

Chapter 13

Front Axle and Suspension

Part 1. Front Suspension

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Specifications

Type	Independent coil springs with upper and lower control arms and stabiliser bar
Shock absorber type	Double acting gas pressurised
Ball joints:	
Lower ball joint —	
Turning torque	0.1 – 2.5 Nm
Vertical play (maximum)	0.5 mm
Upper ball joint turning torque	0.7 – 4.4 Nm
Front wheel alignment:	
Caster angle —	
Standard	2 deg 50 min ± 45 min
Maximum variation between sides	30 min
Camber angle —	
Standard	Minus 0 deg 5 min ± 45 min
Maximum variation between sides	30 min
Toe in —	
Millimetres	3 mm ± 2mm
Degrees	0 deg 14 min ± 12 min

TORQUE WRENCH SETTINGS

ABS sensor:	
Sensor retaining bolt	8 Nm
Harness retaining bolt	8 Nm
Connector bracket	12 Nm
Ball joint:	
Lower —	
Stud nut	140 Nm
Retaining bolts	80 Nm
Upper stud nut	105 Nm
Brake caliper retaining bolts	123 Nm
Driver shaft retaining nut	235 Nm
Control arms:	
¹ Lower through bolts	130 Nm
¹ Upper through bolt	115 Nm

Stabiliser bar:

Link nuts to lower control arm	69 Nm
Link nuts to stabiliser bar	19 Nm
¹ Mounting bracket nut and bolt	25 Nm

Steering gear:

Clamp to crossmember bolt and nut	165 Nm
Driver side mounting nut	190 Nm
Vertical bolt	165 Nm
Intermediate shaft clamp bolt	35 Nm
Steering knuckle dust shield bolts	18 Nm

Suspension unit:

¹ Lower mounting through bolt nut	135 Nm
Piston rod nut	25 Nm
Upper mounting nuts	64 Nm
Tie rod end nut	90 Nm
Wheel nuts	113 Nm

¹ Tighten with the weight of the vehicle on the front wheels.

Description

The independent front suspension consists of upper and lower control arms, suspension units and a stabiliser bar.

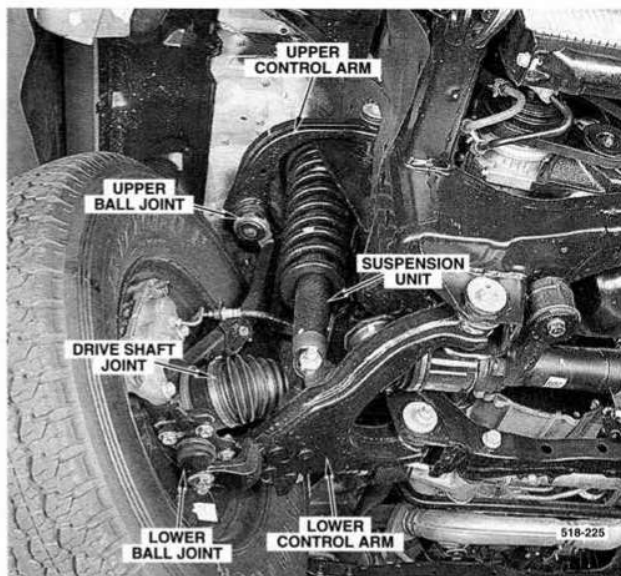
The upper control arms are equipped with renewable, steel backed rubber bushes that pivot on a bolt. The bolt attaches the control arm to the suspension tower, which is welded to the chassis rail. The upper control arm is connected to the steering knuckle by a renewable ball joint.

The lower control arm pivots on steel backed rubber bushes, while the outer end of the control arm is connected to the lower end of the steering knuckle by a ball joint. The rubber bushes and the ball joint are renewable. The suspension units are mounted between the lower control arm and the suspension tower.

Each front suspension unit assembly comprises a tubular shock absorber, surrounded at the upper end by a coil spring. On top of the coil spring is the upper spring seat, which mounts to the suspension tower. The piston rod of the suspension unit is attached to the centre of the spring seat.

When a shock absorber is found to be defective, it is recommended that both suspension units be dismantled and the shock absorber renewed as a pair.

The stabiliser bar is mounted to the chassis by using brackets and mounting rubbers. The lower outer ends are connected to the lower control arms by a ball joint type links, while the upper outer ends join the stabiliser bar by washers and mounting rubbers. The front hubs are supported on the steering knuckle by double row ball type bearings. The bearings have no provision for adjustment or greasing in service.

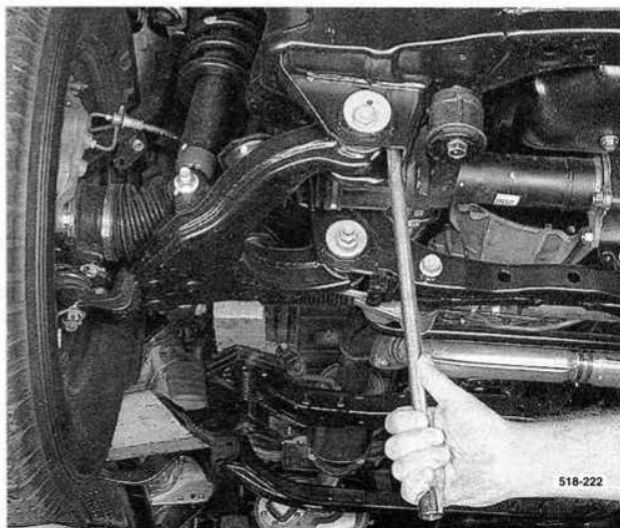


Front suspension components.

Camber and caster adjustment is provided by eccentric cam adjustment on the lower control arm. Steering axis inclination is preset by the manufacturer and is not adjustable in service.

Routine Maintenance

- 1 Check the shock absorber condition by bouncing the front of the vehicle up and down (one side at a time) and observe the vehicle. If the shock absorbers are serviceable the vehicle should come to rest in a single movement, if it bounces two or three times before stopping, the suspension units should be dismantled and the shock absorber portion renewed. Leaking fluid is a sure sign that the suspension units require renewal.
- 2 Check the front suspension components for wear by raising the front of the vehicle and supporting on chassis stands under the jacking points, leaving the front wheels and suspension unsupported. Refer to General Information (chapter 1) for more information.



Checking the control arm pivot bushes for wear.

With an assistant pushing and pulling the front wheel in and out at the top and then the bottom, check for excessive looseness in the hub bearings, suspension ball joints and pivot bushes.

- 3 Check the control arm pivot bushes as illustrated. Renew the bushes if movement is detected.
- 4 Inspect the stabiliser bar mounting rubbers and the link ball joints for wear, damage and deterioration.
- 5 Inspect the vehicle ride height from side to side, if it is lower on one side than the other, remove and dismantle the suspension unit. Check the coil spring and check its free length against a new spring. If one spring is unserviceable, it is a good practice to install two new springs as a matching pair.



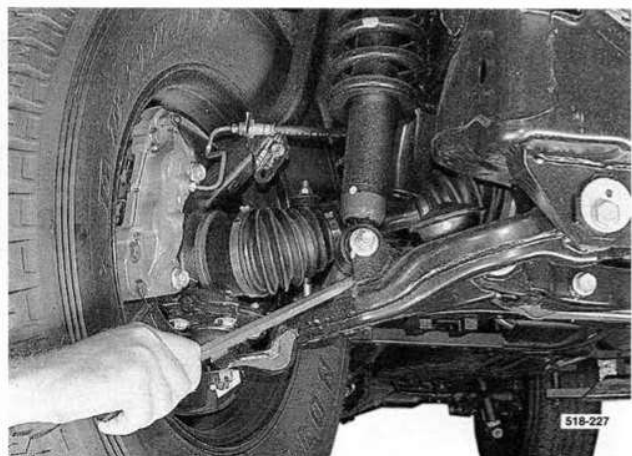
Ensure that the tyre pressures are correct and the vehicle is evenly loaded, before checking the ride height.

- 6 Inspect the condition of the wheel bearings as follows:
 - a Raise the front of the vehicle and support it on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points.
 - b Spin the wheel and listen for rumbling noises, which will indicate worn hub bearings. Grasp the wheel at the top and bottom and feel for excessive play in the wheel bearing. If the hub assembly is not serviceable, it should be overhauled, as described under the Steering Knuckle and Hub Assembly heading in this chapter.
- 7 Check the inner and outer drive shaft boots for cracks, tears or other damage.

Trouble Shooting

FRONT END NOISE

- 1 Loose or worn stabiliser bar link ball joints or bushes: Check, tighten or renew the bushes and/or links.
- 2 Loose or worn upper or lower control arm bushes: Check, tighten or renew the bushes.
- 3 Noise in the suspension unit: Check, overhaul or renew the suspension units on both sides.
- 4 Loose suspension unit assembly upper or lower mounting or piston rod nut: Tighten the mounting or piston rod nuts.



Checking the suspension unit bush for wear and deterioration.

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Part 1

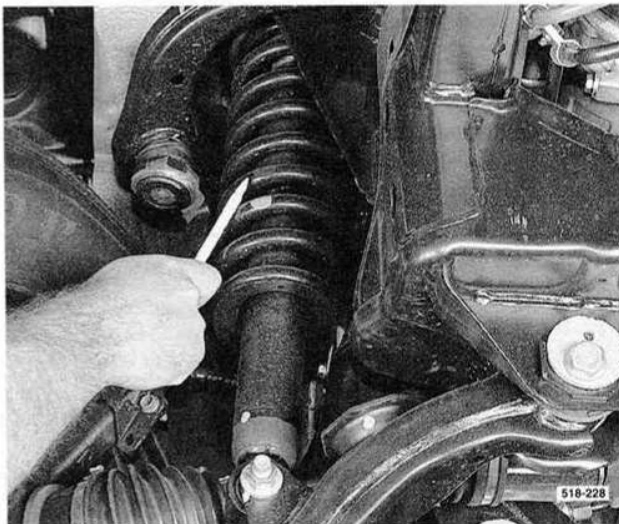
- 5 Loose or worn upper or lower suspension ball joints: Check and renew the ball joints.
- 6 Loose or worn steering gear: Tighten the steering gear mounting nuts and bolts or overhaul the steering gear.
- 7 Loose drive shaft hub nut or worn front hub bearings: Tighten the hub nut or renew the front hub bearings.



To check the front suspension components for wear, refer to Routine Maintenance in this chapter.

POOR OR ERRATIC ROAD HOLDING ABILITY

- 1 Low or uneven tyre pressures: Check and inflate the tyres to the recommended pressure.
- 2 Defective suspension unit: Check, overhaul or renew the suspension units on both sides.
- 3 Incorrect front wheel alignment: Check and adjust the front wheel alignment, or renew components as necessary.
- 4 Weak or broken front spring: Renew the front springs as a matching pair.
- 5 Loose or worn upper or lower control arm bushes or ball joints: Tighten or renew the faulty components.



Check the coil springs for cracks or fatigue. Ensure that the shock absorbers are not leaking fluid.



Check the lower ball joint for deterioration and wear.

- 6 Faulty rear suspension components: Check the rear suspension components as described in Rear Axle and Suspension (chapter 14).
- 7 Defective stabiliser bar link ball joints or loose mounting nuts: Check and tighten or renew the links.



For a quick test of suspension unit condition, refer to Routine Maintenance in this chapter.

