# Chapter 10 Suspension and steering

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## Degrees of difficulty

Easy, suitable for novice with little experience

Fairly easy, suitable for beginner with some experience

Fairly difficult,

**DIY** mechanic

suitable for competent

### **Specifications**

Front suspension

Туре .....

### **Rear suspension**

Туре .....

### Steering

Туре	Rack ar GL mod
Turning circle	10.5 m
Steering roll radius	Negativ
Steering wheel turns lock to lock:	-
Standard	3.83
Power-assisted	3.17
Steering ratio:	
Standard	20.8
Power-assisted	17.5
Front wheel alignment	
Total toe	0° ± 10′

	0 10
Camber (straight-ahead position):	
Golf GTi and Jetta GT	- 35′ ± 20′
All other models	- 30' ± 20'
Maximum difference - side-to-side	30′
Castor:	
Golf GTI and Jetta GT	1°35′ ± 30′
All other models	1°30′ ± 30′
Maximum difference - side to side	1°
Note: Camber and castor settings may differ on some variants - check w	ith VW dealer

### Rear wheel alignment

Total toe	25' ± 15'
Maximum deviation in adjustment	25′
Camber	
Maximum difference - side-to-side	30′

Rear wheel hub bearings - renewal
Steering column - removal, overhaul and refitting
Steering gear - adjustment
Steering gear bellows - renewal
Steering gear unit - removal and refitting
Steering lock - removal and refitting
Steering wheel - removal and refitting
Tie-rods and balljoints - removal and refitting
Track control arm - removal, overhaul and refitting
Wheel alignment - checking and adjustment



Very difficult, suitable for expert DIY or professional

10

Independent with spring struts, lower track control arms and anti-roll bar (some models). Telescopic shock absorbers incorporated in struts

Semi-independent. Incorporating torsion axle beam, trailing arms and spring struts/shock absorbers. Anti-roll bar on some models

Rack and pinion with safety column. Power steering optional on Golf GL models 10.5 m Negative 8.2 mm

Golf GL	5J X 13 5½J X 13 5½ or 6J X 14 5½J X 13	
Tyres		
TypeSize:	Radial ply	
Golf base, C, GL and C Formel E Golf GL Golf GTI Jetta	155 SR 13 175/70 SR 13 185/60 HR 14 175/70 SR 13	
Torque wrench settings	Nm	lbf ft
Front suspension		
Strut to body	60	44
19 mm nut	80 95	59 70
Pivot bolt to subframe	130	96
Lower balljoint bolts	35	26
Track control arm/subframe bolts	130	96
Subframe rear mounting strut to body	80	59
Shock absorber slotted nut	40	30
Anti-roll bar eye bolt nut	25 265	18 195
Hub nut	205	195
Rear suspension		
Mounting bracket shouldered bolt:		( )
Pre 1988	85	63
From 1988	70 70	52 52
Shock absorber lower mounting nut	60	52 44
Axle beam/mounting bracket pivot bolt nut	60	44
Brake pressure regulator spring bracket	35	26
Shock absorber top cover nut	15	11
Shock absorber spacer retaining nut	15	11
Steering		
Steering wheel	40	30
Column tube mounting bracket	20	15
Tie-rod inner	35	26
Tie-rod balljoint	35	26
Tie-rod balljoint locknut	50	37
Rack mounting clip	30	22
Steering column joint	30	22
Power steering pressure and return hose unions Power steering pump and swivel bracket bolts	20 20	15 15
Power steering pump tensioner/bracket	20	15
Power steering pump pulley	20	15
Power steering tie-rod to rack	70	52
Roadwheels	110	81

5J x 13

Golf base, C, CL and C Formel E .....

Roadwheels

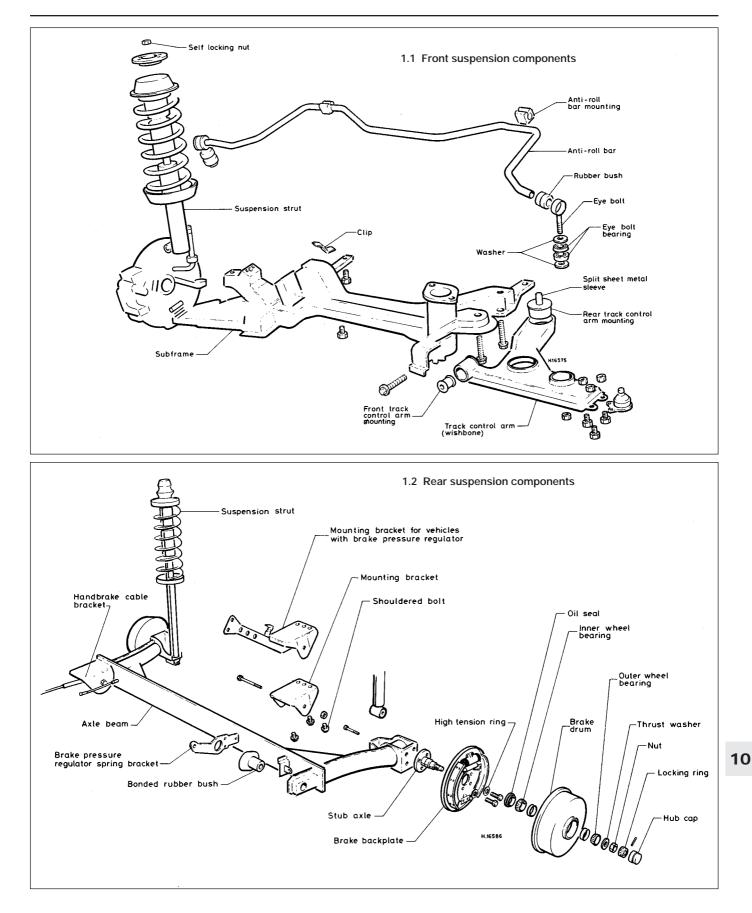
### 1 General information

The front suspension is of independent type, incorporating coil struts and lower track control arms (wishbones). The struts are fitted with telescopic shock absorbers and both suspension units are mounted on a subframe. An anti-roll bar is fitted to the track control arm on some models (see illustration).

