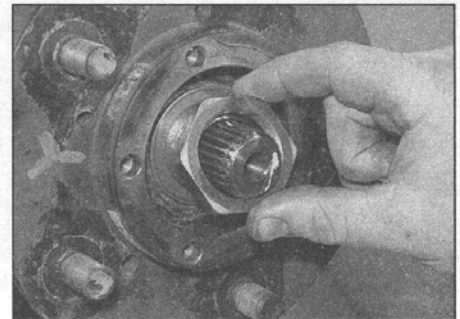
3.10b . . . and recover the thrustwasher(s)



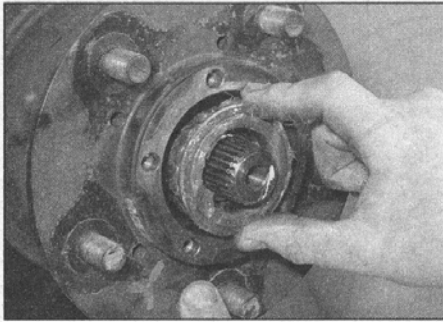
3.11 Removing the hub driving member



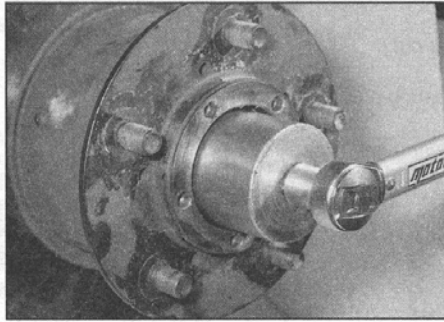
3.15 Fit the spacer . . .



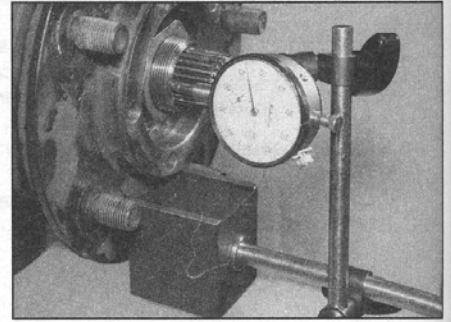
3.16 . . . then screw on the hub adjusting nut



3.28 On later models, fit the hub assembly, making sure that the outer bearing is correctly seated



3.29 Tighten the hub adjusting nut as described in text . . .



3.30 . . . then check the hub endfloat as described in text

18 On all models, attach a dial test indicator to the hub assembly, positioning it so that its pointer is in contact with the end of the stub axle. Move the hub assembly in and out, and measure the hub endfloat. The hub endfloat should be within the range given in the Specifications.

19 If necessary, rotate the adjusting nut as required until the endfloat is within the specified range (set the endfloat as close as possible to the minimum endfloat setting, to allow for wear in use).

20 When the endfloat is correctly set, slide a new lockwasher onto the stub axle, then fit the locknut.

21 Tighten the hub locknut to the specified torque setting, whilst holding the adjusting

nut stationary with a large open-ended spanner.

22 Recheck the hub endfloat, to make sure that the adjusting nut has not moved as the locknut is tightened. If necessary, loosen the locknut and repeat the adjustment procedure.

23 Once the locknut is tightened and the hub endfloat is correct, secure the adjusting nut and locknut in position with the lockwasher. Bend one side of the washer down so it contacts one of the adjusting nut flats, and bend the opposite side of the washer down so it contacts one of the locknut flats.

24 Slide the brake caliper assembly back into position, ensuring that its pads pass either

side of the disc. Refit the caliper retaining bolts, tighten them to the specified torque setting (see Chapter 10).

25 Clean the upper swivel pin retaining bolts, and apply a drop of locking compound to each one's threads. Position the brake hose bracket on top of the swivel pin, then refit the retaining bolts and tighten them to the specified torque setting.

26 Refit the halfshaft outer section as described in Section 2.

Later models (from VIN JA032851)

27 Prior to refitting, remove all traces of locking compound from the hub assembly threads, ideally by running a tap of the correct size and pitch down them.

28 Install the hub assembly as described in paragraphs 13 to 16, ensuring that the outer bearing is correctly fitted (see illustration).

29 Tighten the hub adjusting nut to the Stage 1 torque setting, whilst rotating the hub to settle the bearings in position (see illustration).

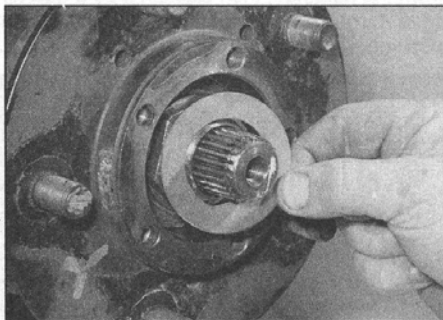
30 Fully slacken the adjusting nut, then tighten it to its Stage 2 torque setting. This should correctly set the hub endfloat (see Specifications). This can be checked using a dial test indicator as described in paragraph 18 (see illustration).

31 Slide a new lockwasher onto the stub axle, then fit the locknut (see illustrations). Tighten the hub locknut to the specified torque setting, whilst holding the adjusting nut stationary with a large open-ended spanner.

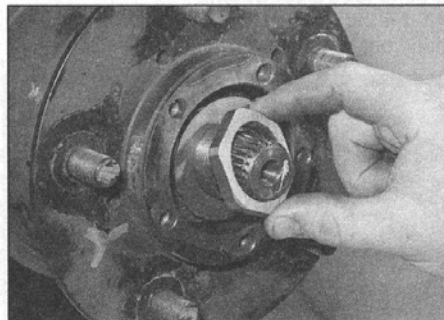
32 Recheck the hub endfloat (see paragraph 18), to make sure that the adjusting nut has not moved as the locknut is tightened. If necessary, loosen the locknut and repeat the adjustment procedure.

33 Once the locknut is tightened and the hub endfloat is correct, secure the adjusting nut and locknut in position with the lockwasher. Bend one side of the washer down so it contacts one of the adjusting nut flats, and bend the opposite side of the washer down so it contacts one of the lockwasher flats (see illustrations).

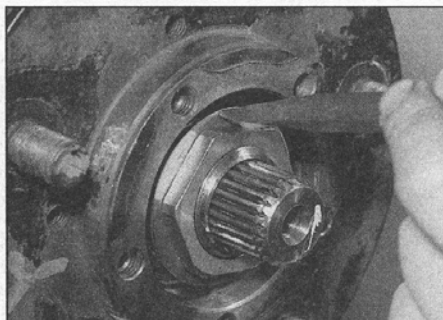
34 Ensure that the hub and driving member



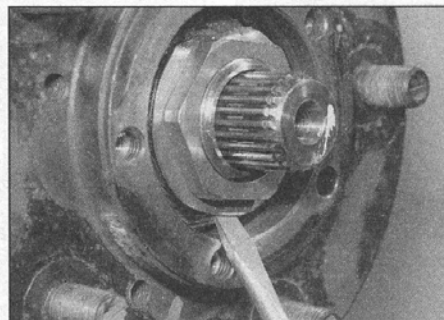
3.31a Once the endfloat is correctly set, fit a new lockwasher . . .



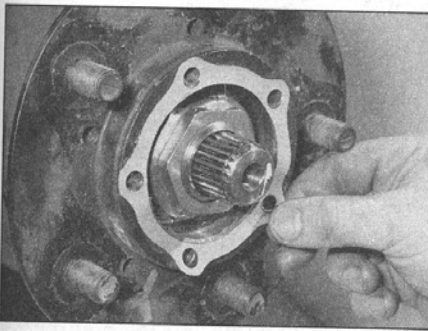
3.31b . . . and screw on the locknut



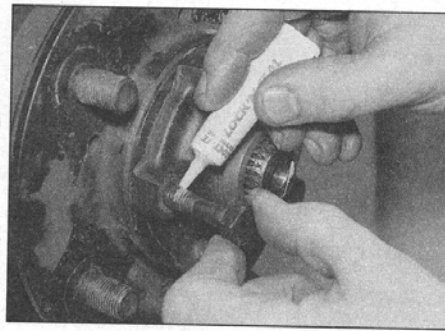
3.33a Tighten the locknut to the specified torque, then bend one side of the lockwasher inwards so it contacts one of the adjusting nut flats . . .



