page

General

Maintenance, Self-diagnosis general

Engine, Crankcase, Engine Mounts

Engine, Crankshaft, Pistons

Engine, Cylinder Head, Valve Drive

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page

The following topics of Repair group 15 are described in the Repair Manual Type 944, vol. 1 - A:

Engine, Lubrication

Engine, Cooling

Fuel Supply

The following topics of Repair group 20 are described in the Repair Manual Type 944, vol. 1 - A:

Fuel System - Electronic Injection

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The following topics of Repair group 24 are described in the Repair Manual Type 944, vol. 1 - A:

Ignition system

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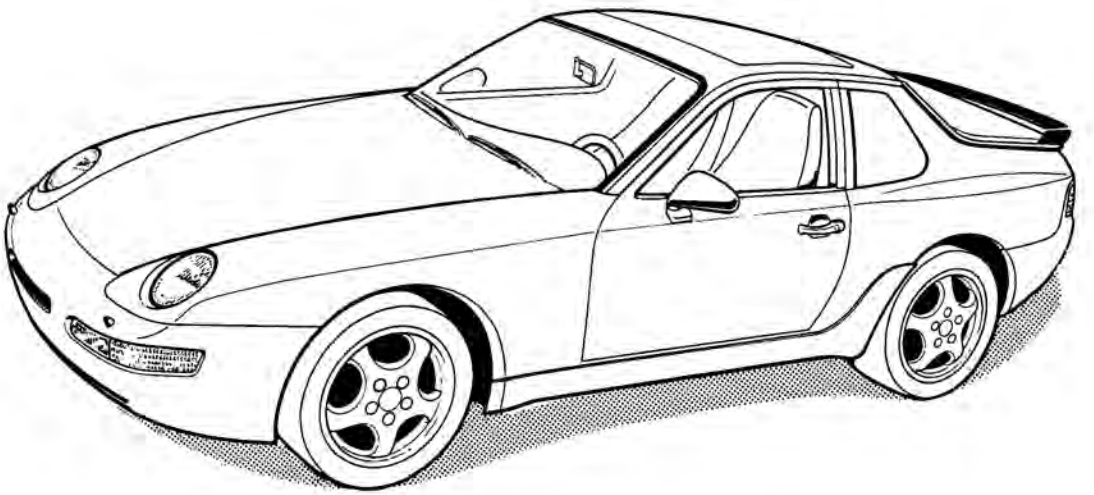
968



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Technical Data - Type 968 - Model '92

(For adjusting values and wear limits, refer to the relevant Repair Groups)

Note: U.S. values are indicated in brackets

Power unit

Internal engine code		Manual transmission Tiptronic	M 44.43 M 44.44
No. of cylinders		4	
Bore	mm (in.)	104 (4.09)	
Stroke	mm (in.)	88 (3.46)	
Displacement (real)	c.c.(cu.in.)	2,990 (182.5)	
Compression ratio		11.0 : 1	
Max. engine power to 80/1269 / EEC Net Power, to SAE J 1349 at engine speed	 kW/HP kW (HP) rpm	 176/240 176 (236) 6,200	
Max. torque to 80/1269/EEC Net torque, to SAE J 1349 at engine speed	 Nm/kpm Nm (lbft) rpm	 305/31.0 305 (225) 4,100	
Max. liter output DIN 70020 SAE J 1349	 KW/l / hp/l KW/l (HP/l)	 58.9/80.3 58.9 (78.7)	
Torque limitation by fuel cutout Idle speed M 44.43 Idle speed M 44.44	 rpm rpm rpm	 6,700 ± 20 840 ± 40 880 ± 40	
Engine weight (dry)	kg	172	