The rear suspension comprises a transverse torsion axle with trailing arms rubber-bushed to the body. The axle is attached to the lower ends of the shock

absorbers, which act as struts since they incorporate mountings for the coil springs (see illustration).

The steering is of rack and pinion type mounted on the front subframe. The tie-rods are attached to a single coupling which is itself bolted to the steering rack. Power assistance is fitted to some models.



2 Front suspension strut - removal, overhaul and refitting

### Removal

**1** Apply the handbrake then jack up and support the front of the vehicle on axle stands (see *"Jacking and vehicle support"*). Remove the roadwheel on the side concerned.

**2** Position a jack under the outer end of the track control arm for support.

3 In the engine compartment, prise the cap from the top of the strut (see illustration) and unscrew the self-locking nut whilst holding the piston rod stationary with an Allen key. Renew the self-locking nut.

4 Undo and remove the anti-roll bar eye bolt nut.

**5** Detach the steering tie-rod balljoint.

6 Remove the brake caliper and hang it up to one side. Detach the brake line from the strut.
7 Scribe an alignment mark around the periphery of the suspension strut-to-wheel bearing housing location lugs to ensure accurate positioning when refitting, then undo the two retaining nuts and withdraw the two bolts securing the strut at its bottom end to the wheel bearing housing (see illustration). Renew the self-locking nuts and washers.

8 Lower the track control arm to disengage the strut from its top mounting, then prise it free from the wheel bearing housing.



2.7 Strut-to-front wheel bearing housing retaining nuts/bolts



Peg spanner and Allen key or suitable spanner will suffice



2.3 Removing front suspension strut top cap

#### Overhaul

**9** Do not attempt to remove the coil spring from the strut unless a spring compressor is available. If a suitable compressor is not available, take the strut to a garage for dismantling and assembly.

**10** Support the lower end of the strut in a vice, then fit the coil spring compressor into position and check that it is securely located.

**11** Compress the spring until the upper spring retainer is free of tension, then remove the slotted nut from the top of the piston rod. To do this, a special tool is available (see illustration). However, it is possible to hold the piston rod stationary with an Allen key or spanner on the flats (as applicable) and use a

peg spanner to unscrew the slotted nut. 12 Remove the strut bearing, followed by the spring retainer (see illustration).

**13** Lift the coil spring from the strut with the compressor still in position. Mark the top of the spring for reference.

**14** Withdraw the bump stop components from the piston rod, noting their order of removal.

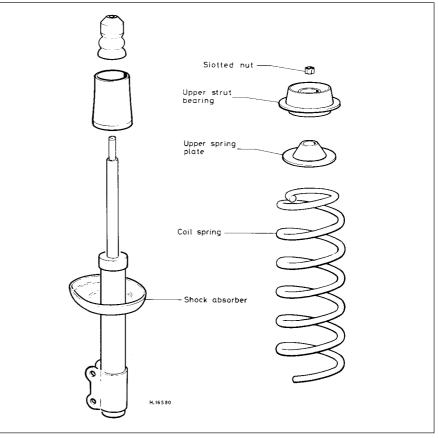
**15** Move the shock absorber piston rod up and down through its complete stroke and check that the resistance is even and smooth. If there are signs of seizing or lack of resistance, or if fluid has been leaking excessively, the shock absorber/strut unit should be renewed.

**16** The coil springs are normally colour-coded. If the springs are to be renewed (it is advisable to renew the springs as an axle set), be sure to get the correct replacement type with an identical colour code.

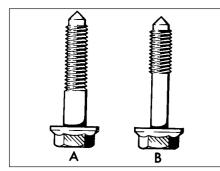
**17** Reassembly is a reversal of removal. Tighten the slotted nut to the specified torque before releasing the spring compressor.

### Refitting

**18** Refitting is a reversal of the removal procedure. Tighten all retaining nuts to the specified torque and use only new self-locking nuts with special washers to secure the strut-to-wheel bearing housing bolts.



2.12 Front suspension strut and coil spring components



- 3.2 Front suspension camber adjustment bolts for later models
  - A Standard 12.0 mm diameter bolt
  - B Special 11.0 mm diameter bolt
- 3 Front suspension camber adjustment

### Early models

1 On early models, front suspension camber adjustment is possible by loosening the two bolts securing the strut to the wheel bearing housing, then turning the eccentric top bolt as required. The position of the eccentric bolt must be accurately marked before removing it, otherwise the camber adjustment will have to be reset.

### Later models

2 On later models no adjustment is possible as assembly tolerances have been reduced sufficiently to make any adjustment unnecessary. However, in isolated instances, it may be found that slight correction of the camber angle within 1° or 2° is required. In this case, a special bolt (part no. N 903-334-01) can be obtained from a VW dealer. The bolt shank is of 11 mm diameter instead of the standard 12 mm diameter and allows a small amount of adjustment to be made (see illustration).

**3** This special bolt should first be fitted in the top bolt position. If this does not provide sufficient adjustment, the lower bolt should also be changed for the special type. No attempt should be made to reduce the diameter of the original bolts.

### 4 Front anti-roll bar - removal and refitting

### Removal

1 Apply the handbrake then jack up the front of the vehicle and support it on axle stands (see "Jacking and vehicle support").

2 Undo and remove the anti-roll bar eye bolt nuts from the underside of the track control arm each side (see illustration).

**3** Position a jack under the subframe to support it.



4.2 Anti-roll bar eye bolt nut (arrowed)

4 Undo the subframe-to-body strut retaining bolt at the rear end. Loosen the front bolt and swing the strut round to provide clearance for anti-roll bar and bush removal. Repeat on the other side.

5 Lift the anti-roll bar eye bolts and disengage them from the anti-roll bar (see illustration). Note the location and orientation of the eye bolt bushes and washers. Remove the anti-roll bar.

**6** Renew the anti-roll bar if damaged or distorted. Renew the bushes if perished or worn.

### Refitting

**7** Refitting is a reversal of the removal procedure. Check that the eye bolt bushes are fitted with their conical face towards the washers, the cover faces of which must face away from the bush mountings.