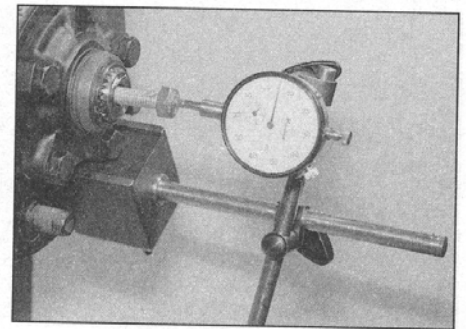
3.33b . . . then bend the opposite side outwards so that it contacts one of the lockwasher flats



3.34 Ensure that the mating surfaces are clean and dry, and fit a new driving member gasket to the hub



3.36 Prior to installation, apply locking compound to the driving member retaining bolt threads



3.38 Checking halfshaft endfloat

mating surfaces are clean and dry, and fit a new gasket (see illustration).

35 Slide the driving member into position.

36 Clean the threads of each driving member retaining bolt, and apply a drop of fresh locking compound to them. Install the bolts, and tighten them to the specified torque setting (see illustration).

37 Slide the thrustwasher onto the halfshaft, and secure it in position with the circlip. Ensure that the circlip is correctly located in the halfshaft groove.

38 Screw a suitable bolt into the threaded end of the halfshaft, then attach a dial test indicator to the hub assembly, positioning it so that its pointer is in contact with the end of the bolt (see illustration). Move the halfshaft in and out, using the bolt, and measure the endfloat. The halfshaft endfloat should be within the range given in the Specifications.

39 To adjust the endfloat, remove the circlip, and slide off the thrustwasher. Calculate the required thickness of shim needed, and obtain it from your Land Rover dealer. Fit the shim, and secure it in position with the circlip.

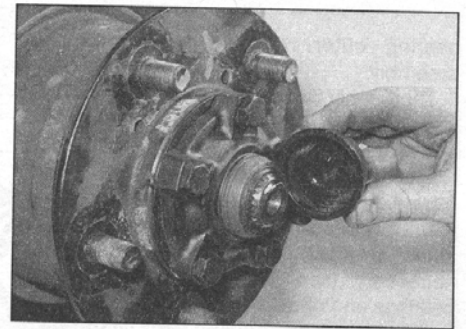
40 Once the halfshaft endfloat is correctly set, unscrew the bolt, and refit the dust cap to the hub assembly (see illustration).

41 Slide the brake caliper assembly back into position, ensuring that its pads pass either side of the disc. Refit the caliper retaining bolts, tighten them to the specified torque setting (see Chapter 10).

42 Remove and clean the upper swivel pin retaining bolts, and apply a drop of locking compound to each one's threads. Position the brake hose bracket on top of the swivel pin, then refit the retaining bolts and tighten them to the specified torque setting (see illustration).

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

44 Top-up/refill the swivel pin housing as described in the relevant part of Chapter 1.



3.40 Once halfshaft endfloat is correctly set, refit the dust cap to the hub

spacers (such as large sockets) will serve as an adequate substitute.

1 Remove the hub assembly as described in Section 3.

2 Remove the brake disc as described in Chapter 10.

3 Using a large flat-bladed screwdriver, lever out the inner oil seal from the hub assembly (see illustration). On early models, note the correct fitted depth of the outer seal in the hub, then lever it out of position.

4 Remove the outer and inner bearing inner races from the hub assembly.

5 Support the hub securely on blocks or in a vice, then using a hammer and suitable punch, carefully tap the inner and outer

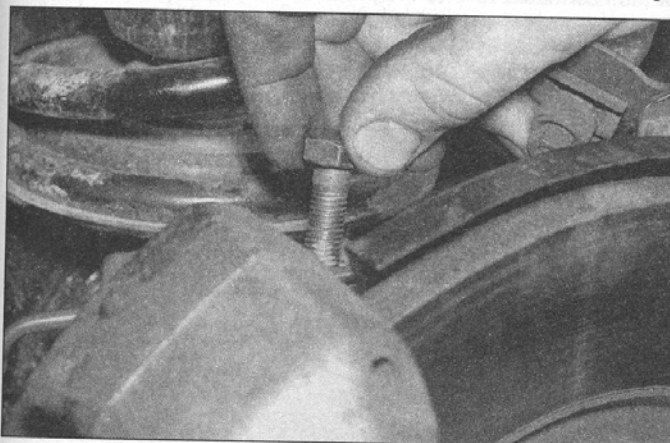
4 Front hub bearing - renewal



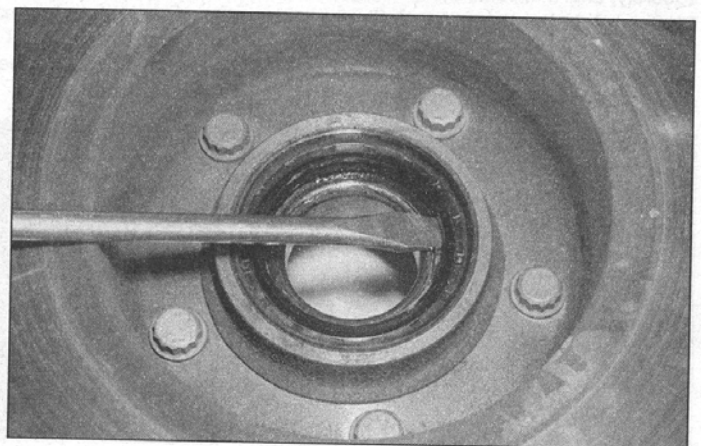
Note: A press may be required to dismantle and rebuild the assembly if the bearing outer races are a tight fit in the hub. If such a tool is not available, a large bench vice and suitable



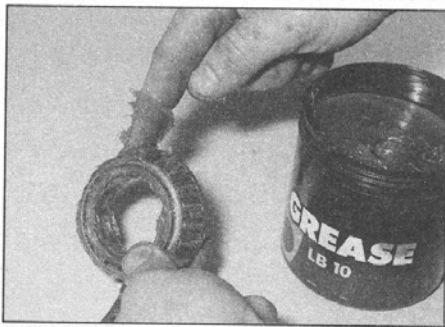
Set the endfloat as close as possible to the minimum endfloat setting, to allow for wear in use.



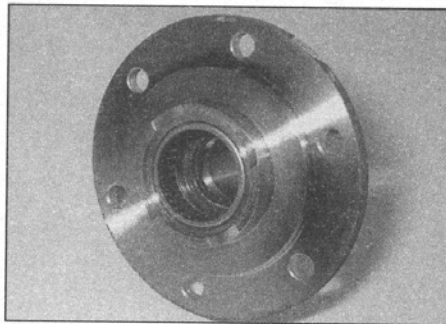
3.42 With the caliper in position, apply locking compound to the threads of the upper swivel pin bolts, then tighten them to the specified torque setting



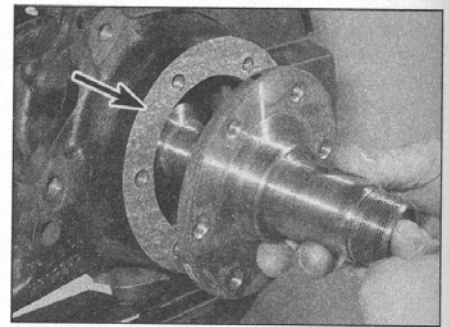
4.3 Lever the oil seal out from the hub using a large flat-bladed screwdriver



4.9 Pack the hub bearings with a suitable multi-purpose lithium-based grease



5.7 On later models inspect the bearing, oil seal and thrust ring fitted to the rear of the stub axle for signs of wear or damage



5.12 Fit a new gasket (arrowed), then slide the stub axle into position

bearing outer races out from the hub assembly.

6 Thoroughly clean the hub bore, removing all traces of dirt and grease. Polish away any burrs or raised edges which might hinder reassembly. Check both for cracks or any other signs of wear or damage, and renew them if necessary. Examine the stub axle for signs of wear or damage, and renew if necessary (see Section 5). Renew both bearings and oil seal(s) as a matter of course.