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Engine Design

Engine type	4-cylinder 4-stroke otto-cycle engine with 2 balance shafts
Crankcase	Light-alloy, two-piece
Crankshaft	Forged, 5 main bearings
Crankshaft bearings	Plain bearings
Connecting rods	Forged
Con-rod bearings	Plain bearings
Pistons	Light-alloy, forged
Cylinders	Light-alloy
Cylinder head	Light-alloy
Valve guides	Pressed in, special brass
Valve arrangement	2 intake, 2 exhaust, overhead in V inclination
Valve gear	2 overhead camshafts, hydraulic flat-base tappets
Camshaft	Without bearing shells, located in cylinder head
Camshaft drive	Toothed belt and internal chain with electric/hydraulic adjustment
Balance shafts	Forged
Balance shaft bearings	Plain bearings with bearings shells
Balance shaft drive	Toothed belt
Valve clearance	Automatic adjustment (hydraulic)
Basic valve timing	Intake opens 7.5 deg. after TDC Intake closes 52 deg. after BDC Exhaust opens 31 deg. before BDC Exhaust closes 1 deg. after TDC
Torque valve timing	Intake opens 7.5 deg. before TDC Exhaust closes 37 deg. after BDC Exhaust opens 31 deg. before BDC Exhaust closes 1 deg. after TDC

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Engine cooling

Type		Closed cooling system with antifreeze protection down to - 30°C (nordic countries - 40°C)
Fan drive		Electric fan with temperature switch

Engine lubrication

Type		Forced-feed circulation lubrication with crescent-type gear pump
Oil cooling		External, thermostatically controlled air/oil cooler
Oil filter		Full-flow type
Oil pressure		0.6...8 bar, min. 3.0 bar at 3,000 rpm
Oil pressure indicator		0...5 bar, electric gauge with warning light contact
Oil consumption		Up to 1.5 l / 1,000 kms
Exhaust system		2 Twin-tube mainfolds, downpipe to catalytic converter, center muffler, rear muffler
Emission control		Oxygen sensor control with 3-way catalytic converter (metal carrier)
Heating		Hot-water heating with heat exchanger and fan

Fuel system

Injection system		DME
Fuel delivery		1 electric feed pump
Fuel octane requirements	RON/MON	98/88 Premium, unleaded

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Electrical equipment

Suppression rating		ECE-R 10 and 72/245/EEC
Battery voltage	V	12
Battery capacity	Ah	63 Manual transmission (64 Tiptronic)
Alternator output	A/W	115/1610 AC
Ignition		via DME
Firing order		1 - 3 - 4 - 2
Spark plugs		Bosch WR 7 DTC 3-ground electrode
Electrode gap	mm (in.)	0.7 + 0.1 (0.028 + 0.004)

Body type

Unit-construction all-steel body, rear spoiler,
Coupé
Cabriolet

Dimensions (at DIN curb weight)

Length	mm (in.)	4320 (170.1)		
Width	mm (in.)	1735 (68.31)		
Height	mm (in.)	1275 (50.20)		
Wheelbase	mm (in.)	2400 (94.49)		
Track front			with rim	
	mm (in.)	1472 (58.2)	7J x 16	ET 52
		1457 (57.7)	7 1/2 J x 17	ET 65
Track rear	mm (in)	1450 (57.1)	8J x 16	ET 52
		1445 (57.0)	9J x 17	ET 55

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Dimensions

Ground clearance (at max. total weight)	mm (in.)	125 (4.92)
Ramp angle (at max. total weight)	deg.	11.0
Front overhang angle (at max. total weight)	deg.	14.5
Rear overhang angle (at max. total weight)	deg.	15.5

Weights (to DIN 70020)

		Coupé Manual transmission RoW
Curb weight front	kg (lbs)	670 (1477)
Curb weight rear	kg (lbs)	700 (1543)
Curb weight total	kg (lbs)	1370 (3020)
Max. total weight	kg (lbs)	1700 (3747)
Max. axle load front	kg (lbs)	820 (1807)
Max. axle load rear	kg (lbs)	990 (2182)
Max. roof load incl. roof rack	kg (lbs)	75 (165) with genuine Porsche roof transportation system

