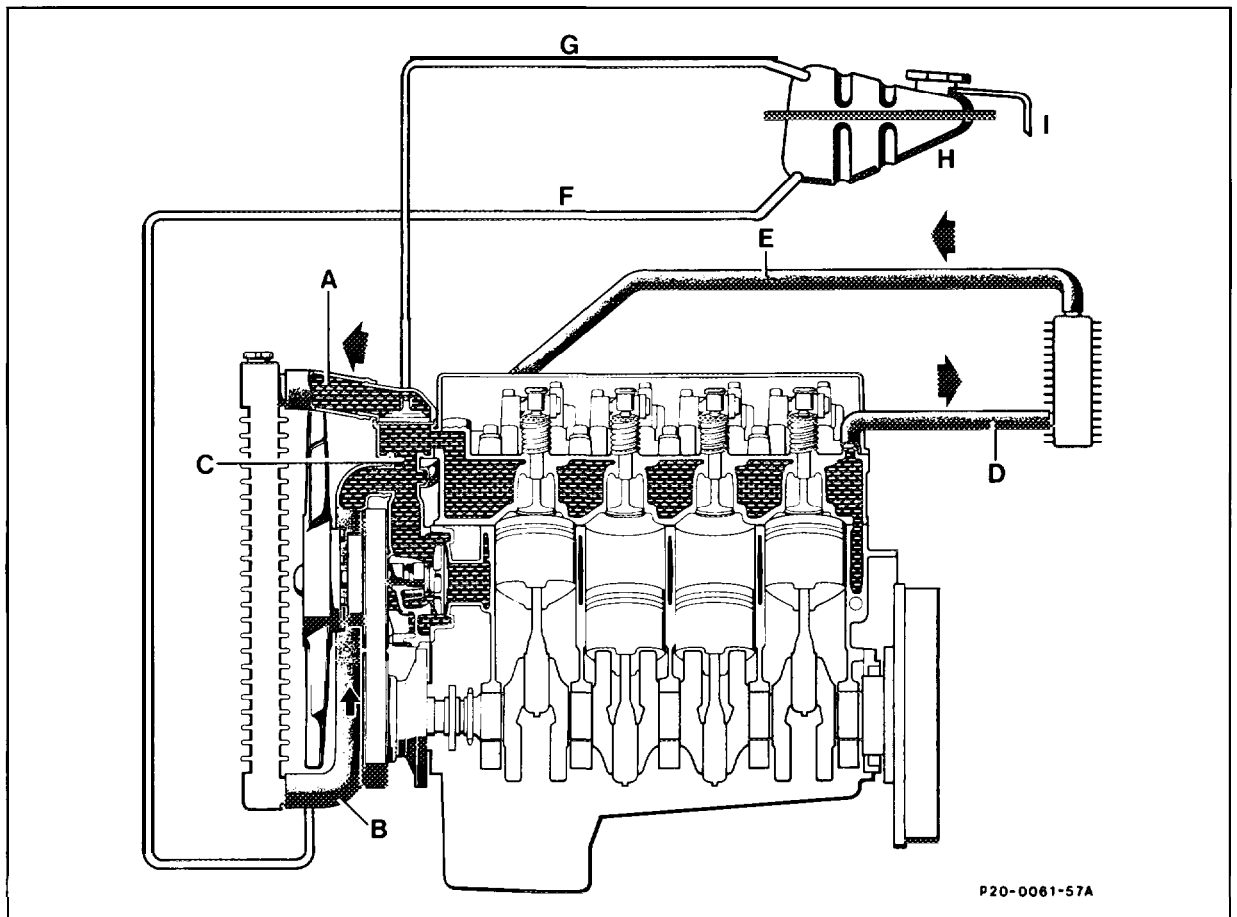




Job No.

Engine coolant circuit and engine cooling	20 – 005
Draining, adding coolant - Antifreeze protection table	20 – 010
Cleaning, flushing engine cooling and heating system	- 015
Removing oil from engine cooling and heating system	- 016
Checking engine cooling system for leaks	- 017
Removal and installation of engine coolant thermostat	- 110
Removal and installation of engine coolant thermostat housing	- 115
Removal and installation of engine coolant pump	-210
Solenoid fan coupling	- 330
Removal and installation of solenoid fan coupling	- 335
Notes on Radiator	-419
Removal and installation of radiator	- 420
Repairing radiator	- 425
Testing radiator or expansion tank pressure cap	- 430
Checking engine coolant level indicator	- 440
Function of engine coolant level indicator	- 445

20-005 Coolant circuit and engine cooling



P20-0061-57A

Coolant circuit

A	From thermostat housing to radiator	F	Filling line from coolant expansion tank to coolant pump
B	From radiator to coolant pump	G	Vent line from thermostat housing cap to coolant expansion tank
C	Bypass line from thermostat housing to coolant pump	H	Coolant expansion tank
D	Feed line to heater (heat exchanger)	I	Overflow hose
E	Return line from heater (heat exchanger) to coolant pump		