7 On reassembly, apply a light film of oil to the inner bearing outer race and hub bore, to aid installation.

8 Securely support the hub, and locate the inner bearing outer race in the hub. Press the race fully into position, ensuring that it enters the hub squarely, using a suitable tubular spacer which bears only on the bearing outer race.

9 Pack the bearing inner race with a multi-purpose lithium based grease. Work the grease well into the bearing race, apply a smear to the outer race surface, then fit the inner race to the hub assembly (see illustration).

10 Install the new inner oil seal, making sure that its sealing lip is facing inwards. Press the seal into position, ensuring it enters the hub squarely, until it is flush with the hub surface.

11 Turn the hub over, and fit the outer bearing as described in paragraphs 7 to 9.

12 On early models, install the new outer oil seal, making sure that its sealing lip is facing

inwards. Press the seal into position, ensuring that it enters the hub squarely, until it is positioned at the same depth as the original (noted prior to removal).

13 Refit the brake disc as described in Chapter 10.

14 Install the hub assembly as described in Section 3.

5 Front stub axle - removal and refitting

Removal

1 Remove the hub assembly as described in Section 3.

2 If not already done, drain the swivel pin housing oil as described in the relevant part of Chapter 1.

3 Make alignment marks between the stub axle and housing, then slacken and remove the six retaining bolts and washers.

4 Lift off the mudshield, then remove the stub axle from the swivel pin housing, and recover the gasket. Discard the gasket - a new one must be used on refitting.

5 Inspect the stub axle for signs of wear or damage, and renew if necessary.

6 On early models, check the bush fitted to the rear of the stub axle for signs of wear or damage. If renewal is necessary, it is recommended that the task is entrusted to a Land Rover dealer.

7 On later models, check the needle-roller bearing and oil seal arrangement fitted to the inside of the stub axle, and the thrust ring fitted to the rear of the axle flange, for signs of wear or damage (see illustration). If renewal is necessary, the task should be entrusted to a Land Rover dealer.

Refitting

8 Prior to refitting, remove all traces of locking compound from the swivel housing threads, ideally by running a tap of the correct size and pitch down them.

9 Ensure that the halfshaft is correctly engaged with the differential splines.

10 Make sure that the stub axle and swivel pin housing mating surfaces are clean and dry, then fit a new gasket to the swivel housing.

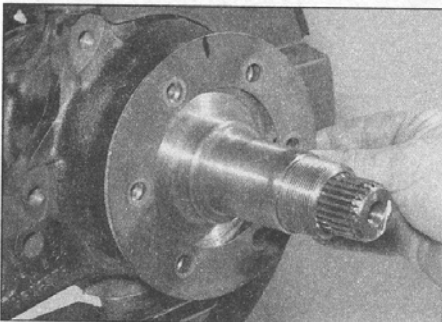
11 Apply a smear of oil to the stub axle bush/bearing and seal (as applicable).

12 Slide the stub axle into position, aligning the marks made prior to removal (see illustration). On early models, make sure that the constant velocity joint and halfshaft bush engage correctly as the stub axle is fitted.

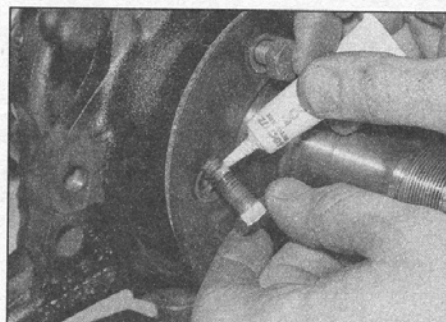
13 Refit the mudshield to the stub axle (see illustration).

14 Clean the threads of the retaining bolts, and apply a drop of fresh locking compound to them. Install the bolts and washers, and tighten them to the specified torque setting (see illustrations).

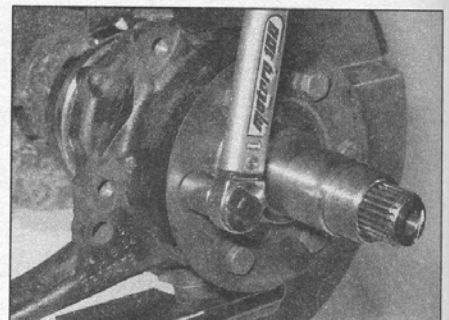
15 Refit the hub assembly as described in Section 3.



5.13 Refit the mudshield ...



5.14a ... then apply locking compound to the threads of the stub axle retaining bolts ...



5.14b ... and tighten them to the specified torque

6 Front axle swivel pin housing assembly - removal, overhaul and refitting



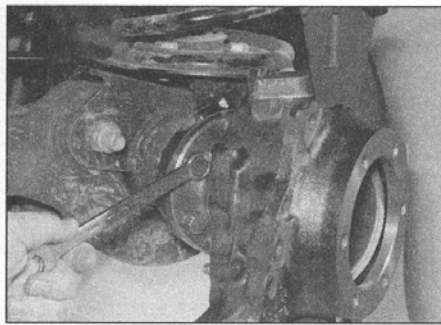
Removal

- 1 Remove the complete halfshaft as described in Section 2.
- 2 Withdraw the split pin, then unscrew the nut securing the track rod to the swivel pin housing. Using a universal balljoint separator, free the track rod from the hub.
- 3 Where necessary, also free the drag link from the swivel pin housing, as described in paragraph 2.
- 4 On models with ABS, trace the wiring back from the sensor which is fitted to the top of the swivel pin housing. Disconnect the wiring connector, then work back along the wiring, freeing it from any relevant retaining clips.
- 5 On all models, slacken and remove the bolts and washers securing the swivel housing assembly to the axle, and remove it from the vehicle (see illustrations). Recover the gasket and discard it - a new one must be used on refitting.

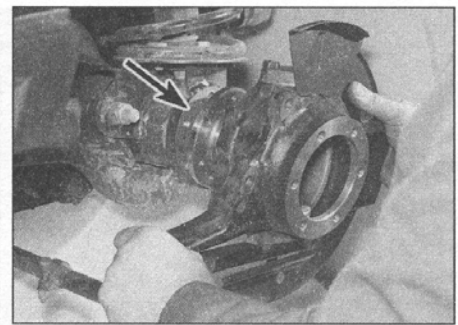
Overhaul

Models without ABS

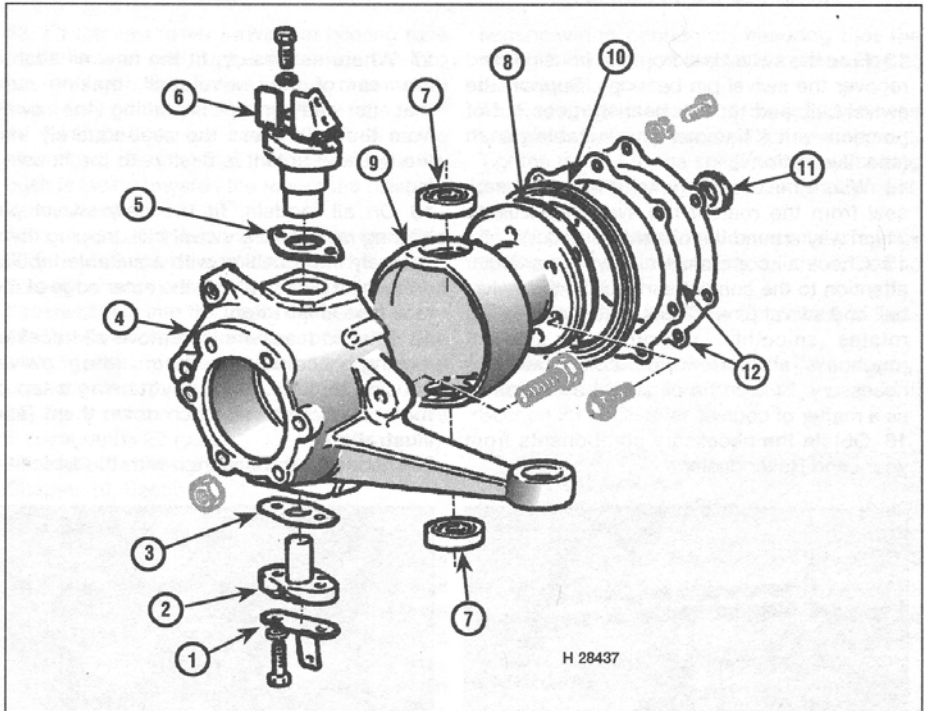
- 6 Remove all traces of grease and dirt from the outside of the swivel housing assembly (see illustration).
- 7 Undo the retaining bolts and washers, and remove the retaining plate and oil seal from the rear of the swivel housing, noting which way around the seal is fitted (see illustration).
- 8 Undo the brake disc mudshield retaining bracket bolt and nut, and remove the shield (see illustration).
- 9 Bend back the locking tabs (where necessary) then slacken and remove the two bolts securing the lower swivel pin to the housing. Remove the brake disc mudshield bracket (see illustration).
- 10 Ease the lower swivel pin out of position, and recover the gasket.
- 11 Unscrew the upper swivel pin retaining bolts from the top of the swivel housing.
- 12 Ease the upper swivel pin from the housing, and recover the shim(s).