Capacities

Engine	Use only approved engine oils. Refer to Technical Information manual
Engine oil quantity	approx. 6.5 l (with filter) Refer to measurement level on oil dipstick according to Owner's Manual
Transmission with differential	approx. 2.75 l
Tiptronic	approx. 7 l
Final drive	approx. 0.7 l
Fuel tank	approx. 74 l (reserve approx. 8 l)
Brake fluid reservoir	approx. 0.2 l
Washer fluid reservoir and headlight washer system	approx. 6.5 l
Engine coolant	approx. 7.8 l
Power-assisted steering	approx. 1.0 l

Performance

		Manual transmission
Max. speed	km/h (mph)	252 (156)
Acceleration 0 to 100 km/h	s	6.5
1000 m from standing start	s	26.6

Climbing performance

		Manual transmission
In %	1st	60%
	2nd	46%
	3rd	30%
	4th	21%
	5th	15%
	6th	12%

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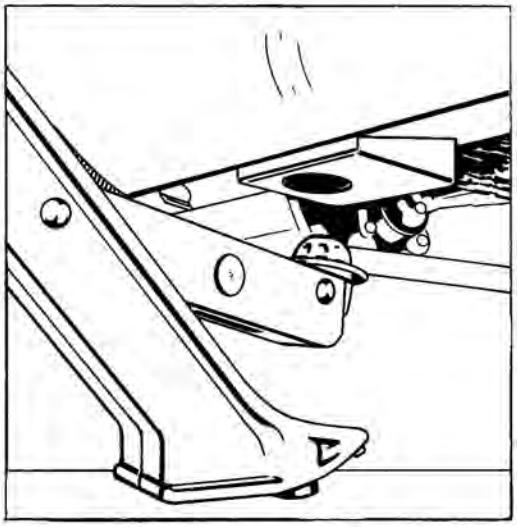
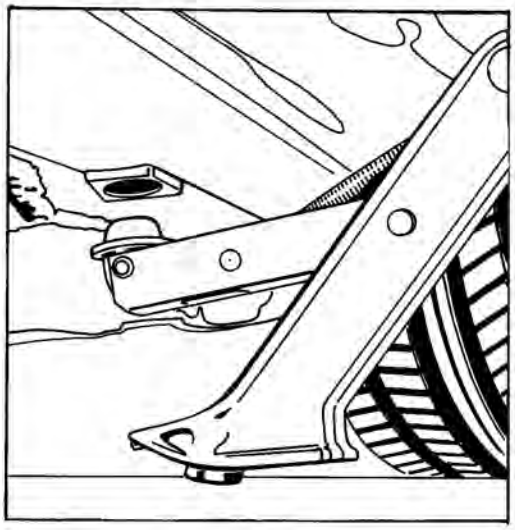
Lifting the vehicle

The car jack, the trolley jack and the support plates of the lifting platform may only be used to lift the car at the jacking points shown below.

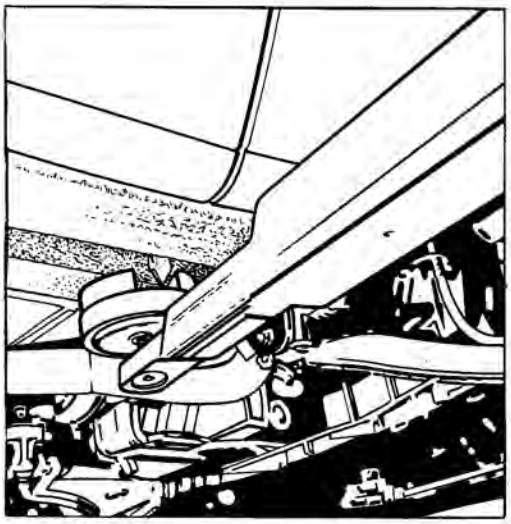


front 846-03



rear 847-03

The jacking point at the front side member may still be used to raise the vehicle on the lifting platform.



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Never raise the vehicle at the oil pan or the transmission since this may cause severe damage.

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Centre's stamp

Maintenance

Working instruction to order no.

Vehicles as from model year 1992

VIN _____

☐ Maintenance every 20,000 km/12,000 mls

(working position 03 20 00..)