8 Do not fully tighten the retaining nuts and bolts until the vehicle is free standing and has been bounced a few times to settle the mountings.



4.5 Anti-roll bar location in eye bolt

5 Front wheel bearing housing - removal and refitting

### Removal

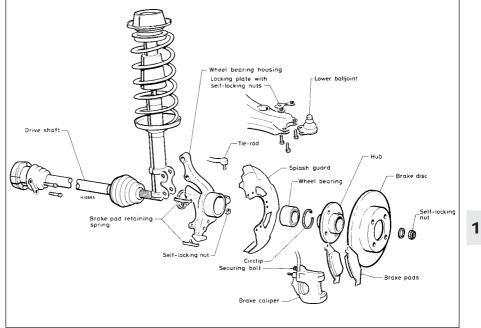
1 Remove the driveshaft on the side concerned.

2 Disconnect the tie-rod balljoint from the wheel bearing housing (see illustration).

**3** Remove the brake caliper. Leave the brake hydraulic line connected to the caliper and hang up the caliper to support it. Disconnect the hydraulic line location bracket from the strut.

4 Undo the retaining screw and remove the brake disc.

5 Scribe an alignment mark around the periphery of the suspension strut-to-wheel bearing housing location lugs, to ensure accurate positioning when refitting.



5.2 Wheel bearing housing and associated components

10

**6** Undo the two suspension arm-to-wheel bearing retaining bolt nuts and remove them, together with their special washers. These nuts must be renewed when refitting. Withdraw the bolts and separate the wheel bearing housing from the suspension strut.

**7** If the wheel bearing housing is to be renewed, remove the wheel bearing then fit the bearing and hub to the new housing.

### Refitting

8 Refitting is a reversal of the removal procedure. Renew all self-locking nuts.

**9** When refitting the suspension strut to the wheel bearing housing, check that they are correctly positioned according to the alignment scribe marks made during dismantling before tightening the securing bolts and nuts to the specified torque setting. **10** Refit the driveshaft.

**11** Reconnect the tie-rod balljoint and anti-roll bar (where applicable) to the track control arm.

**12** Refit the brake disc and caliper.

**13** On completion, lower the vehicle to the ground and tighten the hub nut to the specified torque wrench setting.

### 6 Front wheel bearing renewal

### Removal

1 Remove the wheel bearing housing.

**2** If still fitted, undo the cross-head screw and remove the brake disc.

**3** Remove the screws and withdraw the splash guard.

4 Support the wheel bearing housing with the hub facing downward and press or drive out the hub by using a suitable mandrel. The bearing inner race will remain on the hub and once removed, it is not possible to re-use the bearing. Use a puller to remove the inner race from the hub.

5 Extract the circlips then, while supporting the wheel bearing housing, press or drive out the bearing by using a mandrel on the outer race.

### Fitting

**6** Clean the recess in the housing, then smear it with a little general purpose grease. Where a new wheel bearing kit has been obtained, the kit will contain a sachet of Molypaste. Smear some Molypaste onto the bearing seat (not the bearing).

7 Fit the outer circlip, then support the wheel bearing housing and press or drive in the new bearing by using a metal tube on the outer race only.

**8** Fit the inner circlip, ensuring that it is correctly seated.

**9** Position the hub with its bearing shoulder facing upward, then press or drive on the bearing and housing by using a metal tube on the inner race only.

**10** Refit the splash guard and brake disc, then refit the wheel bearing housing.

**11** On completion, lower the vehicle to the ground and tighten the hub nut to the specified torque setting.

**12** If the bearings have been renewed, it is advisable to raise the vehicle at the front again after the hub nut has been tightened and check that the front roadwheel and hub can be spun freely without excessive binding or lateral play.

7 Track control arm - removal, overhaul and refitting

### Removal

1 Loosen the front roadwheel bolts, jack up the front of the vehicle and support on axle stands (see "*Jacking and vehicle support*"). Remove the roadwheel(s).

2 Where applicable, remove the anti-roll bar. 3 Unscrew and remove the track control arm balljoint clamp bolt at the wheel bearing housing (see illustration). Note that the bolt head faces forwards. Tap the control arm downwards to release the balljoint from the wheel bearing housing.

**4** Unscrew and remove the pivot bolt from the front inboard end of the track control arm (to subframe) (see illustration).

5 Undo and remove the track control arm rear mounting bolt and remove the bolt, together with the strut. Withdraw the split sleeve from the bolt hole using suitable pliers.

**6** Pivot the track control arm downwards at the front and withdraw it from the subframe at the rear mounting, levering if necessary.

### Overhaul

7 With the track control arm removed, clean it for inspection.

8 Check the balljoint for excessive wear and the pivot bushes for deterioration. Also examine the track control arm for damage and distortion. If necessary, the balljoint and bushes should be renewed.

**9** To renew the balljoint, first outline its exact position on the track control arm. This is important as the relative positions of the track control arm and the balljoint are set during



7.4 Track control arm pivot bolt



7.3 Track control arm balljoint and clamp bolt

production and the new balljoint must be accurately positioned when fitting. Unscrew the nuts and remove the balljoint and clamp plate. Fit the new balljoint in the exact outline and tighten the nuts. If fitting a new track control arm, locate the balljoint centrally in the elongated hole.

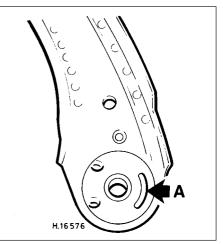
**10** To renew the front pivot bush, use a long bolt, together with a metal tube and washers, to pull the bush from the track control arm. Fit the new bush using the same method but to ease insertion, dip the bush into soapy water first.

**11** The rear mounting bonded rubber bush can be removed by prising it free. Failing this, you will need to carefully cut through its rubber and steel sections to split and release it by driving it out. The latter course of action should only be necessary if it is badly corroded into position.

**12** Press or drive the new mounting bush into position from the top end of the control arm whilst ensuring that it is positioned correctly **(see illustration)**.