Suspension Unit



To Dismantle and Assemble —Spring compressor

TO REMOVE AND INSTALL

- 1 Raise the front of the vehicle, support it on chassis stands and remove the front wheel. Refer to General Information (chapter 1) for the positions of the jacking points. Ensure that the stands are placed under the chassis rails.
- 2 Remove the nut and the washer from the through bolt retaining the suspension unit to the lower control arm.
- 3 Withdraw the through bolt from the bracket on the control arm.
- 4 While supporting the suspension unit, remove the nuts retaining the unit to the suspension tower. Noting its installed position, manoeuvre the suspension unit from the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 Install the suspension unit to the suspension tower in the position noted during removal. Tighten the retaining nuts to the specified torque.
- 2 Position the lower end of the suspension unit in the bracket on the control arm and install the through bolt. Install the washer and the nut, but do not tighten the nut at this stage.
- 3 Install the front wheels and tighten the retaining nuts to the specified torque in a diagonal sequence. Lower the vehicle and roll it back and forth, while bouncing the front of the vehicle several times to stabilise the suspension.
- 4 Tighten the suspension unit through bolt nut to the specified torque.

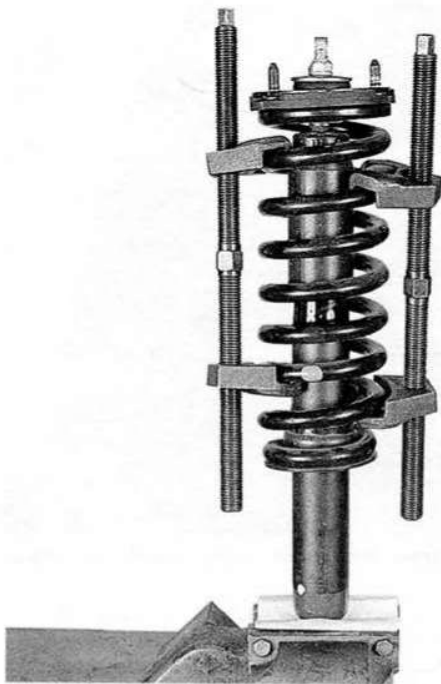
TO DISMANTLE AND ASSEMBLE

- 1 Remove the suspension unit as previously described.
- 2 Mark the installed position of the insulator in relation to the spring and the spring seat of the shock absorber. Install a suitable spring compressor and compress the coil spring. Avoid distortion of the spring which could damage the shock absorber.



The coil spring is partially compressed and has a large amount of potential energy. Removal of the piston rod nut without a spring compressor installed may cause serious injury to the operator.

- 3 While preventing the piston rod from turning, remove the shock absorber piston rod nut. Noting its installed position,



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Suspension unit with spring compressor installed.

withdraw the dished washer, rubber bush, the insulator and the lower dished washer from the piston rod.

- 4 Remove the coil spring from the shock absorber.
- 5 Inspect all the mounting components for wear, damage or deterioration.
- 6 Inspect the coil spring for cracks, distortion and loss of tension. If the coil spring is defective, it is recommended that both front spring be renewed.
- 7 Inspect the body of the shock absorber for damage or fluid leaks. Inspect the lower spring seat for wear and damage. With the shock absorber upright, fully extend and compress the piston rod. A firm resistance with no slack or tight spots should be evident in both direction. The shock absorber is not repairable and should be renewed as a matching pair if faulty.

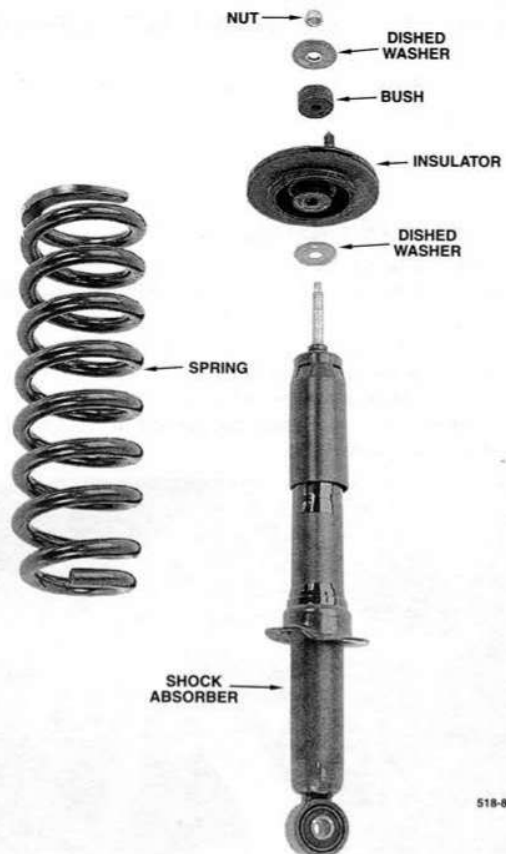


The piston rod should rise smoothly after compression, due to the gas pressure inside the unit. If the piston rod does not rise, renew the shock absorber.

- 8 Inspect the lower mounting bush for wear and distortion. Renew the bush if necessary, as described later under this heading.

Assembly is a reversal of the dismantling procedure with attention to the following points:

- 1 Install the small end of the spring to the shock absorber, ensuring that the tail of the spring is correctly seated against the spring seat.
- 2 Install the dished washer to the piston rod in the position noted during removal.
- 3 Install the insulator to the spring. Ensure that the markings on the spring and the insulator are all correctly aligned, as noted during dismantling.
- 4 Install the rubber bush and the upper dished washer, and while holding the piston rod, tighten the piston rod nut to the specified torque.



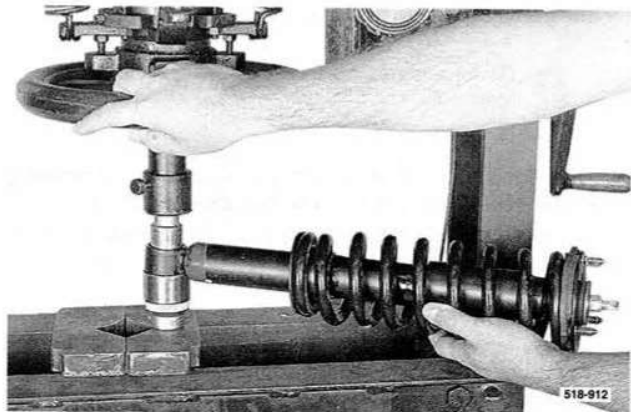
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Suspension unit components.

- 5 Release the spring compressor and check that the lower end of the coil spring is correctly located in the spring seat.

To Renew Bush

- 1 Remove the suspension unit as previously described.
- 2 Remove the bush from the suspension unit, using suitably sized tubes or mandrels and a press.
- 3 Lubricate the outside of the new bush with soapy water.
- 4 Using a press and a suitable tube or mandrel that pushes on the outer tube of the bush only, press the bush until it is seated centrally in the suspension unit.
- 5 Install the suspension unit as previously described.



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Pressing out the suspension unit bush.

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Steering Knuckle and Hub Assembly



To Dismantle and Assemble — Press and press plates

TO REMOVE AND INSTALL

- 1 Where applicable, remove the centre cap from the front wheel. Prise out the dust cover from the centre of the hub and loosen the front wheel nuts.
- 2 Remove the split pin from the end of the drive shaft nut and withdraw the castellated nut retainer washer. While an assistant applies the brakes, loosen but do not remove the drive shaft nut. A long breaker bar will be necessary, as the drive shaft nut is very tight.



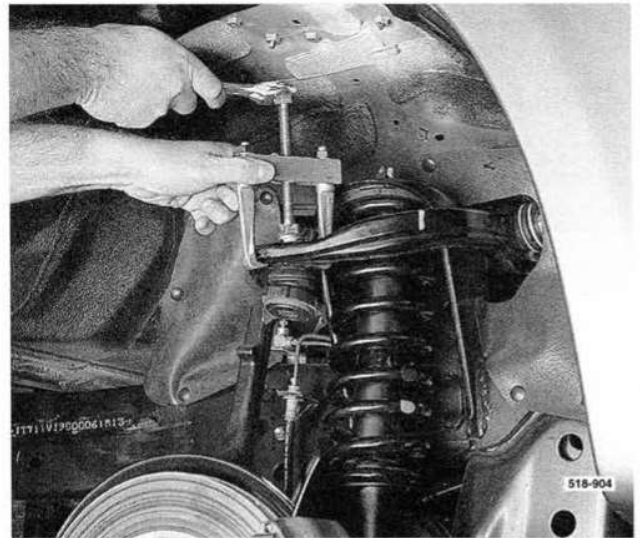
Dust cover removed showing the drive shaft end components.

- 3 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points. Remove the front wheel and the drive shaft nut.
- 4 Remove the brake caliper and the brake hose support bracket retaining bolts. Slide the caliper assembly from the disc and suspend the caliper from the coil spring using a piece of wire. Withdraw the brake disc from the hub. If necessary, refer to Brakes (chapter 15) for the procedure to remove the front caliper and the brake disc.



Do not apply the brake pedal while the caliper is removed.

- 5 On models with ABS, remove the sensor and wiring retaining bracket bolts and place the sensor clear of the work area.
- 6 While supporting the steering knuckle, remove the bolts retaining the lower ball joint assembly to the steering knuckle.
- 7 Pull the lower end of the steering knuckle away from the control arm, while guiding the drive shaft through the hub assembly, being careful not to damage the drive shaft joint boot. Ensure that the steering is in the straight ahead position, and remains so while removing the drive shaft.



Separating the upper ball joint stud from the control arm, using a puller.



If the drive shaft is tight in the hub, temporarily install the ball joint bolts and give the drive shaft a blow from a heavy copper/hide faced hammer to dislodge the shaft. To prevent damage to the threads, ensure that the drive shaft nut is installed level with the end of the shaft before using the soft faced hammer. If the shaft is really stuck in the hub, a puller may be necessary.

- 8 Loosen, but do not remove the nut retaining the ball joint to the upper control arm. Separate the ball joint stud from the control arm, using a suitable puller. If a puller is not available, disconnect the ball joint stud from the upper control by placing a hammer or a suitable dolly against one side of the steering knuckle eye and striking the opposite side with a hammer. Remove the castellated nut from the stud.
- 9 Leave the drive shaft installed in the differential, and secure it away from the working area using wire or rope. Use care not to place excessive strain on the joints or damage the rubber boots.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 Thoroughly clean the steering knuckle, using suitable solvent.
- 2 Ensure that the steering knuckle is in a serviceable condition with no damage or cracks. Check the condition of the oil seals. Renew if necessary, referring to the following heading.
- 3 Apply a light coating of high melting point multipurpose grease to the splines of the drive shaft and to the oil seal lips before installation. Guide the drive shaft in the hub and loosely install the retaining nut.
- 4 Ensure that the ball joints and boots are serviceable. If there is doubt about the serviceability of the ball joints, check them as described under the Ball Joints heading, later in this chapter. Renew if necessary.
- 5 Install and tighten the lower ball joint retaining bolts to the specified torque.
- 6 Connect the upper ball joint stud to the upper control arm. Tighten the upper ball joint castellated nut to the specified torque. Install a new split pin.
- 7 Install the brake disc and the brake caliper and tighten the caliper retaining bolts to the specified torque.