Type ⇨

The terms "inspect" and "check" include all associated work such as adjustments, readjustments, corrections and replenishment. They do not include the repair, replacement or overhaul of components or assemblies. The maintenance points stated above are valid for all vehicle types of the model line in question.

	968	911 Turbo	911	928
Diagnosis system: Read out fault memory	●	●	●	●
Change engine oil and oil filter	●	●	●	●
Check valve clearance		●	●	
V-belt or Polyrib belt: Check condition and tension	●	●	●	●
Toothed belt for camshafts: Check condition and tension				●
Toothed belt for power steering: Check condition		●	●	
Toothed belt tensioner: Check oil level				●
Change spark plugs (only on vehicles without catalytic converter)	●	●	●	●
Check boost pressure safety switch		●		
Visual inspection for leaks: Oils and fluids	●	●	●	●
Coolant hoses: Check condition Radiator: Visual inspection for external fouling Coolant: Check level and anti-freeze content	●			●
Air filter: Replace filter element				●
Crankcase ventilation: Check tightness of hose connections		●	●	●
Fuel system: Visual inspection for damage, correct position and tightness of connections	●	●	●	●
Intake air system: Check hoses, lines and connections for tightness	●	●	●	●
Handbrake: Check free travel of handbrake lever	●	●	●	●
Brake system: Visual inspection of brake pads and disks for wear	●	●	●	●
Brake hoses and lines: Visual inspection for damage, correct position and corrosion, check brake fluid level. For 928: Visual inspection of components for Tire Pressure Monitoring System	●	●	●	●
Clutch: Check play or final position of clutch pedal	●	●	●	●
Throttle valve actuation: Check for ease of movement and full throttle position	●	●	●	●
Resonance flap: Check operation			●	●
Steering gear: Visual check of bellows for damage Track rod links: Check play and dust caps	●	●	●	●
Power steering: Check fluid level	●	●	●	●
Axle joints: Visual inspection of dust caps for damage Screw connections of suspension adjustment system: Check for tightness front and rear	●	●	●	●
Front wheel bearings: Check play	●			●
Manual transmission/axle drives: Check oil level	●	●	●	●
Automatic transmission: Check fluid level	●		●	●
Drive shafts: Visual inspection of sleeves for leaks and damage	●	●	●	●
Exhaust system: Visual inspection for leaks and damage, check attachment	●	●	●	●
Tires: Check condition and pressure (928 with system tester)	●	●	●	●
Door hinges: Lubricate		●	●	
Check door, lid locks and safety hooks on front lid for tightness and operation	●	●	●	●
Hinges for rear lid: Lubricate				●
Safety belts: Check operation and condition	●	●	●	●

Continuation p.t.o.

Maintenance every 20,000 km/12,000 mls

Type ⇨	968	911 Turbo	911	928
Seals for doors, compartment lids and roof: remove abraded rubber, Apply suitable lubricant	●	●	●	●
Check operation of vehicle lighting All headlights: Check setting Horn: Check operation	●	●	●	●
Pop-up headlights: Lubricate linkages	●			●
Windshield washer, headlight washer: Check fluid levels and nozzle settings; in the winter months top up with anti-freeze as necessary.	●	●	●	●
All other electrical equipment as well as indicator and warning lights: Check operation	●	●	●	●
Ignition circuit 1 and 2: Check operation			●	
Additional:				
☐ **every 40,000 km/24,000 mls**				
Automatic transmission: Change fluid, clean ATF strainer or change filter	●		●	●
Replace fuel filter	●	●	●	●
Air filter: Replace filter element	●	●	●	
Auxiliary air pump: Replace filter element		●		●
Toothed belt for balance shafts: Check condition and tension	●			
Toothed belt for camshafts: Check condition	●			
Replace spark plugs (only in vehicles with catalytic converter)	●	●	●	●
☐ **every 80,000 km/48,000 mls**				
Manual transmission/axle drives: Change oil	●	●	●	●
Automatic transmission: Change oil in axle drive	●		●	●
Toothed belt for camshafts: Replace (Check tension of balance shaft belt after 3,000-4,000 km/2,000-2,500 mls if replaced.)	●			
☐ **every 100,000 km/60,000 mls**				
Replace toothed belt for camshafts (check tension after 3,000-4,000 km/2,000-2,500 mls)				●
☐ **Yearly – after the first 2 years**				
File Status Report for Long-life guarantee	●	●	●	●
☐ **every 2 years**				
Change brake fluid	●	●	●	●
Change coolant	●			●
☐ **after 4, 8 and 10 years, thereafter every 2 years**				
Check airbag system	●	●	●	●