### Refitting

**13** Refitting the track control arm is a reverse of removal.



7.12 Correct fitting position for mounting bush in control arm

Opening A to be located on inboard side of vehicle



8.4 Removing rear suspension strut top cap

14 Delay tightening the pivot bolts until the weight of the vehicle is on the suspension.15 Have the front wheel camber angle checked and if necessary, adjusted by a VW dealer.

8 Rear suspension strut and coil spring - removal and refitting



### Removal

1 Detach the trim panel from the top of the rear suspension strut within the luggage compartment.

2 Chock the front roadwheels and then jack up the rear of the vehicle and support on axle stands (see *"Jacking and vehicle support"*). Remove the rear roadwheel(s).

**3** Support the weight of the trailing arm with a trolley jack.

**4** Remove the cap from the top of the strut **(see illustration)**. Unscrew the upper securing nut from the top of the strut, if necessary holding the rod stationary with a spanner.

5 Withdraw the dished washer then undo the second retaining nut and withdraw the thrustwasher and upper bearing ring.

**6** At the bottom end of the strut, engage a spanner on the self-locking nut retaining the mounting bolt. Access is through the trailing arm tube (see illustration). Undo the bolt and withdraw it.

7 Lower the trailing arm as far as possible and withdraw the strut assembly (see illustration).

8 To remove the coil spring from the strut, undo the retaining nut then withdraw the spacer sleeve, lower bearing ring, upper spring seat and packing. Note how the packing is fitted for reference on reassembly (see illustration).

**9** Withdraw the coil spring, rubber stop and ring with protective tube, bottom cap, packing piece and lower spring seat.

**10** If the shock absorber is faulty, it will normally make a knocking noise as the vehicle is driven over rough surfaces. With the unit removed, uneven resistance tight spots will be evident as the central rod is operated. Check



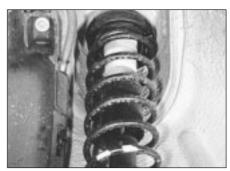
8.6 Rear suspension strut bottom mounting

the condition of the buffers, bump stop and associated components and renew them as necessary.

**11** Coil springs should only be renewed as an axle set and it is important to fit correct replacements only. The springs are colour-coded for identification.

### Refitting

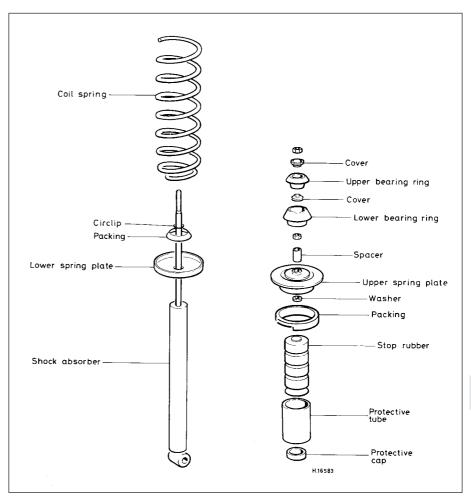
**12** Refitting is a reversal of removal. Ensure that the coil spring is correctly located in the



8.7 Remove rear suspension strut and coil spring downwards

seats. Delay tightening the lower mounting bolt until the full weight of the vehicle is on the roadwheels.

**13** If new coil springs have been fitted, it is advisable to have a rear wheel alignment check made by your VW dealer after an initial distance of 1000 miles (1500 km) has been covered and the springs have settled.



8.8 Rear suspension strut and coil spring components



9.3 Brake pressure regulator unit showing spring bracket

9 Rear axle beam - removal and refitting

**Note:** If the axle beam is suspected of being distorted, then it should be checked in position by a VW garage using optical alignment equipment

**Modification:** On 1988 models, the rear suspension mounting bracket bolts incorporate a modified shoulder. Their tightening torque is reduced to that specified.

#### Removal

1 Remove the rear stub axles.

**2** Support the weight of the trailing arms with axle stands (see *"Jacking and vehicle support"*) then disconnect the struts/shock absorbers by removing the lower mounting bolts.

**3** On models fitted with a brake pressure regulator unit, unbolt the spring bracket from the axle beam (see illustration).

4 Disconnect the handbrake cables from the axle beam and from the left-hand side and underbody bracket.

5 Remove the brake fluid reservoir filler cap and tighten it down onto a piece of polythene sheet in order to reduce the loss of hydraulic fluid.

**6** Lower the axle beam and disconnect the brake hydraulic hoses. Plug the hoses to prevent the ingress of dirt.

7 Support the weight of the axle beam with axle stands then unscrew and remove the pivot bolts and lower the axle beam to the ground. Note that the pivot bolt heads face as shown (see illustration).

8 If the bushes are worn renew them. Using a two-arm puller, force the bushes from the axle beam. Dip the new bushes in soapy water before pressing them in from the outside with the puller. Locate the bush so that the segments which protrude point in the direction of travel (see illustration). When fitted, the cylindrical bush section should protrude by 8 mm.

**9** If the mounting bracket is removed, note its fitted position relative to the axle. If the bolts shear during removal, the stud will have to be



9.7 Axle beam pivot bolt head fitting position

accurately drilled out and the resultant hole tapped for a 12 mm x 1.5 thread. Be careful to drill in the centre of the broken stud since misalignment of the hole will in turn mean misalignment of the axle. Unless you have experience in this type of work it is best entrusted to a trained mechanic.

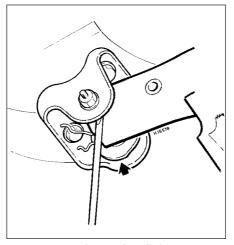
10 When the mounting bracket is refitted, its inclination angle to the axle beam should be  $12^{\circ} \pm 2^{\circ}$ .

### Refitting

**11** Refitting is a reversal of removal whilst noting the following.

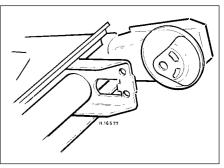
12 When the axle is fitted into position with the mountings under tension, locate the securing bolts then align the right side mounting so that the bolts are centralised in the slotted holes. Now on the left-hand side, use a couple of suitable levers and press the mounting to the rubber bush so that a minimal gap exists on the inside (see illustration). The respective retaining bolts can now be tightened to the specified torque wrench setting.