- 8 On models with ABS, install the sensor and the wire retaining bracket and tighten the retaining bolts to the specified torque.
- 9 With the aid of an assistant applying the brakes, tighten the drive shaft nut to the specified torque. Install the nut retainer and a new split pin. Install the dust cover to the centre of the hub.
- 10 Install the front wheel and lower the vehicle to the ground.

TO DISMANTLE

Once the hub is dismantled, renewal of the bearing and the seals is essential.

- 1 Remove the steering knuckle as previously described.
- 2 Secure the wheel flange in a vice, fitted with soft jaws. Remove and discard the oil seal from the inner side of the hub assembly, using a flat bladed screwdriver.
- 3 Using a press, a mandrel and suitable press plates, push the hub through the steering knuckle and out of the bearing. Ensure that the brake disc dust shield is not damaged while pressing the hub from the steering knuckle. If necessary, remove the retaining bolts and rotate the dust shield until it is clear of the press plates.



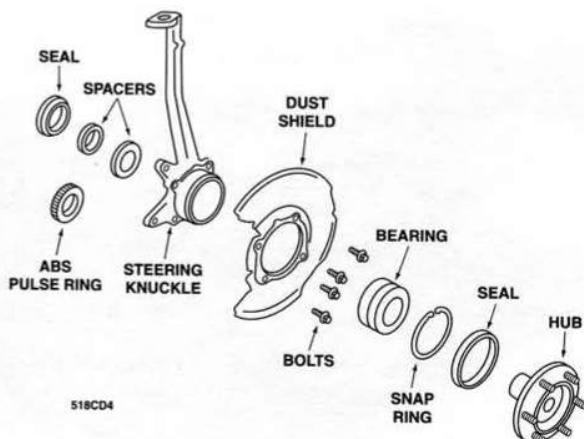
An alternative method to remove the hub from the steering knuckle is to mount the steering knuckle in a vice and attach a heavy duty slide hammer to the wheel studs.

- 4 Noting their installed position, withdraw the spacer(s) and, if applicable, the ABS pulse ring.



Ensure that the pulse ring is not damaged during removal. On models without ABS, a spacer replaces the pulse ring.

- 5 Remove the outer seal from the steering knuckle using a flat bladed screwdriver and discard the oil seal. Using internal snap ring pliers, remove the snap ring retaining the bearing to the steering knuckle.
- 6 Support the outside of the steering knuckle on press plates and place the steering knuckle in a press. While pressing on the inner side of the bearing, press it from the steering knuckle. Discard the wheel bearing.
- 7 Thoroughly clean the steering knuckle and hub in a suitable solvent and inspect for wear, cracks and damage. Renew components as necessary.



Front hub components dismantled.

TO ASSEMBLE

Assembly is a reversal of the dismantling procedure with attention to the following points:

- 1 When grease is referred to in the assembly procedure, use high melting point multipurpose grease.
- 2 Using a suitable metal tube or mandrel that pushes on the outer race only, press the bearing assembly into the steering knuckle.
- 3 Once the bearing is fully seated, install the snap ring using internal snap ring pliers. Apply grease to the lip of the outer oil seal and install the seal into the steering knuckle.
- 4 If removed, install the dust shield retaining bolts and tighten to the specified torque.
- 5 Support the hub on press plates with the wheel mounting flange down.
- 6 Position the steering knuckle squarely onto the hub. Using a suitable diameter steel tube or mandrel, that abuts the inner race of the bearing, press the bearing and steering knuckle assembly fully onto the hub.



Take care not to damage the bearing or the hub when assembling the steering knuckle.

- 7 Press the spacer(s) and if applicable, the ABS pulse ring, to the hub, in the position noted during removal.
- 8 Apply grease to the inner oil seal and install the seal into the steering knuckle.
- 9 Ensure that the hub rotates smoothly in the bearings. Check the assembly procedure if necessary.
- 10 Install the steering knuckle as previously described.

Ball Joints

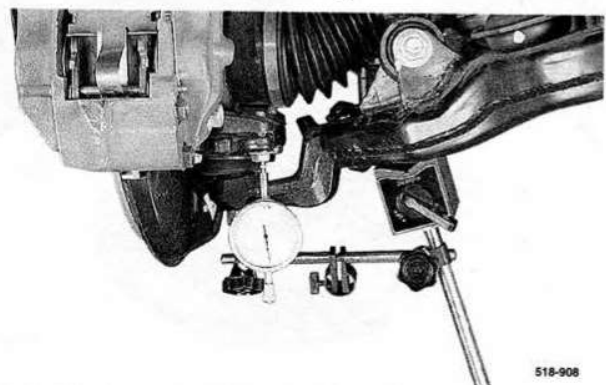


To Check — Low range torque wrench

TO INSPECT ON VEHICLE

Lower Ball Joint

The method described of inspecting the lower ball joint vertical play is part of the initial inspection. If in doubt, remove the ball joint and carry out the inspection procedure, as described later under the Remove and Install heading.



Checking the lower ball joint vertical play using a dial gauge.

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Part 1

- 1 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points.
- 2 Ensure that the wheels hang free and are in the straight ahead position. Install a dial gauge with its plunger bearing against one of the ball joint retaining bolts. Have an assistant apply the brakes.
- 3 Lever the hub up and down with a force of approximately 300 N (30 kg) and check that the lower ball joint has no vertical play in excess of the specified maximum. If the vertical play is excessive, renew the ball joint as described later in this heading.

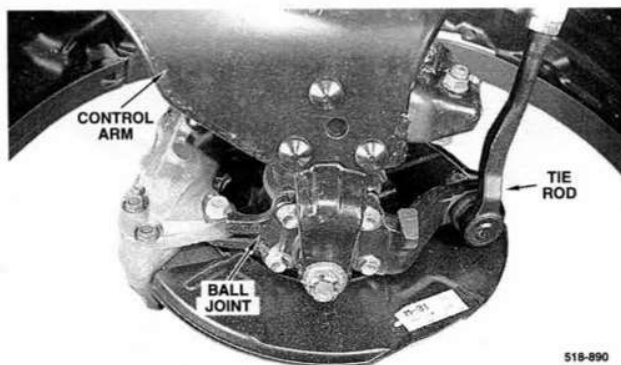
Upper Ball Joint

To inspect the upper ball joint, it must first be separated from the upper control arm. The procedure to separate and inspect the upper ball joint is described under Upper Ball Joint in the next heading.

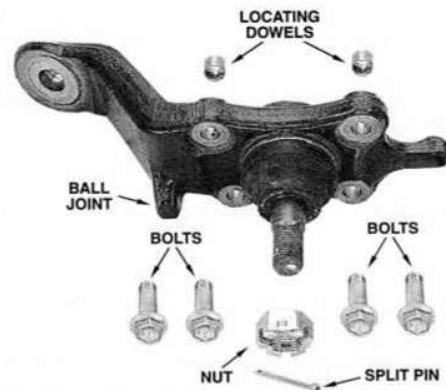
TO REMOVE AND INSTALL

Lower Ball Joint

- 1 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points. Remove the relevant front wheel.
- 2 Remove the split pin and loosen, but do not remove the castellated nut from the tie rod end. Discard the split pin.
- 3 Disconnect the tie rod end from the ball joint arm, using a two legged puller and remove the castellated nut from the tie rod end stud.
- 4 Remove the split pin and loosen the castellated nut retaining the lower ball joint to the control arm. Discard the split pin.
- 5 Separate the ball joint stud from the control arm, using a suitable puller. If a puller is not available, disconnect the ball joint stud from the steering knuckle by placing a hammer or a suitable dolly against one side of the lower control arm and striking the opposite side with a hammer. Remove the castellated nut from the stud.
- 6 Suspend the upper control arm from the vehicle body, ensuring that the lower ball joint stud clears the control arm.
- 7 Remove the bolts retaining the lower ball joint to the steering knuckle and separate the ball joint from the knuckle. Withdraw the locating dowels.
- 8 Inspect the ball joint rubber boot for cracks and deterioration. If the rubber boot is damaged, the ball joint must be renewed as an assembly.



Lower ball joint installed.



Lower ball joint removed.

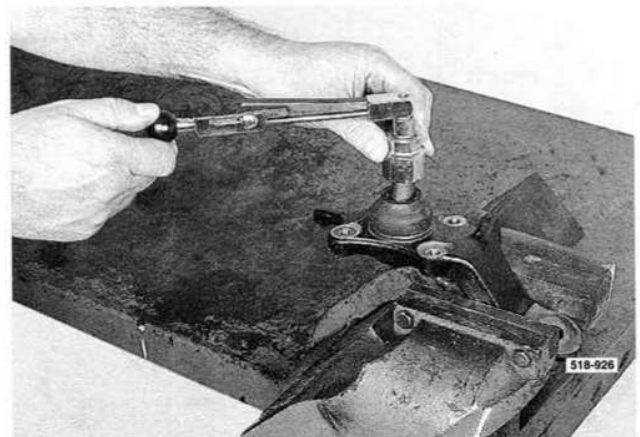
- 9 Inspect the ball joint for wear and play between the joint stud and body. If unsure of the condition of the ball joint, check the turning torque as follows:
 - a Secure the ball joint upright in a vice. Move the ball joint stud back and forth 5 times and return it to the central position.
 - b Install the nut on the ball joint stud until the nut bottoms on the shoulder of the thread.
 - c Using a low range torque wrench, turn the stud continuously 4 times, at a rate of one turn every 2 – 4 seconds. Measure the torque required to turn the ball joint stud on the 5th turn. Renew the ball joint if the turning torque is not within specifications.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 Prior to installing the castellated nut, ensure that the split pin hole is facing towards the front of the vehicle.
- 2 Ensure that all retaining nuts and bolts are tightened to the specified torque. Install a new split pin to the ball joint and the tie rod end castellated nuts.

Upper Ball Joint

i Inspect the ball joint rubber boot for cracks and deterioration prior to removing the ball joint from the steering knuckle. If the rubber boot is damaged, it is available as a separate part.

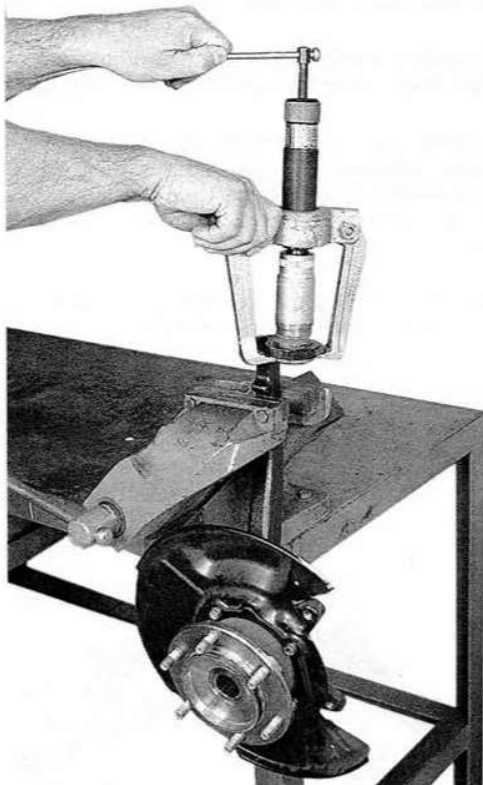


Checking the lower ball joint turning torque.

- 1 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points. Remove the wheel from the relevant side of the vehicle.
- 2 Remove the split pin and loosen, but do not remove the nut retaining the ball joint to the upper control arm. Discard the split pin.
- 3 Separate the ball joint stud from the control arm, using a suitable two or three legged puller. Remove the castellated nut from the tie rod end stud.

i Do not allow the weight of the steering knuckle to rest on the brake hose or on the ABS wiring, if fitted. Secure the steering knuckle to the vehicle body, using wire or rope.