6.5a Slacken and remove the swivel pin housing retaining bolts . . .

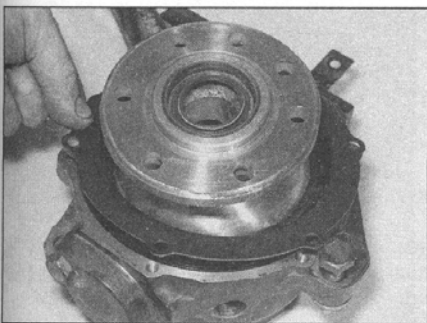


6.5b . . . then lift off the housing assembly, and recover the gasket (arrowed)

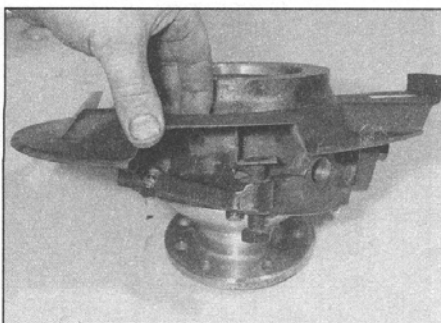


6.6 Exploded view of the swivel pin housing components - non-ABS model (ABS model similar)

- | | | |
|----------------------|---|-------------------------------|
| 1 Mudshield bracket | 6 Upper swivel pin and brake hose bracket | 9 Swivel ball |
| 2 Lower swivel pin | 7 Swivel pin bearing and race | 10 Oil seal |
| 3 Gasket | 8 Gasket | 11 Oil seal |
| 4 Swivel pin housing | | 12 Retaining plate and gasket |
| 5 Shim | | |



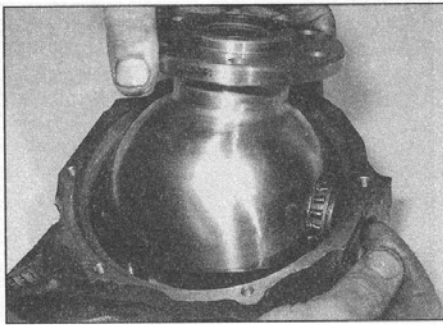
6.7 Remove the retaining plate from the rear of the swivel housing, and recover the oil seal



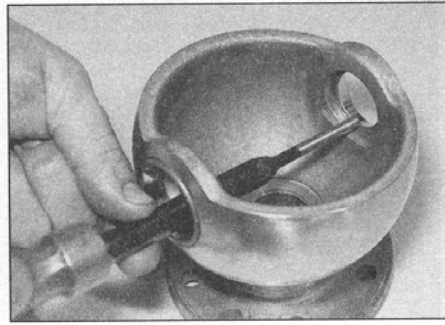
6.8 Removing the brake disc mudshield



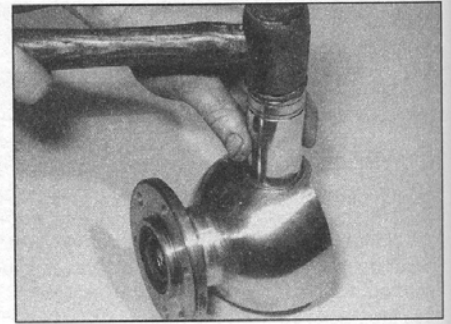
6.9 Remove the lower swivel pin retaining bolts and recover the mudshield bracket, noting which way around it is fitted



6.13a Separate the swivel ball and housing, and recover the bearings



6.13b Tap the bearing outer races out of position using a hammer and suitable punch



6.18 Install the new bearing outer races using a suitable tubular drift which bears only on the hard outer edge of the race

13 Free the swivel ball from the housing, and recover the swivel pin bearings. Support the swivel ball, and tap the bearing races out of position with a hammer and suitable punch (see illustrations).

14 Where necessary, remove the smaller oil seal from the rear of the swivel ball. Note which way around the oil seal is fitted.

15 Check all components, paying particular attention to the contact surfaces of the swivel ball and swivel pins. Check that each bearing rotates smoothly, without any sign of roughness, and renew worn components as necessary. Renew the oil seal(s) and gaskets as a matter of course.

16 Obtain the necessary components from your Land Rover dealer.

17 Where necessary, fit the new oil seal to the rear of the swivel ball, making sure that its sealing lip is facing the away from the ball. Press the seal squarely into the housing until it is flush with the housing face.

18 On all models, fit the new swivel pin bearing races to the swivel ball, tapping them squarely into position with a suitable tubular drift which bears only on the outer edge of the race (see illustration).

19 Prior to reassembly, remove all traces of locking compound from the swivel housing threads, ideally by running a tap of the correct size and pitch down them (see illustration).

20 Lubricate the bearings with the specified

oil (see *Lubricants and fluids* at the end of *Weekly checks*), and seat them in the races (see illustration).

21 Reassemble the swivel ball with the housing, making sure that the bearings remain correctly seated.

22 Apply a smear of suitable sealant to either side of the lower swivel pin gasket, and fit the gasket to the pin.

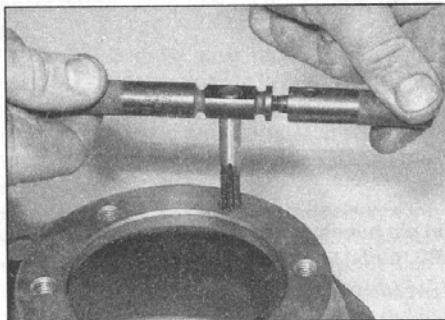
23 Install the lower swivel pin with its lug outermost (see illustration). Fit the mudshield bracket and refit the retaining bolts, tightening them loosely at this stage.

24 Fit the upper swivel pin and shim(s) to the top of the swivel housing, and install the retaining bolts, tightening them loosely at this stage (see illustration).

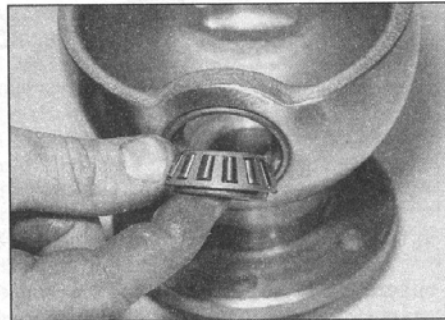
25 With both pins in position, remove the lower pin retaining bolts, and clean their threads. Apply a drop of fresh locking compound to the bolt threads, then refit them and tighten them to the specified torque setting (see illustration). Secure the bolts in position by bending down the locking tabs (where fitted).