**13** On completion, bleed the brake hydraulic system.



9.12 Rear axle refitting

Check that clearance (arrowed) is minimal on left-hand mounting inner side



9.8 Rear axle bonded rubber bush orientation

Protruding segments to face forwards

10 Rear wheel hub bearings - renewal



1 On models fitted with rear disc brakes, refer to Chapter 9.

**2** On models fitted with rear drum brakes, remove the brake drum. The bearings and oil seal can be removed in the same manner as that given for the corresponding components in the rear brake disc.

**3** Refit the brake disc or drum, as applicable, and adjust the bearing as described in Chapter 9.

11 Steering wheel - removal and refitting

### Removal

1 Disconnect the battery earth lead.

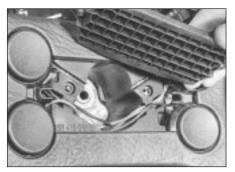
**2** Set the front roadwheels in the straight-ahead position.

**3** Prise free the cover from the centre of the steering wheel. Where the cover is the horn push button, note the location of the wires and disconnect them from the terminals on the cover (see illustrations).

4 Mark the steering wheel and inner column in relation to each other, then unscrew the nut and withdraw the steering wheel (see illustration). Remove the washer.



11.3a Removing steering wheel centre cover – 1.3 litre



11.3b Removing steering wheel centre cover – GTi

### Refitting

**5** Refitting is a reversal of removal. Ensure that the turn signal lever is in its neutral position, otherwise damage may occur in the cancelling arm. The cancelling ring tongue points to the left. Tighten the retaining nut to the specified torque.

**6** On completion, reconnect the battery and check that the horn and column switches operate satisfactorily.

### 12 Steering column - removal, overhaul and refitting

# .

### Removal

- 1 Disconnect the battery negative lead.
- 2 Remove the steering wheel.
- 3 Remove the screws and withdraw the



11.4 Undoing steering wheel retaining nut - GTi

steering column lower shroud.

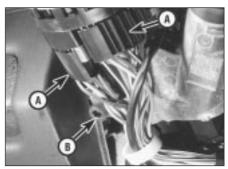
**4** Remove the three screws and withdraw the combination switch. Disconnect the wiring multi-connectors (see illustration).

5 Remove the screws and withdraw the lower facia trim panel.

6 Remove the column mounting bolts. Where shear-head bolts have been fitted, it will be necessary to drill off the heads and unscrew the threaded portions or use a centre punch to unscrew them. On some models, one of the mounting bolts may be a socket-head type, in which case use an Allen key to unscrew it.

7 Undo and withdraw the universal joint-to-column clamp bolt (see illustration). Undo the lower mounting-to-column transverse bolt then withdraw the column from the universal joint and collect the coil spring,

**8** On pre-July 1984 models, a two section column is fitted **(see illustration)**. With this type, push the two sections together to



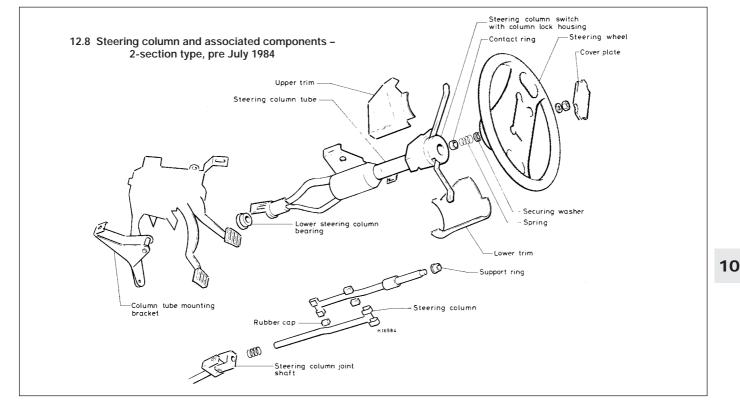
12.4 Detach multi-function switch wiring connectors (A)

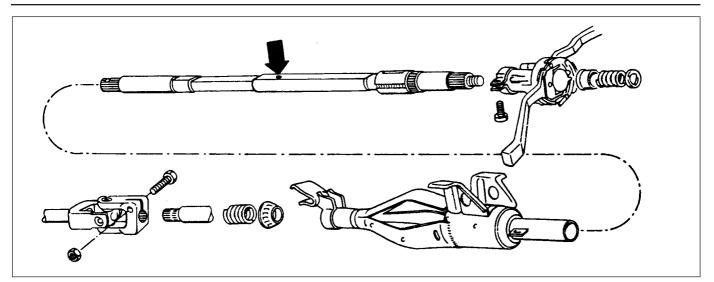
Steering column mounting bolt also shown (B)



12.7 Steering column universal joint (upper). Clamp bolt arrowed

disengage the rectangular engagement pins within the housing, collect the rubber insulation caps and withdraw the lower section upwards through the housing tube.





### 12.16 Steering column - from July 1984

Reassembly alignment hole arrowed

Overhaul

**9** Check the various components for excessive wear. If the column has been damaged in any way then it must be renewed as a unit. If renewing the earlier type column as a unit, then the later telescopic type column unit may be fitted, in which case a new lower mounting must also be fitted as the earlier type is not compatible with the later type.

**10** To dismantle the top housing (both types), prise free the lockwasher from the inner column and withdraw the spring and contact ring. Renew the lockwasher.

**11** Check the condition of the flange tube bushes and if necessary renew them. Lever the old bushes out with a screwdriver then press in the new bushes after dipping them in soapy water. Unscrew the old shear bolt(s) and obtain new bolts.

**12** Using an Allen key, unscrew the clamp bolt securing the steering lock and withdraw the lock. Note that the ignition key must be inserted and the lock released.

**13** Withdraw the inner column from the outer columns and remove the support ring.

14 Clean the components and examine them for wear. Renew them as necessary.

### Refitting

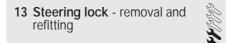
**15** Reassembly is a reversal of dismantling. Lubricate bearing surfaces with multi-purpose grease and renew the inner column lockwasher.