Signature (mechanic): _____

Test drive:

Foot brake and handbrake, clutch, automatic speed control, steering, heating, air conditioning and instruments: Check operation	●	●	●	●
Visual inspection for leaks: Oils and fluids	●	●	●	●

Signature (final control) _____

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Centre's stamp

Maintenance

Working instruction to order no.

VIN _____

☐ **Maintenance 3,000 to 4,000 km/2,000 to 2,500 mls**
(working position 03 01 00 ..)

The terms "inspect" and "check" include all associated work such as adjustments, readjustments,corrections and replenishment. They do not include the repair, replacement or overhaul of components or assemblies. The maintenance points stated above are valid for all vehicle types of the model line in question.

	Type ⇨ 968	911 Turbo	911	928
Tires: Check condition and pressure (928 with system tester)	●	●	●	●
Front axle: Check toe adjustment				●
Diagnosis system: Read out fault memory	●	●	●	●
V-belt and Polyrib belt: Check tension		●		●
Toothed belt for camshafts: Check tension				●
Toothed belt for balance shafts: Check tension	●			
Visual inspection for leaks: Oils and fluids	●	●	●	●
Coolant: Check level	●			●
Windshield washer, headlight washer: Check fluid level, in winter months top up with anti-freeze as necessary	●	●	●	●
Check operation of lighting system	●	●	●	●
Exhaust system: Visual inspection for leaks and damage	●	●	●	●
Test idle speed		●		
Perform system adaptation; on vehicles without catalytic converter: Test CO content			●	●
Convertible top: Check operation	●	●	●	

Signature (mechanic): _____

Test drive:

Foot brake and handbrake, clutch, automatic speed control, steering, heating, air conditioning and instruments: Check operation	●	●	●	●
Visual inspection for leaks: Oils and fluids	●	●	●	●

Signature (final control): _____

☐ Recommended Yearly Maintenance

Vehicles with a low yearly mileage between two required service intervals (working position 03 50 00...)

Type ⇨

The terms "inspect" and "check" include all associated work such as adjustments, readjustments, corrections and replenishment. They do not include the repair, replacement or overhaul of components or assemblies. The maintenance points stated above are valid for all vehicle types of the model line in question.	968	911 Turbo	911	928
Visual inspection for leaks: Oils and fluids	●	●	●	●
Diagnosis system: Read out fault memory	●	●	●	●
Handbrake: Check free travel of handbrake lever	●	●	●	●
Brake system: Visual inspection of brake pads and disks for wear	●	●	●	●
Check brake fluid level	●	●	●	●
Steering gear: Visual inspection of bellows for damage Track rod joints: Check play and dust caps	●	●	●	●
Axle joints: Visual inspection of dust caps for damage	●	●	●	●
Drive shafts: Visual inspection of cup seals for leaks and damage	●	●	●	●
Exhaust system: Visual inspection for leaks and damage, check attachment	●	●	●	●
Tires: Check condition and pressure (928 with system tester)	●	●	●	●
Seals for doors, compartment lids and roof: remove abraded rubber Apply suitable lubricant	●	●	●	●
Check operation of lighting system	●	●	●	●
Windshield washer, headlight washer: Check fluid level and nozzle settings; in the winter months top up with anti-freeze as necessary.	●	●	●	●
Battery: Check electrolyte level and density	●	●	●	●
All other electrical equipment as well as indicator and warning lights: Check operation	●	●	●	●
File Status Report for Long-life guarantee (after the first 2 years)	●	●	●	●

Signature (mechanic)_____

Test drive:

Foot brake and handbrake, clutch, automatic speed control, steering, heating, air conditioning and instruments: Check operation	●	●	●	●
Visual inspection for leaks: Oils and fluids	●	●	●	●

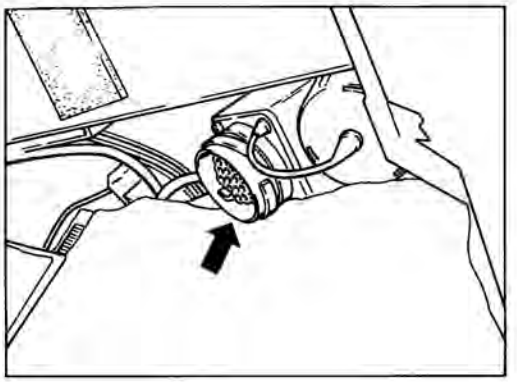
Signature (final control)_____

Diagnosis system:

Read out the fault memory

The procedure for reading out the fault memory is described in the operating instructions for System Tester 9288. A copy of the operating instructions is supplied with each tester.

The System Tester 9288 is connected to the vehicle via a 19-pole socket outlet.



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Toothed belt for for balance shafts

Checking the belt tension

Checking and adjustment operations are identical to those for the 944 S 2.

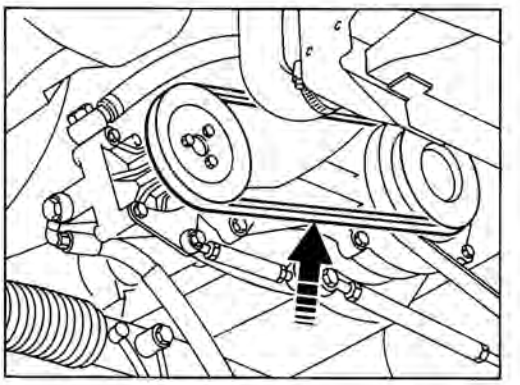
Adjustment value:
(For new and used toothed belts)

2.7 ± 0.3 scale values

Checking and adjusting tightness of power steering pump drive belt

Checking

Check tightness by applying thumb pressure on belt at point midway between two pulleys. Deflection: approx. 5 mm.



858-13

Adjusting

1. Remove splash shield.

2. Loosen upper mounting bolt or nut slightly.

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3. Loosen hexagon head bolts of connecting rod slightly.

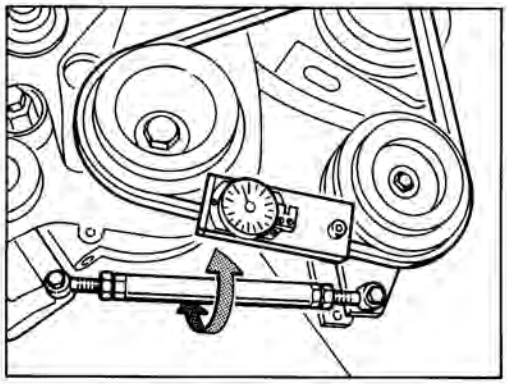
Loosen lock nuts of connecting rod and turn connecting rod accordingly until the correct belt tightness is reached.

4. Tighten mounting bolts and nuts after finishing adjustment.

Polyrib drive belt of alternator or a/c compressor

1. Loosen hexagon head bolts of connectrod slightly. Loosen lock nuts of connecting rod and turn back connecting rod one turn (reduces tension).

2. Prepare Special Tool 9201 for checking. Pull out lockpin on special tool and slide out testing pin opposite the lockpin completely. Place drag needle on indicator needle. Slide special tool on to the drive belt. Push in testing point (arrow) slowly until the lockpin is felt to engage, and read the displayed value from the dial gage.



857-13

Note

The slides must have complete contact on the belt surface.
The special tool must not be turned or moved on the belt while checking.

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Adjustment value without air conditioning
Turn link rod until an adjustment value of 9.5 scale values is reached.

Adjustment value with air conditioning
Adjustment specification modified, refer to page 03 - 18a.