26 Tighten the top swivel pin bolts to the specified torque setting.

27 It is now necessary to check the swivel pin bearing preload setting. Securely retain the swivel ball axle flange, and attach a spring balance to the swivel housing track rod balljoint hole. Use the spring balance to move the swivel housing back and forth,



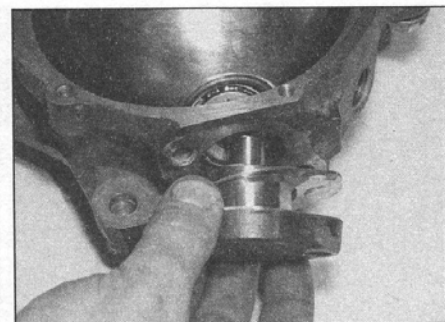
6.19 Prior to reassembly, remove all traces of old locking compound from the housing threads



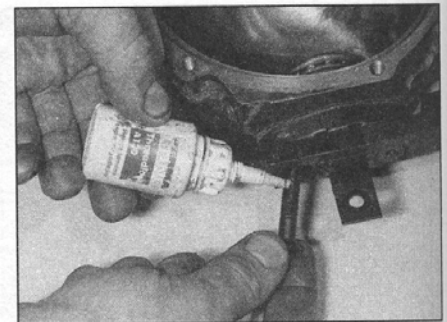
6.20 Lubricate the bearings with the specified oil, and seat them in their races



6.23 Insert the lower swivel pin and gasket . . .



6.24 . . . then fit the upper swivel pin and shim assembly



6.25 Apply locking compound to the lower swivel pin retaining bolts, and tighten them to the specified torque setting

noting the force necessary to do this (see illustration).

28 If the bearing preload is correct, a weight (force) of approximately 1.16 to 1.46 kg (11 to 14 N) will be required to turn the housing.

29 The preload is adjusted by varying the thickness of the shim(s) fitted beneath the upper swivel pin. If the preload is too high (more force than specified required to turn housing), thicker shim(s) will be needed; if the preload is too low (less force than specified required to turn the housing), thinner shim(s) will be required.

30 Remove the upper swivel pin, measure that the thickness of the shims fitted, and obtain the relevant new shims from your Land Rover dealer. Refit the swivel pin and shim(s), and tighten the retaining bolts to the specified torque. Repeat the above procedure as necessary until the preload is correctly set.

31 Once the swivel housing bearing preload is correctly adjusted, apply a smear of lithium-based grease to the lip of the swivel housing oil seal. Apply a smear of oil to the outer edge seal to aid installation then, making sure that its sealing lip is facing inwards, fit the seal to the swivel housing, making sure that it enters the housing squarely (see illustration).

32 Ensure that the housing and retaining plate mating surfaces are clean and dry, and refit the plate to the housing. Refit the plate retaining bolts, tightening them to the specified torque setting.

33 Refit the mudshield to the housing, and securely tighten its retaining nut and bolt.

Models with ABS

34 Carry out the operations described above in paragraphs 6 to 10.

35 Remove the wheel sensor from the housing, as described in Chapter 10, Section 21.

36 Undo the retaining bolts and washers, ease the upper swivel pin from the housing, and recover its shims.

37 Free the swivel ball from the housing. Recover the lower swivel pin bearing and the thrustwashers and bearing from the upper pin bush.

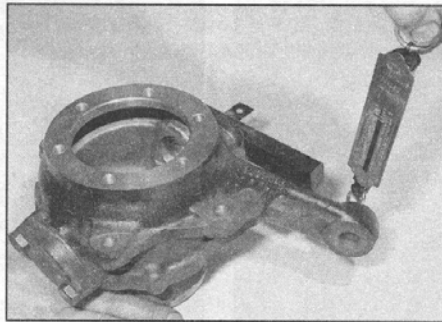
38 Support the swivel ball, and tap the bearing race and bush out of position with a hammer and suitable punch.

39 Check all components, paying particular attention to the contact surfaces of the swivel ball and swivel pins.

40 Check that each bearing rotates smoothly without any sign of roughness, and renew worn components as necessary. Renew the oil seals and gaskets as a matter of course.

41 Obtain the necessary components from your Land Rover dealer.

42 Lever out the oil seal from the rear of the swivel ball, noting which way around it is fitted. Fit the new oil seal to the rear of the swivel ball, making sure that its sealing lip is facing away from the ball. Press the seal squarely into the housing until it is flush with the housing face.



6.27 Checking swivel pin bearing preload (see text)

43 Fit the new lower swivel pin bearing race to the swivel ball, tapping it squarely into position with a suitable tubular drift which bears only on the outer edge of the race.

44 Fit the new upper swivel pin bush to the swivel ball, ensuring that the relieved lip of the bush is facing towards the rear of the ball (see illustration).

45 Lubricate the bearings with the specified oil (see *Lubricants and fluids* at the end of *Weekly checks*) and insert the bearing and thrustwashers into the upper pin bush.

46 Reassemble the swivel ball with the housing, making sure that the bearings remain correctly seated.

47 Carry out the operations described above in paragraphs 22 to 33.

48 Refit the wheel sensor as described in Chapter 10, Section 21.

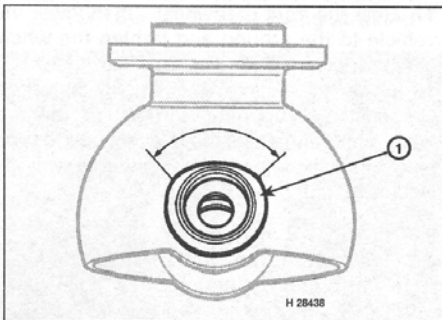
Refitting

49 Ensure that the swivel ball and axle mating surfaces are clean and dry. Remove all traces of locking compound from the axle threads, ideally by running a tap of the correct size and pitch down them.

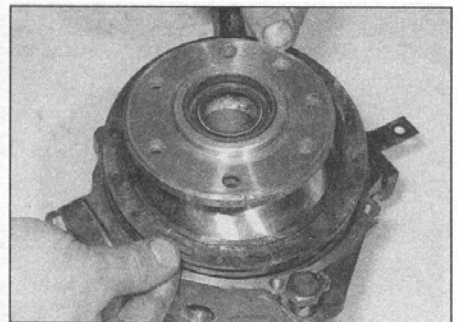
50 Fit a new gasket, and locate the swivel pin housing assembly on the axle (see illustration).

51 Apply a drop of locking compound to the thread of each retaining bolt. Refit the bolts and washers, and tighten them evenly and progressively to the specified torque setting.

52 On models with ABS, reconnect the wheel



6.44 On models with ABS, ensure that the relieved lip of the upper swivel pin bush is positioned as shown when fitting the bush (1) to the swivel ball



6.31 Fit a new oil seal to the rear of the swivel pin housing, making sure that it is fitted the correct way around

sensor wiring connector, ensuring that the wiring is correctly routed and retained by all the relevant clips.

53 Engage the track rod balljoint with the swivel pin housing, and refit its retaining nut. Tighten the nut to the specified torque setting (see Chapter 11) and secure it in position with a new split pin.

54 Where necessary, reconnect the drag link to the swivel pin housing as described in paragraph 53.

55 Refit the halfshaft as described in Section 2.

56 On completion check and, if necessary, adjust the steering lock stops as described in Section 23 of Chapter 11.

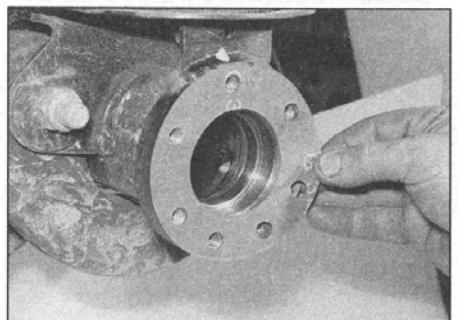
7 Front axle - removal and refitting

Note: This procedure requires at least two people, and ideally three, to be carried out safely.