16 On later models with the telescopic single section column, reassembly differs. Secure the lower end of the column in a soft-jawed vice so that the upper section rests on the jaws and the two halves of the column cannot be slid together. The small lug in the lower part must be visible through the hole in the upper part (see illustration). Assemble the support ring with the column switch and lock housing, the contact ring, spring and locking washer.

**17** On both steering column types, the locking washer is fitted by driving it down the shaft until it is completely pressed on. On the earlier two section type column, compress the two columns together using a suitable pair of pliers as the washer is driven into position.

**18** Check that column alignment is correct when connecting it to the universal joint. Tighten the retaining nuts and bolts to the specified torque setting. Tighten each shear bolt until its head breaks off.

**19** On completion, check that operation of the steering, the various steering column switches and the horn are satisfactory.



### Removal

- 1 Disconnect the battery negative lead.
- 2 Remove the steering wheel.

**3** Remove the screws and withdraw the steering column lower shroud.

**4** Remove the three screws and withdraw the combination switch. Disconnect the wiring plug.

**5** Using an Allen key, unscrew the clamp bolt securing the steering lock.

**6** Prise the lockwasher from the inner column and remove the spring and contact ring.

7 Disconnect the wiring plug and withdraw the steering lock from the top of the column, together with the upper shroud. Note that the ignition key must be inserted to ensure that the lock is in its released position.

8 Remove the screw and withdraw the switch from the lock housing.

**9** To remove the lock cylinder, drill a 3.0 mm diameter hole in the location shown (see illustration). Depress the spring pin and extract the cylinder.

### Refitting

**10** Refitting is a reversal of removal. Renew the inner column lockwasher and press it fully onto the stop while supporting the lower end of the column.

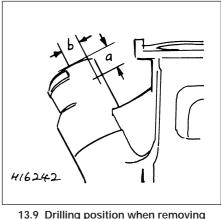
14 Steering gear bellows - renewal



1 The steering gear bellows can be removed and refitted with the steering gear unit in situ or removed from the vehicle.

2 Remove the tie-rod outer balljoint or the tie-rod, as applicable. On power steering models, the outer balljoint can be removed from the left and right-hand side tie-rods and there is therefore no need to remove the tie-rod.

**3** Unscrew and remove the outer balljoint locknut nut from the tie-rod.



steering lock cylinder

*a* = 12.0 mm *b* = 10.0 mm



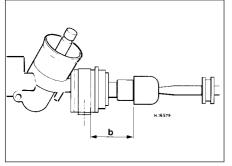
14.4 Steering tie-rod bellows and retaining clip



15.1 Right-hand adjustable balljoint



15.4 Balljoint separator tool in position on left-hand balljoint

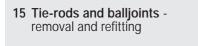


15.10a Tie-rod-to-rack dimensions (b) All models: b = 70.5 mm

**4** Release the retaining clips and withdraw the bellows from the steering gear and tie-rod (see illustration).

**5** Refit in the reverse order of removal. Smear the inner bore of the bellows with lubricant prior to fitting to ease its assembly. Renew the balljoint locknuts.

**6** On completion, check front wheel alignment.



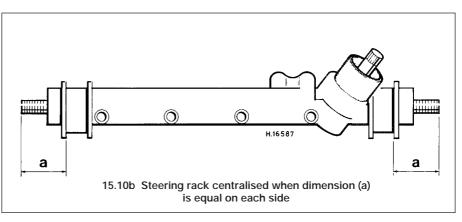
### Manual steering

#### Removal

1 If the steering tie-rod and balljoints are worn, play will be evident as the roadwheel is rocked from side to side. In this case, the balljoint must be renewed. On RHD models, the right-hand tie-rod is adjustable (see illustration) and the balljoint on this tie-rod can be renewed separately, however the left-hand tie-rod must be renewed complete. On LHD models, the tie-rods are vice versa.

**2** Jack up the front of the vehicle and support on axle stands (see *"Jacking and vehicle support"*). Apply the handbrake and remove the front wheel(s).

**3** If removing the tie-rod end balljoint, measure the distance of the exposed thread inboard of the locknut. Make a note of the distance then loosen the locknut.



**4** Unscrew the balljoint nut on the side concerned then use a balljoint nut separator tool to release the joint from the wheel bearing housing **(see illustration)**. With the tie-rod outer joint separated from the wheel bearing housing, the outer balljoint can be unscrewed from the tie-rod (where applicable).

**5** To remove the tie-rod, release the retaining clips from the steering gear bellows then slide the bellows outwards along the tie-rod to expose the inner balljoint.

**6** Loosen the inner joint locknut then unscrew the tie-rod from the steering rack. The steering gear bellows can then be withdrawn from the inboard end of the tie-rod. Renew the bellows if they are damaged or perished.

#### Refitting

**7** Refitting is a reversal of the removal procedure but note the following.

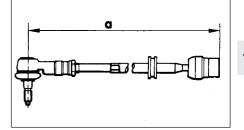
8 Clean the old locking fluid from the steering rack and from the old tie-rod if it is being refitted. Smear both threads with a locking solution prior to assembly.

**9** Lubricate the inner bore of the gaiter ends before sliding it onto the tie-rod .

10 When reconnecting the tie-rod to the rack, screw it in to give the specified dimension "b" (see illustration). Where both tie-rods (left and right) are being refitted to the rack, centralise the rack so that dimension "a" (see illustration) is equal on each side.

11 Centralise the steering, then set the length of the left-hand tie-rod at a distance "a" (see illustration), measured between the centre of the outer balljoint and the steering gear stop face on the inboard end of the driveshaft, When the distance is correct, tighten the locknut against the tie-rod end to set it at the specified fixed length. Set the right-hand tie-rod to the original length measured on dismantling, This will provide an approximate initial setting only, On completion, it will be necessary to check the toe-in setting. If further minor adjustment is required, adjust the right-hand tie-rod to provide the specified front wheel toe-in alignment. Any subsequent adjustments to the track setting must only be made by altering the length of the right-hand tie-rod.

12 Alternatively, screw on the balljoint to give the exposed thread dimension noted during removal, then tighten the locknut. Check that the steering gear-to-inner balljoint distance is as previously specified, then lock the inner locknut. Refit the steering gear bellows and ensure that they are not distorted.