- 4 Inspect the ball joint for wear and play between the joint stud and body. If unsure of the condition of the ball joint, check the turning torque as follows:
 - a Move the ball joint stud back and forth 5 times and return it to the central position.
 - b Install the nut on the ball joint stud until the nut bottoms on the shoulder of the thread.
 - c Using a low range torque wrench, turn the stud continuously 4 times, at a rate of one turn every 2 – 4 seconds. Measure the torque required to turn the ball joint stud on the 5th turn. Renew the ball joint if the turning torque is not within specifications, using the following procedure.
- 5 Remove the steering knuckle as previously described under the Steering Knuckle and Hub Assembly heading.
- 6 Carefully cut the wire retaining the dust boot and withdraw the boot from the ball joint.



Removing the upper ball joint from the steering knuckle, using a two legged puller and a deep socket.

- 7 Remove and discard the snap ring retaining the ball joint to the upper control arm.
- 8 Support the steering knuckle, using a suitable tube or socket, that is large enough to allow the ball joint flange and the stud to pass through and press the ball joint from the steering knuckle.

TIP If difficulty experienced placing the steering knuckle assembly in a press, use a two or three legged puller and a deep socket to press the ball joint from the steering knuckle.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 If fitted, remove the dust boot retaining ring and the dust boot from the new ball joint
- 2 Place the new ball joint on a flat press plate and position the steering knuckle over the ball joint stud. Using a tube or socket with a diameter slightly larger than the diameter of the ball joint, press the steering knuckle on the ball joint, until the ball joint is fully seated.
- 3 Install the new snap ring to the ball joint and install the dust boot and the retaining ring.
- 4 Install the steering knuckle, as previously described.

Control Arms

TO REMOVE AND INSTALL

Lower Control Arm

i The cam bolts and cams retaining the lower control arm are adjusting points for the caster and camber angles. It will be necessary to carefully mark the position of the arms prior to removal to preserve the correct angles. Even so, it is still advisable to take the vehicle to a wheel alignment specialist to have the caster and camber angles check/adjust on completion of the repair.

- 1 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points. Remove the relevant front wheel from the vehicle.
- 2 Remove the split pin and loosen the castellated nut retaining the lower ball joint stud to the lower control arm. Discard the split pin.
- 3 Separate the ball joint stud from the control arm, using a suitable puller or alternatively by placing a hammer or a suitable dolly against one side of the lower control arm and striking the opposite side with a hammer. Remove the castellated nut from the ball joint end stud.
- 4 Suspend the upper control arm and the steering knuckle from the vehicle body, ensuring, that the lower ball joint stud clears the control arm.
- 5 Remove the nut and the washer and withdraw the through bolt retaining the suspension unit to the lower control arm.
- 6 Insert a 6 mm allen key into the hole in the stabiliser bar link stud and while retaining the stud, remove the nut retaining the stabiliser bar link to the lower control arm. Separate the stud from the bracket.
- 7 Remove the retaining bolts and withdraw the front and rear stoneguards from the vehicle.

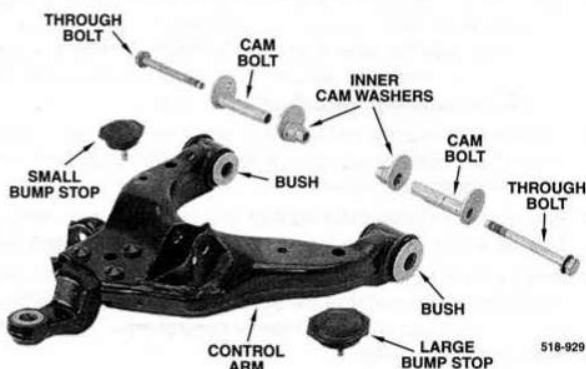
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i The rear control arm through bolt interferes with the steering gear, so the steering gear must be lowered, as described next, to provide more working space.

- 8 Suitably mark the relationship of the steering intermediate shaft lower universal joint clamp to the steering gear pinion shaft.
- 9 Remove the clamp bolt from the intermediate shaft universal joint.
- 10 Remove the steering gear retaining nut from the driver side of the vehicle. Withdraw the through bolt from the steering gear.
- 11 Remove the vertical steering gear retaining bolt, located adjacent to the through bolt.
- 12 Working on the left hand side of the steering gear, remove the clamp bolt and the nut retaining the steering gear to the chassis.
- 13 Using a 10 mm socket, remove the stud retaining the clamp to the chassis, while supporting the steering gear. Withdraw the clamp.
- 14 Remove the bolts retaining the power steering lines to the chassis rail brackets.
- 15 Move the steering gear towards the rear of the vehicle, until the vertical bush clears the bracket.
- 16 Carefully lower the steering gear, and release the intermediate shaft clamp from the steering gear pinion shaft. Once the clamp is released, support the steering gear, using wire or rope.
- 17 Suitably mark the installed position of the front and rear control arm adjusting cam bolts and the inner washers.
- 18 Remove the through bolts and withdraw the inner cam washers. While supporting the control arm, withdraw the cam bolts, noting the order of removal.
- 19 Withdraw the lower control arm from the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 Clean the lower control arm and inspect for cracks and distortion. Renew if necessary.
- 2 Inspect the lower control arm and bushes for wear, cracking and damage. Renew components as necessary. If necessary, the control arm bushes can be renewed, as described later in this heading.
- 3 Inspect the condition of the bump stops. If the bump stops are worn or damaged, turn the faulty bump stop anticlockwise, using a pipe spanner and remove it from the control arm. Tighten the new bump stop securely.



Lower control arm components.

i The large bump stop must be installed to the front of the control arm.

- 4 Ensure that the cam bolts and nuts are installed to their original position, aligning the matchmarks made on removal. Do not tighten the bolts at this stage.
- 5 Raise the steering gear and connect the intermediate shaft clamp to the pinion shaft, ensuring that the matchmarks are correctly aligned. Install the clamp bolt and the steering gear retaining bolts and nut. Tighten the retaining bolts and nut to the specified torque.
- 6 Connect the stabiliser bar link and the suspension unit to the lower control arm. Do not tighten the suspension unit retaining nut at this stage.
- 7 Lower the steering knuckle and guide the lower ball joint stud into the lower control arm. Tighten the castellated nut to the specified torque and install a new split pin.
- 8 Lower the front of the vehicle to the ground and roll the vehicle about a metre back and forth, while bouncing the front of the vehicle several times to stabilise the suspension. Tighten the cam through bolts and the suspension unit retaining nut to the specified torque.

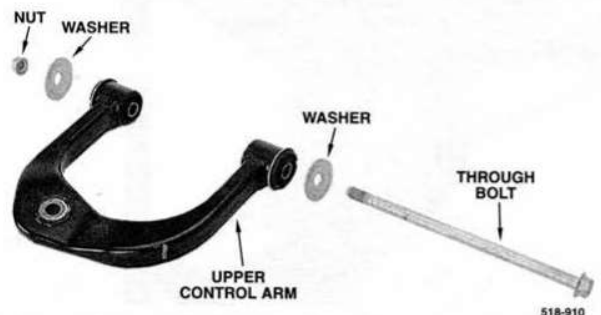
i If the cam bolts are not returned to the original positions, the front wheel alignment must be checked by a wheel alignment specialist.

Upper Control Arm

- 1 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points. Remove the relevant front wheel from the vehicle.
- 2 Remove the split pin and loosen the castellated nut retaining the upper ball joint stud to the control arm. Discard the split pin.
- 3 Separate the ball joint stud from the control arm, using a suitable puller. Remove the castellated nut from the ball joint stud. Separate the ball joint from the steering knuckle and secure the steering knuckle to the vehicle body, using wire or rope.

i Do not allow the weight of the steering knuckle to rest on the brake hose, or if fitted, on the ABS wiring.

- 4 If removing the passenger side upper control arm, remove the wiring harness retaining bolt and move the wiring clear of the work area.



Upper control arm components.

- 5 Remove the nut and noting its installed position, withdraw the dished washer from the upper control arm through bolt and while supporting the control arm, withdraw the through bolt and the washer. Manoeuvre the upper control arm from the vehicle.

i While removing the passenger side control arm, it will be necessary to carefully pull the air conditioning pipes away from the vehicle body.

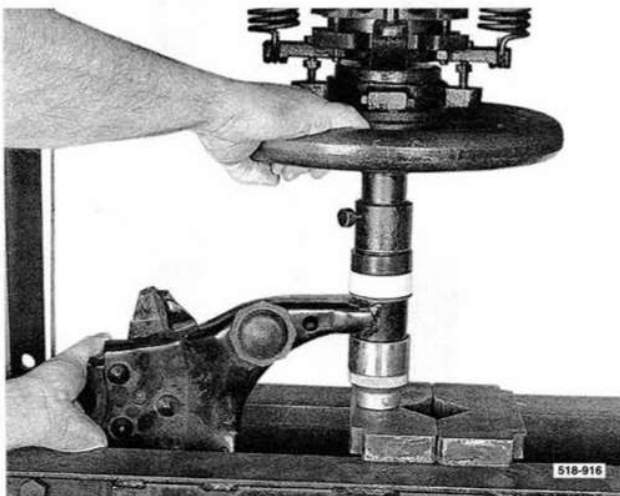
Installation is a reversal of the removal procedure with attention to the following points:

- 1 Clean the upper control arm and inspect for cracks and distortion. Renew if necessary.
- 2 Inspect the upper control arm and bushes for wear, cracking and damage. Renew components as necessary. If necessary, the control arm bushes can be renewed, as described later in this heading.
- 3 Install the control arm to the vehicle. Place the washer on the end of the through bolt and guide the bolt to the control arm. Install the washer and the nut, but do not tighten at this stage.
- 4 When the ball joint castellated nut has been tightened to the specified torque, install a new split pin.
- 5 Install the wheel. Lower the front of the vehicle to the ground and roll the vehicle about a metre back and forth, while bouncing the front of the vehicle several times to stabilise the suspension.
- 6 Tighten the nut on the end of the control arm through bolt to the specified torque.
- 7 If a new arm or bushes have been installed, have the wheel alignment checked by a specialist.

TO RENEW BUSHES

The operations to renew the upper and lower control arm bushes is similar. It is recommended that the relevant control arm be taken to an authorised dealer or suspension specialist for renewal of the bushes, as special tools will greatly speed up the renewal procedure and lessen the chance of damage. The bushes can be renewed as follows, if care is taken.

- 1 Support the control arm in a vice with the outer flange of the bush facing up. Using a hammer and chisel, raise the outer flange of the bush 90° to the control arm in two opposing positions.



Installing one of the lower control arm bushes.

i Raising the outer flange allows the control arm to be supported correctly during bush removal.

- 2 Support the control arm under the bush with press plates or a square section steel bar, with enough space to allow the bush to pass through. Ensure that the press plates or steel bar are positioned where the flange of the bush has been raised.
- 3 Press out the old bush using a tube or mandrel that pushes on the outer metal flange of the bush. Ensure that the tube or mandrel will easily pass through the control arm.
- 4 Press the new bush into the control arm ensuring that the flange of the bush is facing towards the outside of the control arm. The flange must be fully seated on the control arm.