Changing engine oil and engine oil filter

Requirements:

Engine at operating temperature.

1. Undo and remove oil filler cap.
2. Remove oil drain plug from oil pan and drain engine oil.
3. Undo oil filter with oil filter wrench (Special Tool 9204). Drain remaining oil into suitable container.
4. Clean drain plug. Always replace seal. Tightening torque: 50 Nm (37 ftlb).
5. Oil seal of oil filter lightly, tighten by hand until seal is seated, tighten by one more turn. Use oil filter wrench to check tight seating of filter afterwards. Guide value for tightening torque: 20 Nm (15 ftlb).
6. Fill in engine oil, warm up engine to operating temperature and check tightness.
7. Check oil level with engine turned off.

Parking brake:

Checking free play of parking brake lever

The parking brake system is fitted with asbestos-free brake pads. The parking brake fitted with asbestos-free brake pads must not be adjusted in such a manner that the pads must "grind free" in operation.

If the parking brake lever can be pulled by more than 4 teeth under moderate pulling force without showing any sign of braking effect, the parking brake must be readjusted.

Adjusting the parking brake

1. Remove rear wheels.
2. Release parking brake lever and push back rear-axle disc until the brake pads rotate freely.
3. If required, slacken adjusting nut at tension jack of parking brake lever far enough to release the tension of the cable.
4. Use a screwdriver to reach through the bore in the brake disc and reset the adjuster until the wheel can no longer be turned. Then turn adjuster back again until the wheel can be rotated freely. Now turn back by two more teeth (loosening). Repeat operation on the other wheel.
5. Tighten parking brake lever by two teeth and turn adjuster nut at tension jack of parking brake lever until both wheels can hardly be rotated manually any more.
6. Release parking brake lever and check if both wheels rotate freely again.
7. Lock adjusting nut at tension jack.

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Brake system:

Visual inspection, checking the brake pads and brake disk for wear

Note

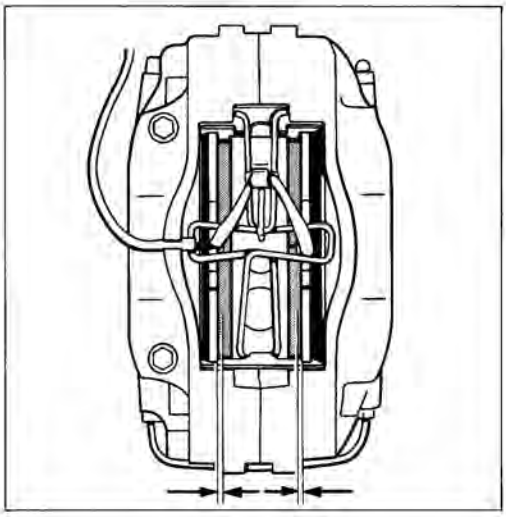
Brake pads must be replaced for the complete axle when the brake-pad warning lamp lights up, but at the latest when the pads have worn down to 2 mm. If the brakepad wear is indicated by the warning lamp, the warning contact (sensor including cable and connector) must also be replaced. It is possible to avoid replacing the warning contact if the brake pads are replaced when worn down to 2.5 mm at the latest. Warning contacts must be replaced if the core of the cable has been exposed. If only the plastic part of the warning contacts has been rubbed, however, it is not necessary to replace it.

1. To check the rear brake pads, remove the **rear wheels***. The front pads can be checked with the wheels remaining on the car.

2. Check the brake pads for war by means of a visual inspection.

The wear limit has been reached when the brake pads is worn down to 2 mm.