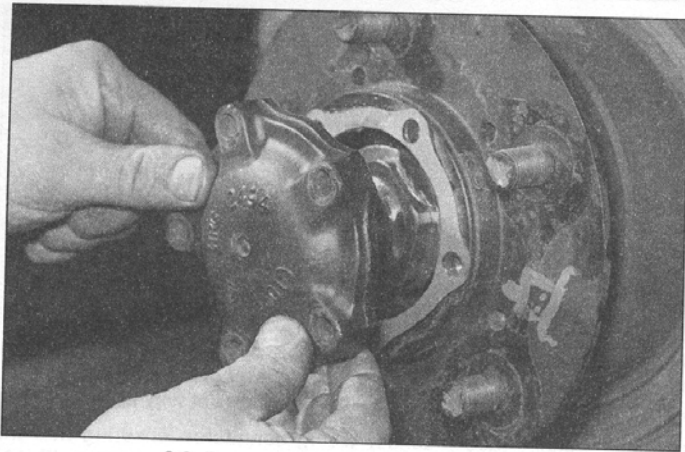
Removal

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

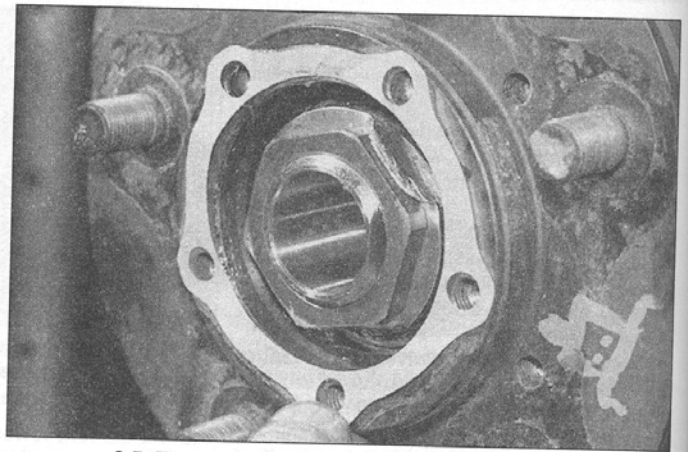
2 Undo the (upper swivel pin) bolts securing



6.50 Ensure that the axle mating surface is clean and dry, and fit a new swivel pin housing gasket



8.3 Removing a rear axle halfshaft



8.5 Fit a new gasket to the hub assembly . . .

the brake hose retaining bracket to the swivel housing. Position the bracket clear of the housing, then refit the bolts to prevent oil leakage. Repeat the procedure on the opposite side.

3 Slacken and remove the two retaining bolts securing the brake caliper in position. Slide the caliper assembly off the disc and, using a piece of wire or string, tie the caliper to the front suspension coil spring, to avoid placing any strain on the hydraulic brake hose. Repeat the procedure on the opposite side.

4 On models with ABS, trace the wiring back from each wheel sensor. Disconnect the wiring connectors, then work back along the wiring, freeing it from any relevant retaining clips so that both sensors are free to be removed with the axle.

5 Disconnect the propeller shaft from the front differential as described in Chapter 8.

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

7 Carry out the following procedures as described in Chapter 11:

- a) Remove both radius arms.
- b) Remove the Panhard rod.
- c) Remove the track rod.
- d) Disconnect the drag link from the swivel pin housing.
- e) Disconnect the anti-roll bar connecting links from the axle.
- f) Remove the nuts securing the shock absorbers to the axle.

8 With an assistant supporting either end of the axle, carefully lower the axle away from the vehicle, making sure that all the relevant components have been disconnected.

9 Remove the axle from underneath the vehicle, and recover the front coil springs.

Refitting

10 On refitting, position the axle assembly on the jack.

11 With the aid of two assistants, carefully raise the axle assembly into position, whilst aligning the front coil springs with their upper and lower spring seats.

12 With the axle raised and both coil springs correctly seated, carry out the following procedures as described in Chapter 11:

- a) Refit the nuts securing the shock absorbers to the axle.
- b) Connect the anti-roll bar connecting links from the axle.
- c) Connect the drag link from the swivel pin housing.
- d) Refit the track rod.
- e) Refit the Panhard rod.
- f) Refit both radius arms.

13 On models with ABS, reconnect the wheel sensor wiring connectors, ensuring that the wiring is correctly routed and retained by all the relevant clips.

14 Slide the brake caliper assembly back into position, ensuring that its pads pass either side of the disc. Refit the caliper retaining bolts, tighten them to the specified torque setting (see Chapter 10). Repeat the procedure on the opposite side.

15 Clean the upper swivel pin retaining bolts, and apply a drop of locking compound to each one's threads. Position the brake hose bracket on top of the swivel pin, then refit the retaining bolts and tighten them to the specified torque setting. Repeat the procedure on the opposite side.

16 Reconnect the propeller shaft to the axle as described in Chapter 8.

17 Refit the front roadwheels, then lower the vehicle to the ground and tighten the wheel nuts to the specified torque setting.

18 Rock the vehicle to settle all disturbed suspension components in position, then go around and tighten all the relevant suspension fasteners which need to be tightened with the vehicle resting on its wheels.

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

2 Drain the axle oil as described in the relevant part of Chapter 1, or be prepared for some oil spillage as the shaft is removed.

3 Slacken and remove the five bolts and washers securing the halfshaft to the centre of the hub, and withdraw the shaft from the centre of the hub assembly (see illustration). Recover the gasket from the halfshaft flange, and discard it.

Inspection

4 Inspect the halfshaft splines and hub flange for signs of wear or damage, and renew if necessary.

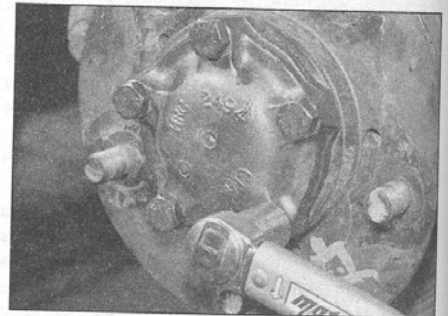
Refitting

5 Ensure that the halfshaft and hub mating surfaces are clean and dry, and fit a new gasket (see illustration).

6 Slide the halfshaft carefully into position. Refit its retaining bolts and washers, tightening them to the specified torque setting (see illustration).

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

8 If necessary, top-up/refill the axle with oil as described in the relevant part of Chapter 1.

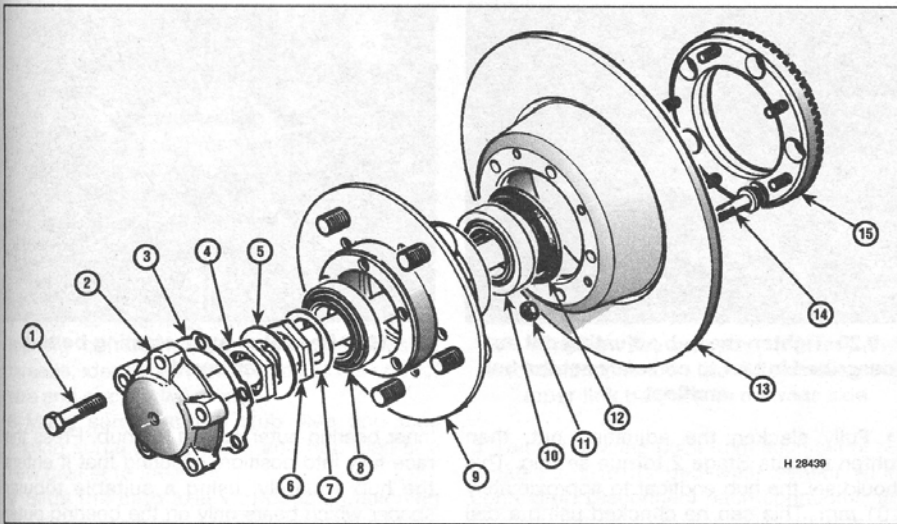


8.6 . . . then refit the halfshaft and tighten its retaining bolts to the specified torque

8 Rear axle halfshaft - removal, inspection and refitting

Removal

1 Loosen the rear roadwheel nuts, and chock



9.1 Exploded view of the rear hub and associated components

- | | | |
|-----------------|---|---|
| 1 Bolt | 7 Spacer | 12 Seal |
| 2 Halfshaft | 8 Outer bearing and race | 13 Brake disc |
| 3 Gasket | 9 Hub | 14 Retaining bolt |
| 4 Locknut | 10 Inner bearing and race | 15 Toothed wheel sensor (ABS models only) |
| 5 Lockwasher | 11 Toothed wheel sensor nut (ABS models only) | |
| 6 Adjusting nut | | |

9 Rear hub assembly - removal and refitting

Note: Refer to Vehicle identification numbers at the end of this manual for information on VIN numbers.