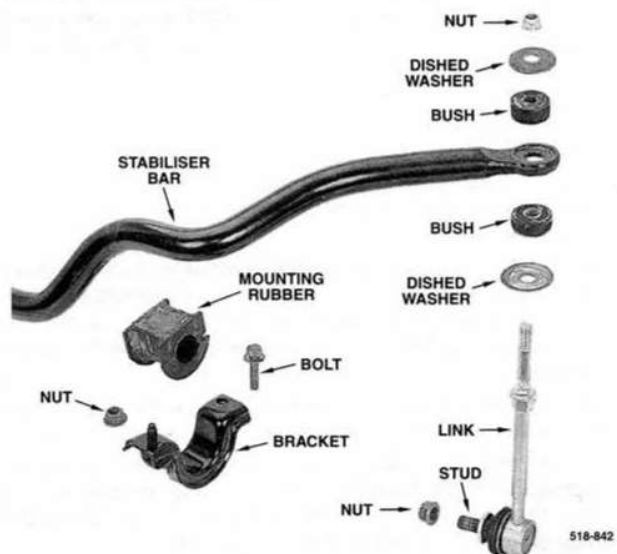
TIP Coat the outside of the bush sparingly with soapy water to ease the installation of the new bushes.

- 5 Install the control arm as previously described.

Stabiliser Bar

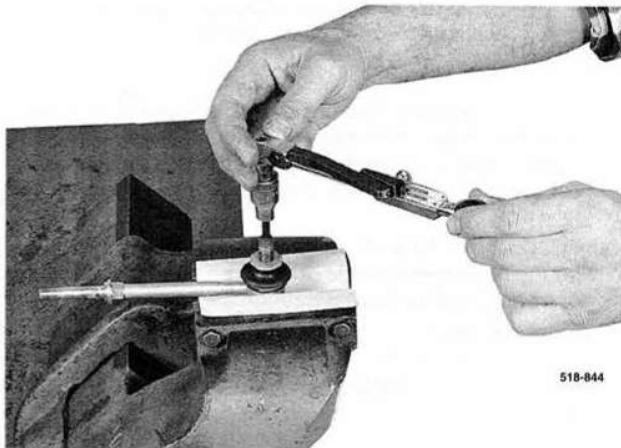
TO REMOVE AND INSTALL

- 1 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points. Remove the front wheels.
- 2 Remove the stabiliser bar link retaining nut and noting their installed positions, withdraw the upper dished washer and bush from the link. Repeat this on the other side of the vehicle. Discard the link nuts.
- 3 Insert a 6 mm allen key into the hole in the stabiliser bar link stud, remove the nut retaining the stabiliser bar link to the lower control arm.
- 4 Separate the stud from the stabiliser bar and withdraw the links from both sides of the vehicle. Remove the bush, and



Stabiliser bar components.

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Checking the stabiliser bar ball joint turning torque.

noting its installed direction, withdraw the lower dished washer from the link.

- 5 Mark the location of the mounting rubber in relation to the stabiliser bar on one side, so that it can be returned to its original position.



Use a daub of paint to mark the bar. Do not make a file mark or cut as this would create a fatigue point and can lead to failure of the stabiliser bar.

- 6 While supporting the stabiliser bar, remove the retaining nuts and bolts from the stabiliser bar mounting brackets. Remove the brackets and withdraw the stabiliser bar from the vehicle.
- 7 Examine the stabiliser bar and brackets for damage, cracks and bends.
- 8 Inspect the stabiliser bar rubber bushes and links for wear and deterioration. It is standard practice to renew the rubber bushes as a matter of course and renew other parts as necessary.
- 9 Inspect each link ball joint for wear and play between the joint stud and link body. Renew the link as an assembly if necessary. If unsure of the condition of the ball joints check the starting torque as follows:
 - a Secure the link with the ball joint upright in a vice, move the ball joint stud back and forth five times and return it to the central position.
 - b Using a 6 mm allen key socket or alternatively, install a nut on each ball joint stud until the nut bottoms on the shoulder of the thread.
Using a low range torque wrench, turn the stud continuously 4 times, at a rate of one turn every 2 – 4 seconds. Measure the torque required to turn the ball joint stud on the 5th turn. Renew the link if the turning torque is not within specifications.

Installation is a reversal of the removal procedure with attention to the following points:

- 1 Ensure that the stabiliser bar mounting bushes are located according to the paint marks made during removal. Ensure that the open ends of the mounting rubbers are facing the rear of the vehicle and are correctly seated.
- 2 Install the stabiliser bar brackets and tighten the retaining nuts and bolts to the specified torque.



The brackets are marked L and R and should not be installed to the wrong side.

- 3 Install each link to the stabiliser bar as follows:
 - a Install the lower dished washer and bush to the link, in the position noted during removal. Place the link into the stabiliser bar.
 - b Place the bush onto the link protruding from the stabiliser bar. Install and the upper dished washer and the nut to the link, as noted during removal. Install a new link retaining nut and tighten to the specified torque.
 - c Install the ball joint stud to the bracket on the lower control arm and tighten the retaining nut to the specified torque, while holding the stud with the allen key.

Front Wheel Alignment

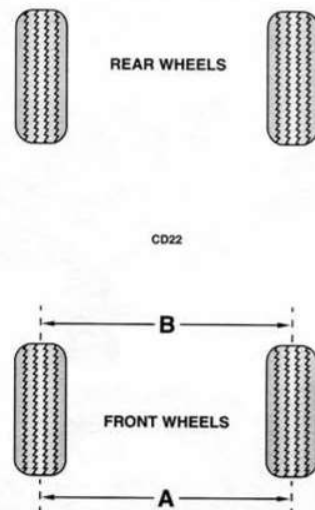
Specialised equipment is required to accurately measure the front wheel alignment. Therefore it is not a worthwhile proposition for the home mechanic to perform a complete wheel alignment check. The vehicle should be taken to a wheel alignment specialist.

The camber and caster angles can be altered by adjusting the eccentric cams on the lower control arm inner pivots, but setting requires special equipment. However, the toe in may be checked and adjusted using the procedures described later in this chapter.

Prior to performing a wheel alignment, thoroughly inspect the steering gear, tie rods, ball joints, coil springs and suspension units. Renew or repair as necessary. Also check the control arm bushes, as these can effect the way the vehicle handles.

The tread of the front tyres should be examined for excessive or uneven wear as certain conditions of tyre wear are indicative of damaged or worn components in the suspension, steering linkage and/or wheels and bearings. Refer to Tyre Wear Trouble Shooting in Wheels and Tyres (chapter 19). If the tyres are found to be defective, renew with serviceable tyres.

The vehicle should be unladen, except for the normal amount of fuel. The tyres should be inflated to the normal pressure.



Front wheel toe in/toe out. If dimension A is less than B, this is termed toe in. If dimension A is more than B, this is termed toe out. Refer to Specifications.

TO CHECK AND ADJUST TOE IN

The following procedures may be used as a temporary measure to check and adjust the toe in. The vehicle should be taken to a wheel alignment specialist at the earliest opportunity.

- 1 With the vehicle on a level floor, raise the front of the vehicle and support it on chassis stands. Refer to General Information (chapter 1) for the location of the jacking points.
- 2 Spin each front wheel in turn and using a piece of chalk, mark a thin line around the periphery of each tyre as near to the centre as possible.
- 3 Lower the front of the vehicle to the ground and roll the vehicle about a metre back and forth a few times to stabilise the suspension. Set the front wheels in the straight ahead position.
- 4 Mark the centre chalk line at the front of both tyres at approximately 20 – 25 cm above the ground.
- 5 Using a telescopic gauge or tape measure, measure and record the distance between the chalk marks on the centre of the tyres.
- 6 Maintaining the wheels in a straight ahead position, roll the vehicle forward until the chalk marks are the same distance above the ground, but at the rear of the front tyres.
- 7 Measure and record the distance between the centre of the tyres.
- 8 The difference between the front and rear measurements will give the toe in/toe out reading. If the larger measurement is at the front, the wheels are in a toe out position. If the larger measurement is at the rear, the wheels are in a toe in position. Compare the reading obtained with Specifications.
- 9 If the toe in is not to Specifications, adjust it as follows:
 - a Using pliers, expand the clips retaining the steering gear boots to the tie rods and move the clips onto the tie rods.
 - b Loosen the locknuts at both tie rod ends.
 - c Rotate the tie rods in small, equal amounts to bring the toe in to Specifications.



It is important to make equal adjustments to each tie rod to maintain the central position of the steering gear.

- d Tighten the tie rod end locknuts securely, ensuring that the tie rods do not move from the adjusted position.
- e Locate the steering gear boots in the groove provided on the tie rods, ensuring that they are not twisted or deformed, and install the retaining clips.
- f Check the position of the steering wheel with the front wheels in the straight ahead position. If necessary, adjust each tie rod an equal amount to centralise the steering wheel.
On models with an airbag, do not remove and reposition the steering wheel as damage to the clock spring will result. If large adjustments are necessary, centralise the clock spring as described in Steering (chapter 12).
- g It is advisable to check the toe in measurement after the adjustment is completed and the tie rod end locknuts are tightened. Have the wheel alignment checked by a specialist at the earliest opportunity.

Part 2. Front Axle and Drive Shafts

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Specifications

Type	Hypoid final drive assembly
Ratio	4.100:1
Lubricant:	
Type	SAE 90 hypoid gear oil GL 5
Capacity	1.1 litres
Carrier bearing adjusting shim thicknesses	2.00 – 3.80 mm in increments of 0.03mm
Crownwheel backlash	0.10 – 0.18 Nm
Drive pinion:	
Height spacer thicknesses	1.69 – 2.32 mm in increments of 0.03 mm
Maximum vertical and lateral flange runout	0.10 mm
Drive pinion turning torque (bearing preload):	
New bearings	1.2 – 1.9 Nm
Original bearings	0.6 – 1.0 Nm
Drive shaft length	530.8 ± 5.0 mm
Total differential turning torque (bearing preload)	Drive pinion turning torque plus 0.4 – 0.6 Nm
Side gear:	
Backlash	0.00 – 0.20 mm
Thrust washer thickness	0.96 – 1.26 mm in increments of 0.10 mm

TORQUE WRENCH SETTINGS

Brake caliper retaining bolts	123 Nm
Breather tube	13 Nm
Carrier bearing cap retaining bolts	78 Nm
Crownwheel bolts	97 Nm
Drain plug	65 Nm
Drive pinion flange nut	Refer to text
Drive shaft retaining nut	235 Nm
Filler plug	39 Nm
Final drive assembly:	
Front mountings —	
Mounting bracket bolts	157 Nm
Through bolts and nuts	137 Nm
Mounting cushion —	
Bolts	108 Nm
Nut	87 Nm
Intermediate shaft tube retaining bolts	105 Nm
Side cover retaining bolts	69 Nm
Propeller shaft nuts and bolts	74 Nm

Description

A hypoid front axle is mounted via rubber bushes to the chassis. Drive is transmitted to the front wheels by drive shafts which incorporate constant velocity joints at the inner and outer ends.

The final drive assembly consists of a drive pinion, crownwheel and two pinion differential assembly. The differential and crownwheel assembly is supported by two tapered roller bearings, called carrier bearings.

The crownwheel and differential assembly is carried on tapered roller bearings. Axial adjustment of the assembly controlling the bearing preload and crownwheel to pinion backlash is obtained by the use of spacer shims installed between the bearing outer cups and the differential housing.