15.11 Check that fixed length of left-hand driveshaft is as specified between points indicated

Distance 'a' = 410 mm



### 16.1 Manual steering gear adjustment screw (arrowed)

**13** Reconnect the outer balljoints to the wheel bearing housing and tighten the locknuts to the specified torque wrench settings. Always fit new locknuts if refitting the old balljoints/tie-rod.

14 On completion, check front wheel alignment.

### **Power steering**

#### Removal

**15** Remove the steering gear unit together with the tie-rods from the vehicle. This is necessary to avoid damaging the rack and pinion.

**16** With the steering gear removed, clean it externally then release the clips and slide the bellows outwards along the tie-rods away from the inner joints.

**17** Support the steering gear in a soft jaw vice with the steering rack in the jaws. Do not clamp the rack into a vice not fitted with protective jaws.

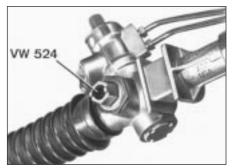
**18** Each tie-rod and outer balljoint can be removed in a similar manner to that described for the manual steering gear unit.

#### Refitting

**19** Refit the steering tie-rods to the rack and adjust the fitted lengths, as given. Tighten the tie-rods to the specified torque when the settings are correct.

20 Refit the steering gear and tie-rods.

21 On completion, check front wheel alignment.



16.8 Power steering gear adjustment – use VW tool

16 Steering gear - adjustment

### Manual

**1** If there is any undue slackness in the steering gear which results in noise or rattles, then the steering gear should be adjusted as follows (see illustration).

**2** Raise and support the vehicle at the front end on axle stands (see "*Jacking and vehicle support*").

**3** With the wheels in the straight-ahead position, tighten the self-locking adjustment screw by approximately 20°.

4 Lower the vehicle to the ground then road test the vehicle. If the steering fails to self-centre after cornering, loosen the adjustment screw a fraction at a time until it does.

**5** If, when the correct self-centring point is reached, there is still excessive wear in the steering, retighten the adjuster nut a fraction to take up the play.

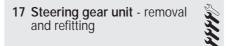
**6** If the above adjustment procedure does not provide satisfactory steering adjustment, then it is probable that the steering gear is worn beyond an acceptable level and it must be removed and overhauled.

### Power-assisted

7 Remove the steering gear unit.

8 Loosen the adjuster screw locknut then turn the adjustment screw in to the point where the rack can just be moved by hand without binding or sticking (see illustration). Retighten the locknut.

9 Refit the steering gear to the vehicle.



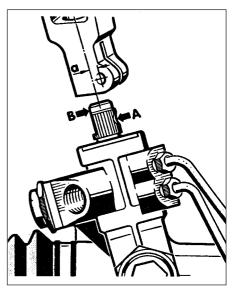
Modification - power steering gear pinion: From May 1985, the pinch-bolt clamping the intermediate shaft to the steering gear pinion is located approximately 1.0 mm nearer the centre line of the pinion. To identify the modified pinion, a flat is cut opposite the pinch-bolt location. When renewing either of the components separately, it may be necessary to increase the depth of the pinch-bolt recess in the pinion by 1.0 mm so that the two components match. Do not alter the hole in the intermediate shaft (see illustration).

### Removal

1 Apply the handbrake, jack up the front of the vehicle and support it on axle stands (see *"Jacking and vehicle support"*). Remove the roadwheels.

**2** Disconnect the inner ends of the tie-rods.

**3** On power steering models, detach the fluid suction hose at the pump unit end by



### 17.0 Power steering gear pinion modification

- a Dimension reduced from 12.1 mm to 11.0 mm
- A Notch depth increased
- B Flat for identification

loosening the hose clip, withdrawing the hose from the pump and draining the fluid into a suitable container (see illustration).

**4** Disconnect the steering tie-rod outer balljoints.

5 Where applicable, disconnect the gearshift securing bracket from the steering gear.

**6** Undo and remove the steering gear pinion-to-lower column joint clamp bolt (**see illustration**). Prise free the joint shaft bellows and pull the bellows up the shaft for access to the clamp bolt.

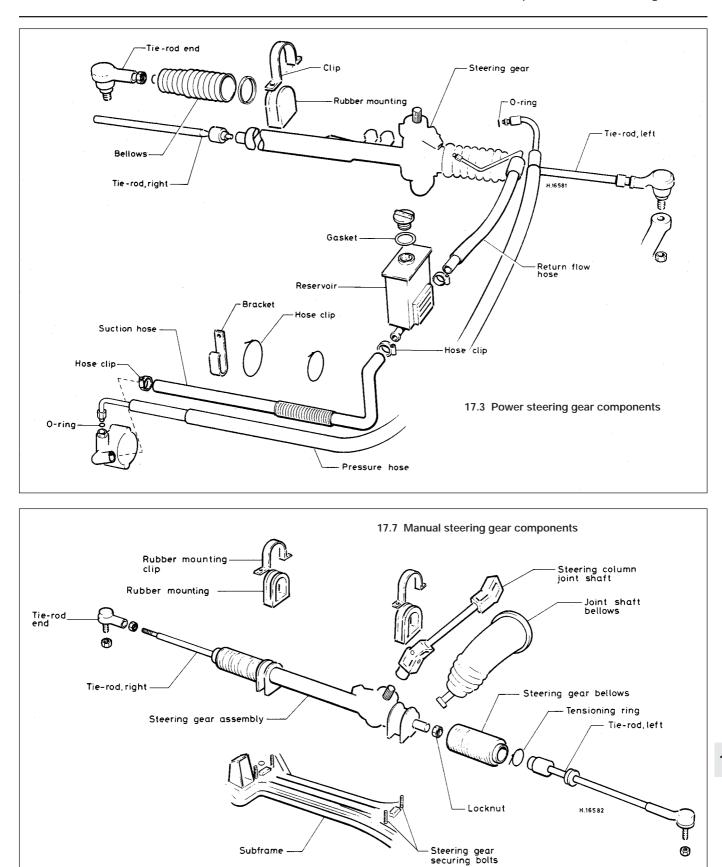
**7** Undo and remove the steering gear unit retaining clamp nuts and withdraw the clamps. Note that the retaining bolts remain in the subframe (see illustration). If necessary the bolts can be removed by driving them out downwards using a soft metal drift.