Removal

1 Remove the halfshaft as described in Section 8 (see illustration).
 2 Release the retaining clips securing the rear brake pipe to the axle. Slacken and remove the two retaining bolts securing the brake caliper in position. Slide the caliper assembly

off the disc and, using a piece of wire or string, tie the caliper to the suspension coil spring, to avoid placing any strain on the hydraulic brake pipe (see illustrations). Note: Do not bend the pipe any more than is absolutely necessary.

3 Using a hammer and suitable chisel, bend back the lockwasher tab from the hub locknut's flat (see illustration).

4 Slacken and remove the hub locknut, and slide off the lockwasher. Discard the lockwasher - a new one must be used on refitting.

5 Unscrew the hub adjusting nut, then slide off the spacer, noting which way around it is fitted.

6 Slide the hub assembly off the stub axle, complete with bearings.

Refitting

Early models (up to VIN JA032850)

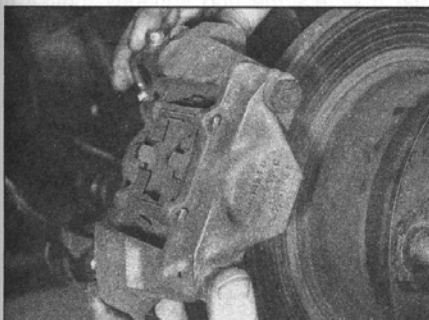
7 Apply a smear of lithium-based grease to the lips of the hub oil seal(s).

8 Carefully slide the hub assembly onto the stub axle, taking care not to damage the oil seal lips (see illustration).

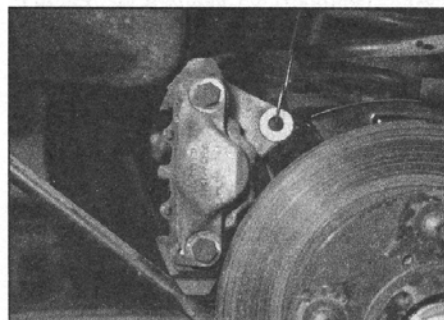
9 Slide the spacer onto the stub axle, ensuring that it is fitted the correct way around (see illustration).

10 Fit the hub adjusting nut, tightening it by hand only (see illustration).

11 If a new hub/bearing has been installed, tighten the hub adjusting nut whilst rotating the hub to settle the bearings in position. Tighten the nut until all freeplay is removed from the bearings, then slacken it by a quarter of a turn; this will settle the bearings in position.



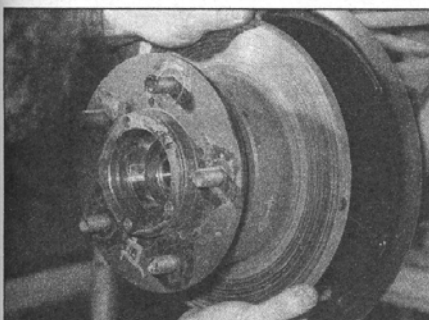
9.2a Slide the brake caliper assembly off the disc ...



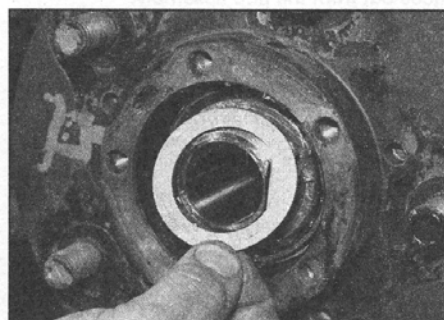
9.2b ... and tie it to the coil spring, to prevent the brake pipe being strained



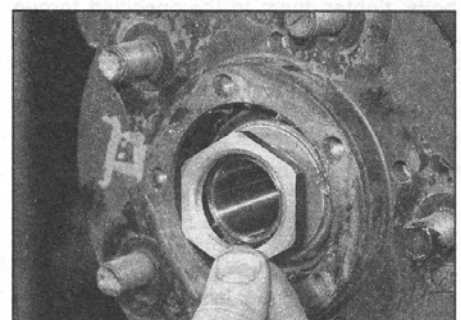
9.3 Bend back the lockwasher from the locknut's flat using a suitable chisel



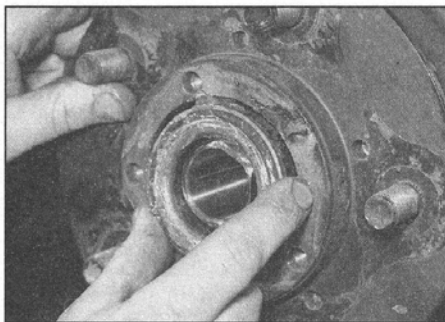
9.8 Slide the rear hub assembly into position ...



9.9 ... then refit the spacer ...



9.10 ... and screw on the hub adjusting nut



9.19 On later models, refit the rear hub assembly, making sure that the outer bearing is correctly seated

12 On all models, attach a dial test indicator to the hub assembly, positioning it so that its pointer is in contact with the end of the stub axle. Move the hub assembly in and out, and measure the hub endfloat. The hub endfloat should be within the range given in the Specifications. If necessary, rotate the adjusting nut as required until the endfloat is within the specified range.



Set the endfloat as close as possible to the minimum endfloat setting, to allow for wear in use.

13 When the endfloat is correctly set, slide a new lockwasher onto the stub axle, then fit the locknut.

14 Tighten the hub locknut to the specified torque setting, whilst holding the adjusting nut stationary with a large open-ended spanner.

15 Recheck the hub endfloat, to make sure that the adjusting nut has not moved as the locknut is tightened. If necessary, loosen the locknut and repeat the adjustment procedure.

16 Once the locknut is tightened and the hub endfloat is correct, secure the adjusting nut and locknut in position with the lockwasher. Bend one side of the washer down so it contacts one of the adjusting nut flats, and bend the opposite side of the washer down so it contacts one of the locknut flats.

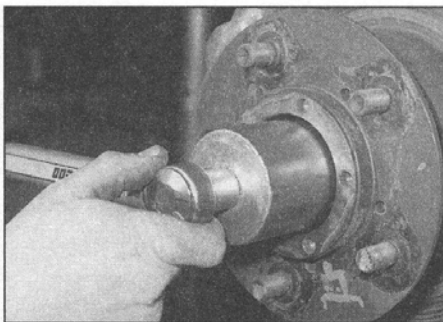
17 Slide the brake caliper assembly back into position, ensuring that its pads pass either side of the disc. Refit the caliper retaining bolts, tighten them to the specified torque setting (see Chapter 10). Secure the brake pipe back in position with all the necessary retaining clips.

18 Refit the halfshaft as described in Section 8.

Later models (from VIN JA032851)

19 Install the hub assembly as described in paragraphs 7 to 10, ensuring that the outer bearing is correctly fitted (see illustration). On models with ABS, take great care to ensure that the ABS wheel sensor is not damaged as the hub is installed.

20 Tighten the hub adjusting nut to the Stage 1 torque setting, whilst rotating the hub to settle the bearings in position (see illustration).



9.20 Tighten the hub adjusting nut as described in text to correctly set the hub endfloat

21 Fully slacken the adjusting nut, then tighten it to its Stage 2 torque setting. This should set the hub endfloat to approximately 0.01 mm. This can be checked using a dial test indicator as described in paragraph 12.

22 Refit the remaining components as described above in paragraphs 13 to 18.

10 Rear hub bearing - renewal



Note: A press may be required to dismantle and rebuild the assembly, if the bearing outer races are a tight fit in the hub. If such a tool is not available, a large bench vice and suitable spacers (such as large sockets) will serve as an adequate substitute.

Removal

1 Remove the hub assembly as described in Section 9.

2 Remove the brake disc as described in Chapter 10.

3 Using a large flat-bladed screwdriver, lever out the inner oil seal from the hub assembly and, where necessary, recover the shim(s) fitted behind the seal. On early models, note the correct fitted depth of the outer seal in the hub, then lever it out of position.