The drive pinion is supported in the housing by two tapered roller bearings. The bearing preload is adjusted by a collapsible spacer and the pinion height is adjusted by a shim situated between the pinion gear and the inner bearing. The pinion oil seal and collapsible spacer can be renewed in the vehicle.

The drive from the front differential assembly is transmitted to the front wheels through drive shafts, that have a tripod constant velocity joint on the differential end of the shaft. The drive shafts are of equal length.

The Birfield type constant velocity joint is splined to the front hub and retained by a nut on the outer end. The drive shaft inner constant velocity joints are serviceable while the outer joint and drive shaft must be renewed as an assembly. The only servicing that can be performed on the outer joints is renewal of the boot and repacking the joint with grease.

Routine Maintenance

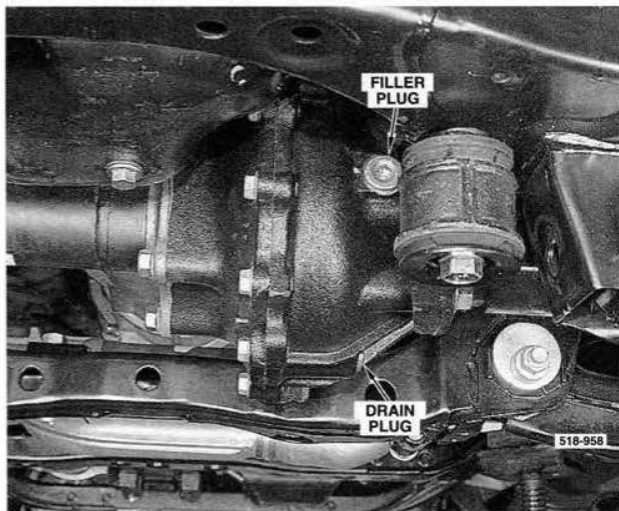
CHECKING FRONT AXLE OIL

- 1 If extra clearance is required, raise the front and rear of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points.



It is important that the vehicle is level to obtain a correct oil level reading.

- 2 Remove the retaining bolts and withdraw the stoneguards from beneath the vehicle.
- 3 Remove the filler plug from the differential housing and discard the sealing washer. Using a finger or a bent piece of wire, check the oil level.
The oil should be level with or fractionally below the bottom of the filler plug hole. Overfilled units should be drained until the oil is level with the bottom of the plug hole.
- 4 If the oil is being renewed, place a suitable container beneath the drain plug and remove the plug from the



Location of the front axle filler and drain plugs. Stoneguards removed.

bottom of the differential housing. Discard the sealing washer. Allow all of the oil to drain from the front axle. Install a new sealing washer to the drain plug and tighten the plug to the specified torque.

- 5 If the oil level is low or is being renewed, use an oil gun to fill the front axle to the correct level with the specified oil.
- 6 When the level is correct, install a new sealing washer to the filler plug and tighten the plug to the specified torque. Wipe around the plug/s with a cloth after installation.

Oil Leakage

- 1 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points.
- 2 If necessary, remove the bolts and withdraw the stoneguards. Check around the drive pinion oil seal and the axle shaft oil seals for leakage. Oil seal renewal is covered later in this chapter.
- 3 Check for leakage from the side cover. Check that the bolts are not loose. If necessary, renew the sealant on the side cover.
- 4 Check that the axle breather tube and hose are not obstructed and that the hose is not damaged or kinked. Also check that the hose is securely connected to the axle and the vehicle body.



A blocked or restricted breather hose will pressurise the front axle assembly when the oil warms up, and force the oil from the seals.

Trouble Shooting

FRONT WHEEL NOISE

- 1 Tyre noise: Determine whether normal or excessive for the type of vehicle and tyre construction.
- 2 Wheel loose on the front hub: Check the condition of the wheel rim, hub, wheel studs and nuts, tighten securely or renew the damaged components.

- 3 Wheel out of balance or bent: Balance the wheel and tyre assembly or renew the wheel.
- 4 Defective brake components: Check the front brakes as described in Brakes (chapter 15), and renew the faulty components as necessary.
- 5 Defective front hub bearings: Renew the bearings.
- 6 Worn or defective drive shaft constant velocity joint: Check and if necessary, renew the faulty components.

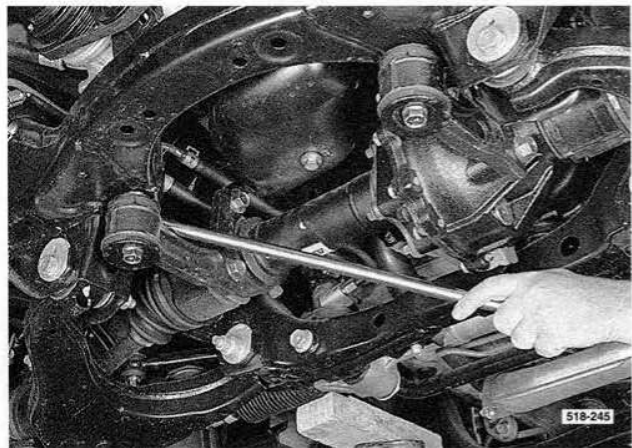


Front hub bearing noise can be diagnosed by spinning one wheel at a time and listening for a rumbling noise. When carrying out the hub bearing test, place the transmission in neutral and prevent the opposite wheel turning.

Constant velocity joint noise can be diagnosed by slowly driving the vehicle in a figure eight pattern and listening for a change in noise when turning from one direction to the other. Alternatively, raise the front of the vehicle and rotate each front wheel by hand with the steering on full lock in both directions.

FINAL DRIVE GEAR NOISE

- 1 Loose propeller shaft or worn universal joint: Tighten the retaining nuts and bolts or renew the universal joint.
- 2 Lack of lubricant: Check for oil leakage and rectify the cause. Top up with the correct grade of lubricant.
- 3 Loose drive pinion flange nut: Install a new nut, and adjust the bearing preload as described under the heading To Renew Drive Pinion Oil Seal, in this chapter.
- 4 Worn or damaged differential components: Overhaul the final drive assembly.



Checking the front bracket bushes. A worn or deteriorated bush can be a source of noise.

PINION SHAFT WILL ROTATE BUT NO FRONT WHEEL DRIVE

- 1 Broken constant velocity joint or drive shaft: Check and renew the components as necessary.
- 2 Broken or damaged intermediate drive shaft: Check and renew the components as necessary.
- 3 Damaged differential gears: Overhaul the final drive assembly.
- 4 Sheared crownwheel bolts: Remove the final drive assembly and renew the bolts.

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TIP Remove the intermediate shaft and check for breakage. If necessary, remove the final drive assembly and ensure that all foreign metal particles and contaminated lubricant are removed from the axle housing.

LOSS OF LUBRICANT

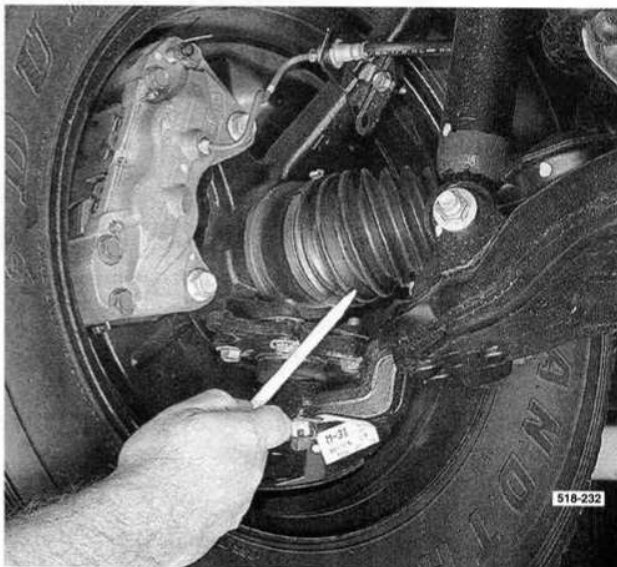
- 1 Leaking drive pinion oil seal: Renew the oil seal and inspect the flange running surface.
- 2 Leaking drive shaft oil seal: Remove the drive shafts and renew the oil seals.
- 3 Leaking side cover and/or intermediate shaft tube: Check that the retaining bolts are tight. If necessary, renew the sealant on the side cover and/or intermediate shaft tube.
- 4 Porous or cracked final drive housing: Repair or renew the housing as necessary.

TIP Check the breather for restriction prior to cleaning the final drive housing. If oil leakage is not apparent when the assembly is cold, drive the vehicle until the differential reaches operating temperature and thoroughly check the housing for small cracks.

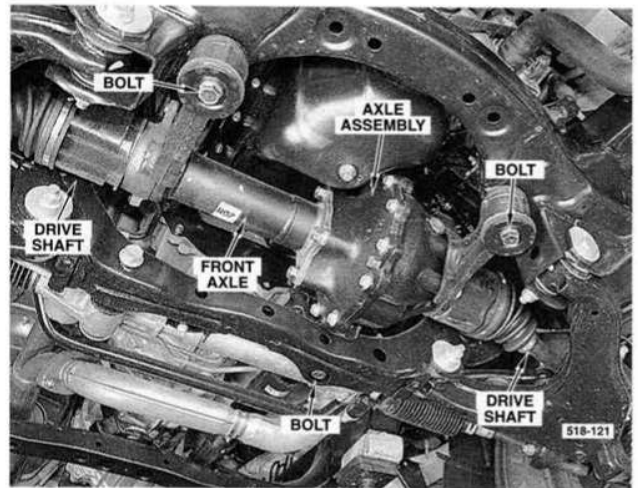
NOISE OR VIBRATION IN DRIVE SHAFTS

- 1 Lack of lubricant due to damaged drive shaft joint boots: Check the drive shaft joints for wear, repack the drive shaft joints and renew the drive shaft boots.
- 2 Worn or damaged inner or outer drive shaft joint: Check and renew the worn components as necessary.
- 3 Loose drive shaft hub nut: Tighten the hub nut to the specified torque.
- 4 Bent or twisted drive shafts: Check and renew the drive shafts as necessary.

TIP Noise or vibration in the front end can also be caused by excessive tyre or wheel imbalance. Drive shaft joint noise is usually more pronounced when moving slowly with the steering on full lock.



Rotate the drive shaft and carefully check the boots for splits and damage.

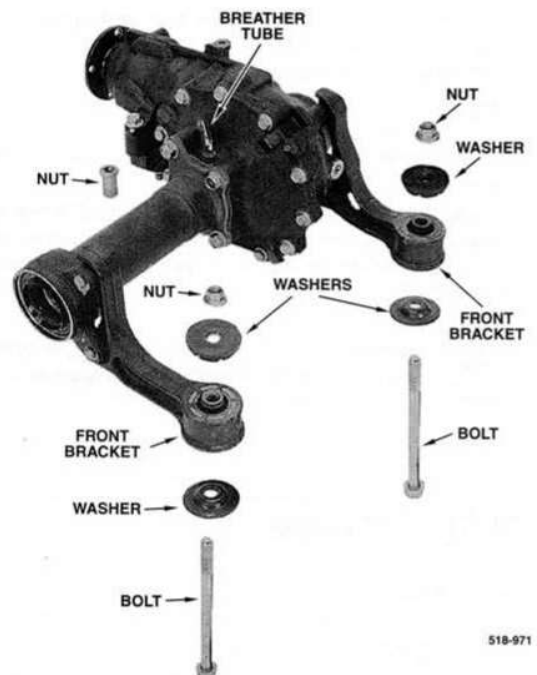


Front axle assembly installed.