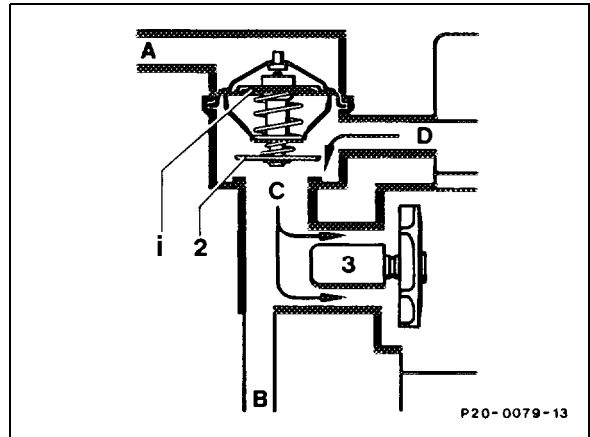
Thermostat

Engine	Thermostat start to open	Fully open
102	87 °C	102 °C

Function

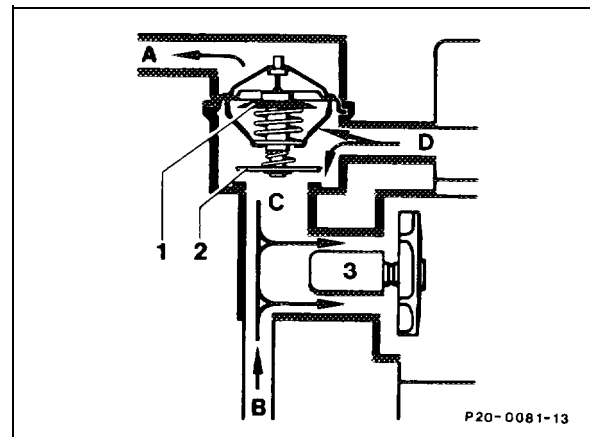
Warming-up period (engine coolant temperature up to approx. 87°C)

The main valve (1) is closed and the bypass valve (2) fully open. Consequently, the flow (A) to the radiator is interrupted and the coolant flows along the bypass line (C) directly to the coolant pump (3) and from there to the engine.



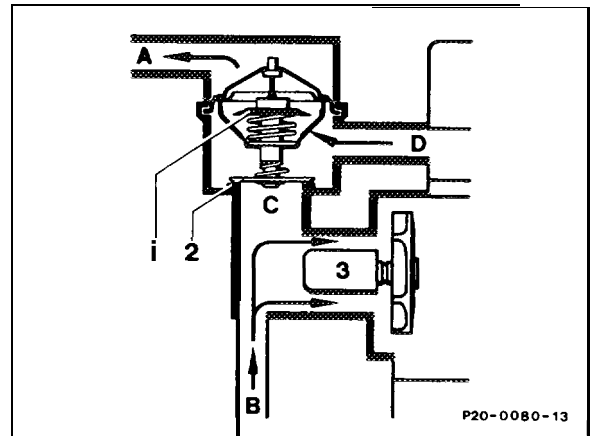
Part load operation (engine coolant temperature approx. 87 °C up to max. 102 °C)

The main valve (1) and bypass valve (2) are more or less wide open depending on engine load and outside temperature. The coolant flows both through the radiator (A) as well as through the bypass line (C), depending on the position of the coolant thermostat.

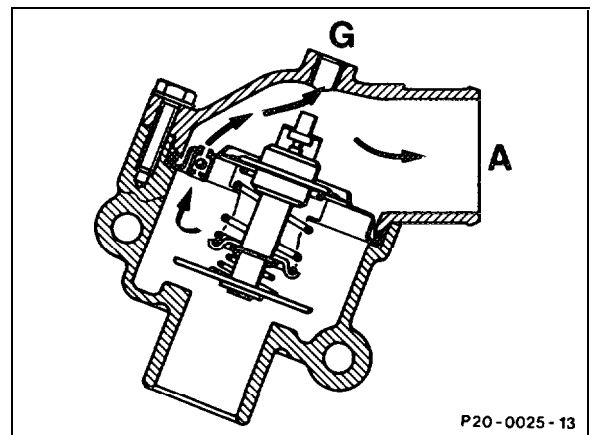


Full load operation - High outside temperatures (engine coolant temperature above 102 °C)

The main valve (1) is fully open and the bypass valve (2) closed. All of the coolant must flow through the radiator and, in so doing, is optimally cooled. It is therefore incorrect to remove the coolant thermostat in order to "improve" engine cooling.