8 On power steering models, disconnect the pressure and return flow fluid hoses at the union connections to the steering gear unit.

**9** To enable the steering unit to be withdrawn, it may be necessary to detach and withdraw



17.6 Steering gear pinion-to-lower column joint



the steering column a sufficient amount to enable the pinion shaft to disengage from the lower column joint. Before disengaging the pinion from the lower column joint, it is advisable to make an index mark between the two to ensure correct alignment when refitting. **10** On power steering models, support the weight of the engine/gearbox unit by using a hoist then unscrew and remove the left-hand subframe bolt. Loosen but do not remove the right-hand subframe retaining bolt.

**11** On manual steering models, withdraw the steering gear unit through the aperture in the left-hand side wheel arch.

12 On power steering models, remove the steering gear unit from the left side, guiding it past the partially lowered subframe. Plug the power steering fluid hoses whilst the steering gear is removed to prevent the ingress of dirt.13 Remove the tie-rods from the steering gear.

### Refitting

14 Refitting is a reversal of the removal procedure. All self-locking nuts must be renewed.

**15** Lubricate the steering gear rack with steering gear grease before refitting the tie-rods. Adjust the tie-rods when fitting them to the rack.

**16** Establish that pinion shaft-to-lower column alignment is correct to ensure that correct

steering centralisation is made. If a new steering gear unit is being fitted, centralise the rack and steering column before assembly.

**17** Delay tightening all nuts and bolts until the weight of the vehicle is on its suspension. Check and if necessary, adjust front wheel alignment.

**18** On power steering models, unplug the hoses and reservoir cap ventilation hole. Connect the hoses whilst taking care not to let dirt enter the system. Top-up the system fluid and check for any signs of leakage on completion.

18 Power steering fluid - draining and refilling	

### Draining

1 To drain fluid from the system, detach the fluid suction hose at the pump unit and drain the fluid into a container for disposal. When draining, turn the steering wheel from lock to lock to expel as much fluid as possible.

### Refilling

**2** After draining off the fluid, reconnect the suction hose to the pump unit then fill the reservoir to the top with new fluid from a sealed container. Restart the engine and

switch off as soon as it fires. Repeat the starting and stopping sequence several times, this will cause fluid to be drawn into the system quickly.

**3** Watch the level of fluid and keep adding fluid so that the reservoir is never sucked dry. When the fluid ceases to drop as a result of the start/stop sequence, start the engine and allow it to run at idling speed.

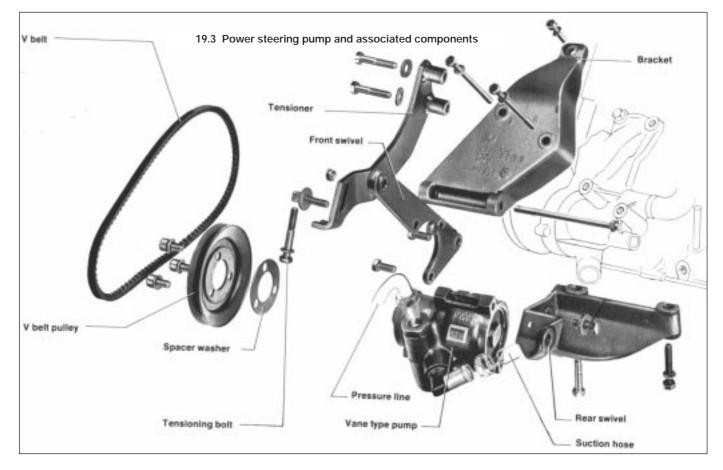
**4** Turn the steering from lock to lock several times, being careful not to leave the wheels on full lock because this will cause pressure in the system to build up.

5 Watch the level of the fluid in the reservoir and add fluid if necessary to keep the level at the MAX mark.

**6** When the level stops falling and no more air bubbles appear in the reservoir, switch the engine off and fit the reservoir cap. The level of fluid will rise slightly when the engine is switched off.

### 19 Power steering pump removal, refitting and drivebelt adjustment

1 If the power steering is suspected of malfunction, have the supply and system pressure checked by your VW dealer. The pump unit cannot be overhauled or repaired and if defective, must be renewed as a unit.



### Removal

 ${\bf 2}$  To remove the pump unit, first drain the system fluid.

**3** Disconnect the pressure hose from the pump unit (see illustration).

**4** Loosen the pump unit retaining bolts and pivot the pump so that the drivebelt can be disconnected from the pulley.

5 Support the pump, withdraw the retaining bolts and withdraw the pump unit.

### Refitting

**6** Refitting is a reversal of removal. Tension the drivebelt, top-up with new fluid and bleed the system.

### Drivebelt adjustment

7 Refer to Chapter 1, Section 13.

20 Wheel alignment - checking and adjustment

HHH i

1 Accurate wheel alignment is essential for good steering and slow tyre wear. Alignment details are given in *Specifications* and can be accurately checked by a suitably equipped garage. However, front wheel alignment gauges can be obtained from most motor accessory stores and used as follows.

2 Check that the vehicle is only loaded to kerbside weight, with a full fuel tank and the tyres correctly inflated.

**3** Position the vehicle on level ground with the wheels straight-ahead, then roll the vehicle backwards 4.0 m and forwards again.

4 Using a wheel alignment gauge in accordance with the manufacturer's instructions, check that the front wheel toe dimension is as specified. If adjustment is necessary, loosen the balljoint-to-tie-rod locknut on the right-hand side and turn the tie-rod as required, then retighten the locknut. Note that the left-hand tie-rod is set at the specified length - see illustration 15.11. Its setting should not be changed.

**5** Although the camber angle of the front wheels can be adjusted, this is a task best entrusted to your VW dealer.

**6** The castor angle is not adjustable. As with the camber angle, is best checked by your VW dealer.