Differential and Final Drive Assembly

TO REMOVE AND INSTALL

- 1 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points.
- 2 Remove the retaining bolts and withdraw the stoneguards from beneath the vehicle.
- 3 Place a container beneath the differential housing, remove the drain plug and drain the oil from the differential.
- 4 Mark the propeller shaft and drive pinion flanges, remove the nuts and bolts and disconnect the propeller shaft. Place the propeller shaft on the stabiliser bar and secure it using a piece of wire.



Front axle removed, showing components.

- 5 Remove both drive shafts from the vehicle as described later in this chapter.
- 6 Release the clip retaining the long breather hose to the metal pipe on top of the differential and separate the hose from the pipe. Place the breather hose clear of the work area.
- 7 Remove the bolt retaining the metal pipe to the differential and separate the short hose from the breather tube on the differential housing. Withdraw the metal pipe.
- 8 Support the final drive housing, using a floor jack. Place a block of timber between the head of the floor jack and the housing, to prevent the assembly slipping or damage to the housing.
- 9 Remove the bolts from the front brackets, retaining the final drive assembly to the chassis, noting the installed position of the dished washers. Remove the long nut retaining the rear mounting of the axle to the chassis.
- 10 While tilting the assembly forward, carefully lower it from the vehicle.

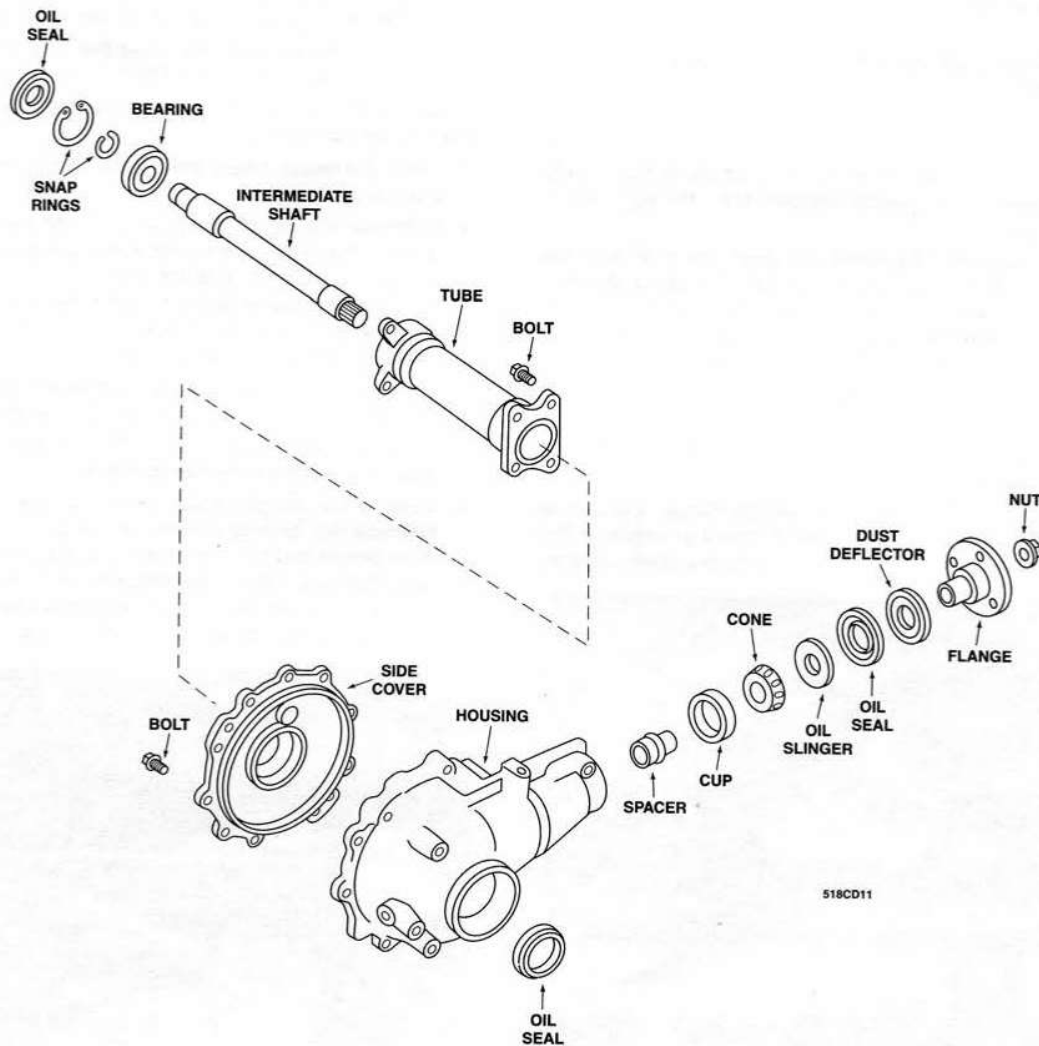
Installation is a reversal of the removal procedure with attention to the following points:

- 1 Check the condition of the bush in the front brackets and in the rear mounting. If the bushes are worn, the bracket(s) or the mounting must be renewed.
- 2 Install the dished washer to the retaining bolts in the position noted during removal. Install the bolts and tighten to the specified torque.
- 3 Install the drive shafts as described later in this chapter.
- 4 Fill the final drive assembly with the correct grade and quantity of lubricant.

TO OVERHAUL

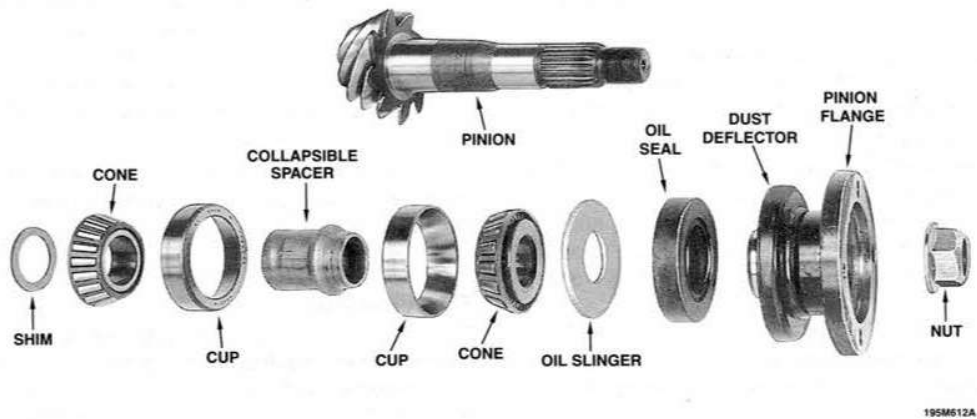
Specialised knowledge and equipment is required to overhaul the differential and final drive assembly. As the cost of the equipment required normally exceeds the cost of an exchange unit, or repair by a specialist, it is not a worthwhile proposition for the home mechanic to attempt the overhaul procedure.

Specifications are included in the beginning of the chapter for those who feel competent and are sufficiently equipped to undertake the operation.



Front differential housing and associated components.

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Drive pinion and associated components.

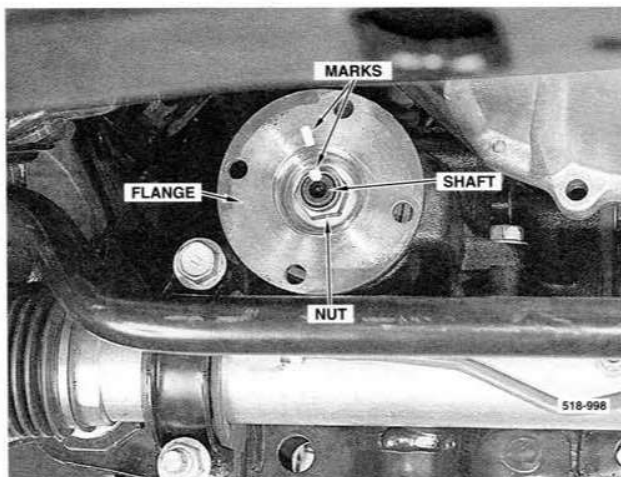
OIL SEALS

Drive Pinion Oil Seal — To Renew



To Renew Oil Seal — Pinion flange puller, low range torque wrench

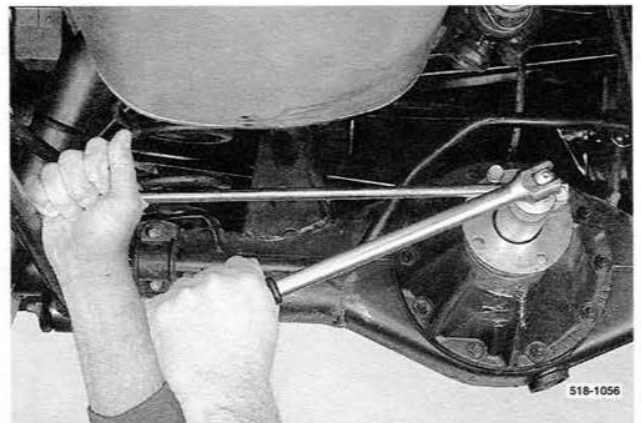
- 1 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points.
- 2 Mark the alignment between the propeller shaft and the drive pinion flange to ensure correct installation. Remove the nuts and bolts and disconnect the propeller shaft from the drive pinion flange. Place the propeller shaft on the stabiliser bar and secure it using a piece of wire.
- 3 Carefully mark the alignment of the pinion shaft, pinion nut and the pinion flange to ensure correct assembly.
- 4 Using a hammer and punch, release the staking from the pinion flange nut.
- 5 Insert two suitable length bolts to the flange and secure them using retaining nuts. Insert a long bar between the bolts and rest the bar on the vehicle body or suspension arm.



The pinion flange, the nut and the shaft must be accurately marked prior to removing the oil seal.

- 6 Using a socket and a long breaker bar, remove the pinion retaining nut.
 - 7 Position a container under the pinion flange. Using a puller or a lever, remove the pinion flange from the drive pinion.
 - 8 Clean the pinion seal area. Prise the oil seal from the final drive housing, using care not to damage the oil seal housing.
- Installation is a reversal of the removal procedure with attention to the following points:

- 1 Clean the recess where the oil seal is housed and check for burrs and damage.
- 2 Lubricate the lip of the new seal with the multipurpose grease. Install the seal squarely into the final drive housing using a suitable size tubular drift and hammer. Ensure that the lip of the seal is facing towards the pinion bearing and that the outer face of the seal is installed 4.5 mm below the surface of the final drive housing.
- 3 Install the pinion flange using a soft faced hammer, ensuring the mating marks made on removal are aligned.
- 4 Apply gear oil to the threads of the pinion nut, install the washer and tighten the nut to 108 Nm.
- 5 Install a low range torque wrench to the pinion nut and measure the bearing preload of the backlash between the drive pinion and the crownwheel. If the preload is less than Specifications, tighten the pinion nut in increments of 13 Nm until the correct preload is achieved, ensuring that the maximum torque of 223 Nm is not exceeded.



Method of removing the drive pinion retaining nut.

i It is imperative that all marked components are assembled in the same position as they were prior to dismantling. If the pinion flange nut is tightened excessively, the collapsible preload spacer may collapse causing excessive preload on the pinion bearings and necessitating renewal of the spacer.