4 Remove the outer and inner bearing inner races from the hub assembly.

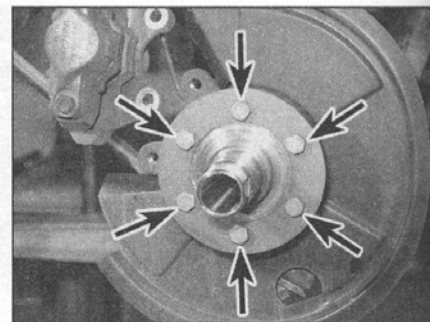
5 Support the hub securely on blocks or in a vice. Using a hammer and suitable punch, carefully tap the inner and outer bearing outer races out from the hub assembly.

6 Thoroughly clean the hub bore, removing all traces of dirt and grease. Polish away any burrs or raised edges which might hinder reassembly. Check both for cracks or any other signs of wear or damage, and renew them if necessary. Examine the stub axle for signs of wear or damage and renew, if necessary (see Section 11). Renew both bearings and oil seal(s) as a matter of course.

Refitting

7 On reassembly, apply a light film of oil to the inner bearing outer race and hub bore to aid installation.

8 Securely support the hub, and locate the



11.3 Rear stub axle retaining bolts (arrowed)

inner bearing outer race in the hub. Press the race fully into position, ensuring that it enters the hub squarely, using a suitable tubular spacer which bears only on the bearing outer race.

9 Pack the bearing inner race with a multi-purpose lithium-based grease. Work the grease well into the bearing race, apply a smear to the outer race surface, then fit the inner race to the hub assembly.

10 Refit the shim(s) (where fitted), then install the new inner oil seal, making sure that its sealing lip is facing inwards. Press the seal into position, ensuring that it enters the hub squarely, until it is flush with the hub surface.

11 Turn the hub over, and fit the outer bearing as described in paragraphs 7 to 9.

12 On early models, install the new outer oil seal, making sure that its sealing lip is facing inwards. Press the seal into position, ensuring that it enters the hub squarely, until it is positioned at the same depth as the original (noted prior to removal).

13 Refit the brake disc as described in Chapter 10.

14 Install the hub assembly as described in Section 9.

11 Rear stub axle - removal and refitting



Removal

1 Remove the rear hub assembly as described in Section 9.

2 If not already done, drain the axle oil as described in the relevant part of Chapter 1.

3 Make alignment marks between the stub axle and axle, then slacken and remove the six retaining bolts and washers (see illustration).

4 Lift off the mudshield, then remove the stub axle from the axle, and recover the gasket. Discard the gasket - a new one must be used on refitting.

5 Inspect the stub axle for signs of wear or damage, and renew if necessary.

6 On later models, check the oil seal fitted to the rear of the stub axle for signs of wear or

damage. If renewal is necessary, lever out the old seal, noting which way around it is fitted. Apply a smear of grease to the new seal lip, to aid installation. Fit the new seal to the axle, making sure that its sealing lip is facing away from the stub axle. Press it into position using a suitable tubular spacer which bears only on the outer edge of the seal. Ensure that the seal squarely enters the stub axle, and is positioned flush with the axle end.

Refitting

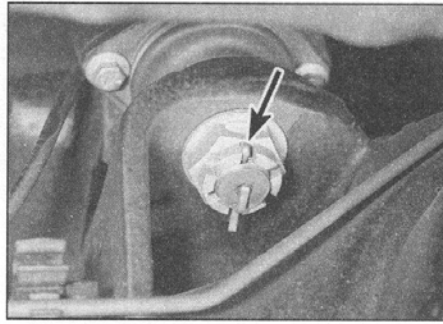
7 Prior to refitting, remove all traces of locking compound from the axle housing threads, ideally by running a tap of the correct size and pitch down them.

8 Make sure that the stub axle and axle mating surfaces are clean and dry, then fit a new gasket to the axle.

9 Slide the stub axle into position, aligning the marks made prior to removal, and refit the mudshield to the stub axle.

10 Clean the threads of the retaining bolts, and apply a drop of fresh locking compound to them. Install the bolts and washers, and tighten them to the specified torque setting.

11 Refit the hub assembly as described in Section 9.



12.7 Withdraw the split pin (arrowed), then slacken and remove the nut securing the upper link balljoint to the rear axle

3 Trace the wiring back from each set of rear brake pads to its pad wear sensor wiring connector. Disconnect each connector, and free the wiring from any relevant retaining clips so that the calipers are free to be removed complete with the axle. On models with ABS, also free the rear wheel sensor wiring connectors.

4 Disconnect the propeller shaft from the rear differential as described in Chapter 8.

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

6 Carry out the following procedures as described in Chapter 11:

- a) Disconnect the lower links from the axle.
- b) Disconnect the shock absorbers from the axle.
- c) Disconnect the anti-roll bar connecting links from the axle.

7 Withdraw the split pin, then slacken and remove the nut securing the upper link balljoint to the top of the axle (see illustration).

8 With an assistant supporting either end of the axle, carefully lower the axle away from the vehicle, making sure that all the relevant components have been disconnected.

9 Remove the axle from underneath the vehicle, and recover the spring seats from the tops of the front coil springs.

Refitting

10 On refitting, position the axle assembly on the jack, and refit the spring seats to the coil springs.

11 With the aid of two assistants, carefully raise the axle assembly into position, whilst aligning the front coil springs with their upper seats and the upper link balljoint with the axle.

12 With the axle raised and both coil springs correctly seated, refit the balljoint retaining nut, and tighten it to the specified torque setting (see Chapter 11). Secure the nut in position with a new split pin.

13 Carry out the following procedures as described in Chapter 11:

- a) Connect the anti-roll bar connecting links from the axle.
- b) Connect the shock absorbers to the axle.
- c) Connect the lower links to the axle.

14 Reconnect the brake pad wear sensor wiring connectors, ensuring that the wiring is correctly routed and retained by all the relevant clips. On models with ABS, also reconnect the wheel sensor wiring connectors.

15 Reconnect the propeller shaft to the differential as described in Chapter 8.

16 Referring to Chapter 10, reconnect the brake pipe(s) to the axle, tightening them to the specified torque setting, then bleed the complete hydraulic braking system.

17 Refit the roadwheels, then lower the vehicle to the ground and tighten the wheel nuts to the specified torque setting.

18 Rock the vehicle to settle all disturbed suspension components in position, then tighten the lower link pivot bolts to the specified torque (See Chapter 11).

13 Axle differential overhaul - general information



Overhauling a differential unit is a difficult and involved job for the DIY home mechanic. In addition to dismantling and reassembling many small parts, clearances must be precisely measured and, if necessary, changed by selecting shims and spacers. Components are also often difficult to obtain and in many instances, extremely expensive. Because of this, if the differential develops a fault or becomes noisy, the best course of action is to have the unit overhauled by a specialist repairer, or to obtain an exchange reconditioned unit.

Nevertheless, it is not impossible for the more experienced mechanic to overhaul the differential, if the special tools are available and the job is done in a deliberate step-by-step manner so that nothing is overlooked.

The tools necessary for an overhaul include internal and external circlip pliers, bearing pullers, a slide hammer, a set of pin punches, a dial test indicator, and possibly a hydraulic press. In addition, a large, sturdy workbench and a vice will be required.

During dismantling, make careful notes of how each component is fitted, to make reassembly easier and more accurate.

Before dismantling, it will help if you have some idea what area is malfunctioning. Refer to *Fault finding* at the end of this manual for more information.

12 Rear axle - removal and refitting



Note: This procedure requires at least two people, and ideally three, to be carried out safely.

Removal

1 Loosen the rear roadwheel nuts, and chock the front wheels. Jack up the rear of the vehicle and support it on axle stands positioned underneath the chassis (see *Jacking and vehicle support*). Remove both rear roadwheels.

2 Unscrew the master cylinder fluid reservoir cap, then tighten the cap down onto a piece of polythene, to minimise fluid loss. Trace the brake pipes back from the calipers to their union piece situated on top of the axle. Slacken the union nut(s), and disconnect the pipe(s). Remove the retaining clips, and release the pipes from the axle/vehicle body.



Plug the hydraulic pipe end(s), to minimise fluid loss and to prevent the entry of dirt into the hydraulic system.