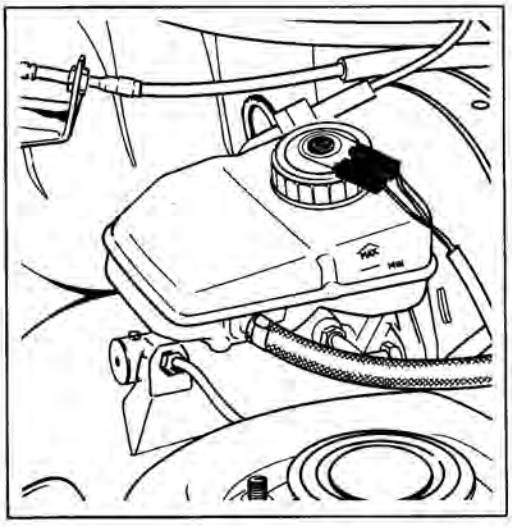
* Note instructions on page 44 - 03 (fitting of Cup-Design wheels).



578-46

Checking the brake fluid

The brake fluid level must be between the min. and max. mark on the reservoir.
Use only DOT 4 brake fluid.



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Clutch:

Checking clutch free play and pedal end position

The clutch master cylinder is provided with internal stops. Free play adjustment is therefore no longer required.
The pedal end position must still be checked, however, for smooth clutch operation.

Depress clutch pedal at the pedal plate for a couple of millimeters and release again.
The pedal must return to its initial position (end position of clutch master cylinder) under its own force.

Pull back and check at pedal plate if pedal has actually reached the end position.
On vehicles with cruise control, check cruise control switch position if required.

Steering gear:

Checking rubber boots visually for cracks and damage

Tie rod ends:

Checking free play and dust bellows

Check all unions to steering gear and tie rods as well as operation and sealing quality of dust boots, rubber bellows and joints.

The rubber boots and bellows at the steering gear and the tie rods may have been damaged due to esternal forces, e.g. by stone hips or when working on the axle. If the dust boot is found to be leaky, replace the joint or tie rod, respectively, since the joint will then deteriorate rapidly due to ingress of dirt and water.

Power-assisted steering:

Checking fluid level

General

Damage to the power-assisted steering system is often due to lack of oil in the hydraulic system. Even minor leaks may cause fluid to escape due to the high hydraulic system pressure, thus damaging the power pump.

Grunts that become audible when turning the steering wheel or foaming in the reservoir indicate lack of oil and/or air drawn into the system. Before topping up the reservoir, however, remedy any leaks present on the intake side and replace damaged parts on the feed side.

Note

For adjustment of the drive belt, refer to page 03 - 1.

Checking fluid level of the power steering system

The reservoir is fitted on the right-hand side of the engine compartment (on the wheel housing panel).

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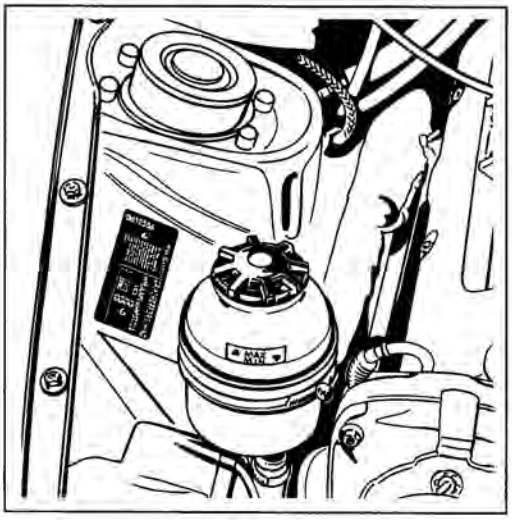
With the engine at idle, check the ATF-fluid (ATF-Dexron II D) without moving the steering. The correct level is between the min. and max. marks on the reservoir.



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Axle Joints

Visual inspection for damage to the dust caps

Check the dust caps for the axle joints (ball joints) on the wheel suspension as follows:

- Drive the vehicle onto the lifting plattform, steering lock released.
- Turn the front wheels as far as the stop.
- After cleaning, carry out a visual inspection of the visible areas to the left and right. Press the rubber caps back with your figures and look for concealed cracks.
- After turning the front wheels to the stop in the other direction, check the remaining rubber caps.

Note

It is not possible to carry out a visual inspection on a small area around the brake cover panels. Check this area by touch.
If a rubber cap is found to be leaky, the respective joint must be replaced as it will be destroyed by the penetration of dirt or moisture.