Do not loosen the pinion nut to reduce the bearing preload.

- 6 Stake the pinion nut to the recess in the drive pinion.
- 7 Align the propeller shaft mark with the mark made on the pinion flange and install the propeller shaft nuts and bolts in the positions noted on removal. Tighten the retaining bolts to the specified torque.
- 8 Check and if necessary top up the rear axle oil with the specified lubricant.

Drive Shaft Oil Seals — To Renew

- 1 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points.
- 2 Remove the relevant drive shaft from the vehicle, referring to the procedure described under the Drive Shafts heading, later in this chapter.
- 3 Note the installed depth of the seal. Using a suitable puller or lever, remove and discard the oil seal from the final drive housing.
- 4 Clean the seal area. Prise the oil seal from the final drive housing, using care not to damage the oil seal housing.



Removing the drive shaft oil seal from the final drive housing.

5 Clean the oil seal seat and inspect for burrs or damage. Installation is a reversal of the removal procedure with attention to the following points:

- 1 Lubricate the lip of the new seal with the multipurpose grease.
- 2 Install the seal squarely into the final drive housing using a suitable size socket and hammer. Ensure that the lip of the seal is facing towards the final drive and that the outer face of the seal is flush with recess in the final drive housing.

Drive Shafts

If the drive shafts are worn or damaged, it is usually more economically viable to install an exchange assembly from a drive shaft specialist. If the rubber boots require renewal, the procedure is covered in this chapter.

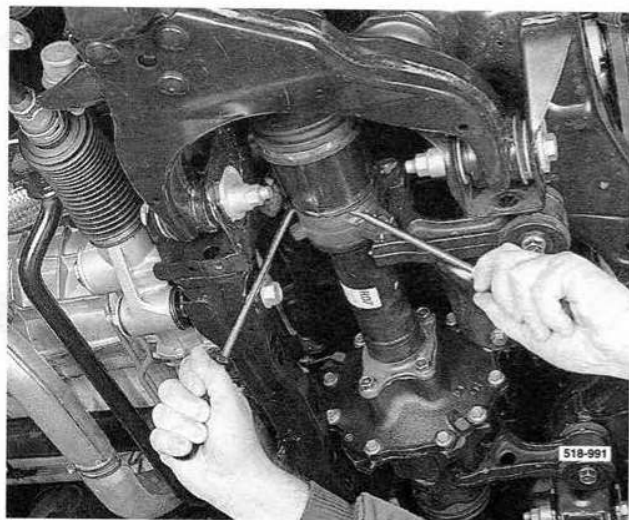
TO REMOVE AND INSTALL

- 1 Where applicable, remove the centre cap from the front wheel. Prise out the dust cover from the centre of the hub and loosen the front wheel nuts.
- 2 Remove the split pin from the end of the drive shaft nut and withdraw the castellated nut retainer washer. While an assistant applies the brakes, loosen but do not remove the drive shaft nut. A long breaker bar will be necessary, as the drive shaft nut is very tight.
- 3 Raise the front of the vehicle and support on chassis stands. Refer to General Information (chapter 1) for the positions of the jacking points. Remove the front wheel and the drive shaft nut.
- 4 Place a suitable container beneath the final drive assembly. Remove the drain plug and drain the lubricant. Discard the sealing washer.
- 5 Remove the brake caliper and the brake hose support bracket retaining bolts. Slide the caliper assembly from the disc and suspend the caliper from the coil spring using a piece of wire. Withdraw the brake disc from the hub.

i Do not apply the brake pedal while the caliper is removed.

- 6 On models with ABS, remove the sensor and wiring retaining bracket bolts and place the sensor clear of the work area.
- 7 Remove the bolts retaining the lower ball joint to the steering knuckle and separate the ball joint from the knuckle. Raise the knuckle, until it clears the ball joint and secure the steering knuckle to the vehicle body, using wire or similar.
- 8 Position the drive shaft retaining nut so that the flat face of the nut is level with the end of the shaft. Strike the end of the shaft with a heavy copper/hide hammer to loosen the splines, remove the nut and using a suitable drift, drive the shaft through the hub. Rest the outer joint on the lower control arm.

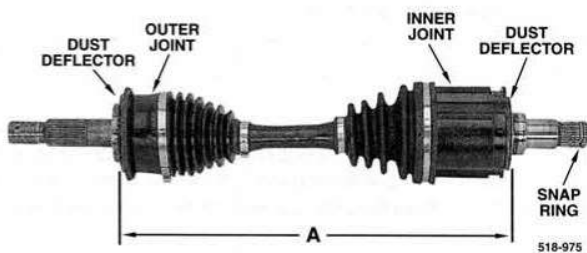
TIP If the shaft is really stuck in the hub, a puller may be necessary.



Levering the drive shaft from the axle housing.

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Part 2



Front drive shaft showing components. When installing the inner boot clips Dimension A must be 530.8 ± 5.0 mm.

- 9 To provide ample working space, hold the steering knuckle away from the work area using wire or similar.
- 10 Place suitable bars or levers at opposite sides of the tripod joint, between the final drive and the tripod joint housings to prevent the inner joint cocking and binding.
- 11 Lever the tripod joint evenly away from the final drive housing, to release the snap ring from the differential/intermediate shaft and guide the drive shaft from the vehicle. The drive shaft snap ring can be very tight on some vehicles.
- 12 Withdraw the drive shaft from the vehicle and plug the hole in the final drive housing to prevent the entry of dirt. Remove and discard the drive shaft snap ring.

i Take care not to damage the drive shaft oil seal and avoid pulling on the drive shaft if it is to be reinstalled.

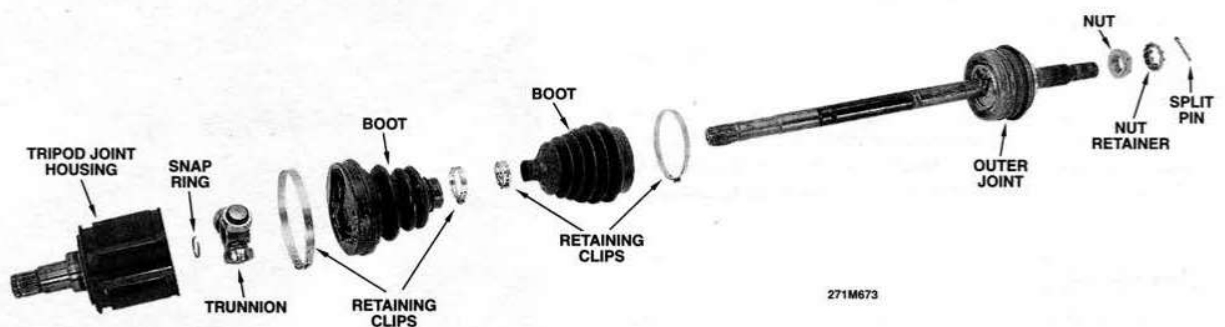
Installation is a reversal of the removal procedure with attention to the following points:

- 1 Check that the drive shaft joints and boots are serviceable. Renew components as necessary, referring to the following heading.
- 2 Check the oil seal for wear and deterioration and if necessary, renew as previously described.
- 3 Apply a smear of multipurpose grease to the lip of the drive shaft oil seal.
- 4 Install a new snap ring to the drive shaft. Ensure that the open end of the snap ring is facing downwards, and install the drive shaft into the differential/intermediate shaft. Push the shaft firmly towards the centre of the vehicle, until the snap ring securely retains the shaft in position.
- 5 Guide the outer joint into the hub. Install the drive shaft hub nut and tighten the nut until the drive shaft is fully seated in the hub.

- 6 Install the brake disc and caliper, referring to Brakes (chapter 15) and tighten the retaining bolts to the specified torque.
- 7 Install the lower ball joint retaining bolts and tighten to the specified torque.
- 8 Fill the final drive with the correct quantity and grade of lubricating oil. Refer to the Routine Maintenance heading in this chapter if necessary.
- 9 Install the wheels and lower the vehicle to the ground. While an assistant applies the brakes, tighten the drive shaft retaining nut to the specified torque. Install the nut retaining washer and install a new split pin.

TO RENEW BOOTS

- 1 Remove the relevant drive shaft as previously described.
- 2 Secure the centre of the drive shaft in a vice equipped with soft jaws. Using suitable pliers remove and discard the clips from the dust boots. Slide the inner boot toward the outer joint.
- 3 Using quick drying paint, mark the relationship of the inner (tripod) joint housing and the drive shaft to ensure correct alignment at assembly. Do not use punch marks.
- 4 Remove the inner joint housing from the drive shaft. Using a small centre punch, place alignment marks on the shaft and trunnion to ensure correct assembly. Using snap ring pliers, remove and discard the snap ring from the end of the shaft.
- 5 Using a brass drift and a hammer, carefully drive the inner joint from the shaft. Remove the boot and withdraw both small clamps. Discard the clamps.
- 6 Remove the outer joint boot. Do not dismantle the outer joint.
- 7 If damaged, remove the dust deflectors from the inner and outer joints, using a hammer and punch.
- 8 Remove as much of the old grease as possible from the outer drive shaft joint without using solvent. Note the amount of old grease removed to aid assembly.
- 9 Check the drive shaft for distortion and worn splines. Check the seal running surface for wear.
- 10 Inspect the trunnion rollers for smooth operation, pitting and evidence of water entry. The joint must slide smoothly in the housing.
- 11 Inspect the outer joint for wear, excessive looseness, evidence of water or foreign material entry and smooth movement.
- 12 Check the rubber boots for cracks and deterioration.
- 13 Renew all worn or damaged components as necessary.



Drive shaft dismantled.



The outer constant velocity joint must not be dismantled. If damage or excessive wear is found, the drive shaft and joint must be renewed as an assembly.

- 14 If removed, install new dust deflectors to the shoulder on the inner and outer joints, using a suitable mandrel or tube.
- 15 Cover the splines on the inner end of the drive shaft with vinyl adhesive tape to prevent damage to the boot.
- 16 Install the outer joint boot, two new small clips and the inner joint boot to the drive shaft.
- 17 Remove the adhesive tape from the splined end of the drive shaft and install the trunnion joint, ensuring that the punch marks are aligned and that the bevelled inner spline side of the joint is facing towards the outer joint.
- 18 Using snap ring pliers, install a new snap ring to the drive shaft ensuring that it is seated in the groove.
- 19 Work the special grease supplied with the repair kit into the outer joint and apply the remainder to the inside of the outer housing.
- 20 Manoeuvre the outer boot to its correct position on the drive shaft, ensuring that the ends of the boot are located in the grooves in the shaft and the outer joint housing.
- 21 Install the inner joint and drive shaft into the housing ensuring that the marks made during dismantling are aligned. Pack the excess grease forced out of the joint assembly into the rubber boot and into the cavity in the housing behind the installed inner joint.
- 22 Adjust the boot to its correct position on the shaft, ensuring that the ends of the boot are located in the grooves in the shaft and joint housing.
- 23 Ensure that the boots are not stretched, contracted or twisted. Adjust the length of the drive shaft to the dimension shown in the illustration. Release excess air from the boots, by carefully inserting a small screwdriver between the joint and the boot and slightly raising the boot.
- 24 With the drive shaft still set to the standard length of 530.8 mm, install the new clips and tighten them securely.
- 25 Install the drive shaft to the vehicle as previously described.