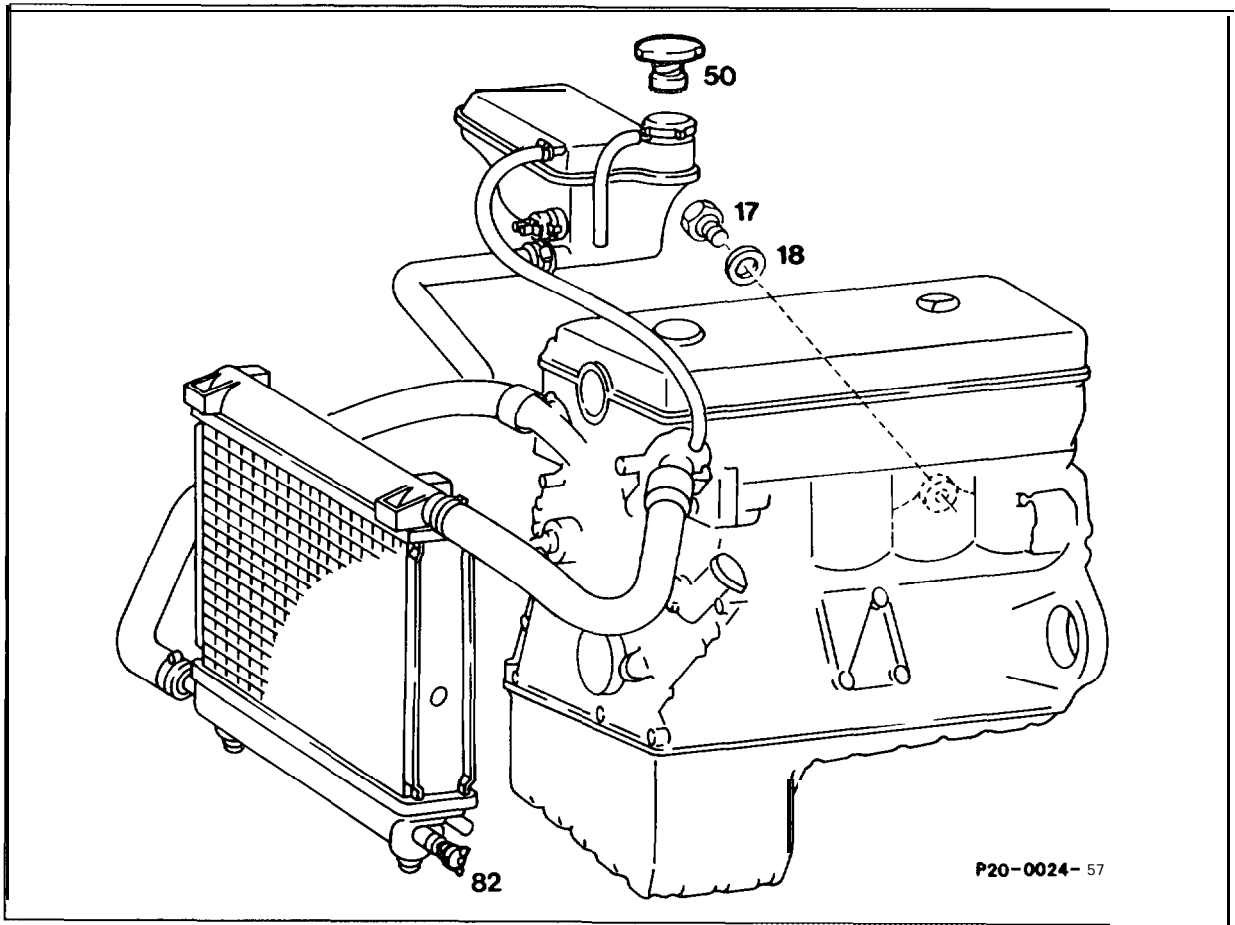



The cooling system is vented through the ball valve when the system is being filled and automatically when the engine is operating. The system is vented at the cap of the coolant thermostat housing (G) along a vent line to the coolant expansion tank.



20-010 Draining, adding coolant - Antifreeze protection table

Preceding work:
Bottom engine compartment panelling removed
(except Model 201.024).



- | | |
|-------------------------------|---|
| Pressure cap (50) | open in stages, close. |
| |  |
| | Do not open until coolant temperature below 90 °C (step 2). |
| Drain plug (82) | open, close, tightening torque 1.5 Nm (reference value, step 3). |

Note

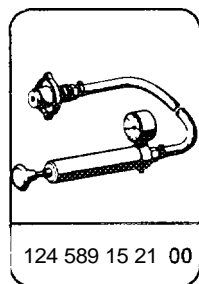
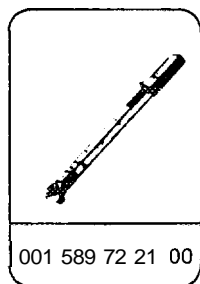
A suitable extension hose can be fitted onto the outlet connection for collecting the coolant.

- | | |
|-------------------------------|---|
| Drain plug (17) | unscrew, insert, renew seal (18), tightening torque 30 Nm (step 4). |
|-------------------------------|---|

Coolant pour in up to marking on expansion tank, press filler hose down a little if necessary. Switch on heater (step 5).

Cooling system check for leaks (20-017).

Special tools



Commercial tool

Antifreeze protection tester
Prestone-W-Check (Union Carbide)

e.g. Ph. Gather,
4020 Mettmann

Total filling capacities of cooling system with heater and mixing ratio of corrosion protection/antifreeze agent¹⁾ and water^{*)} in liters

Model	Engine	Total capacity of cooling system with heater	Mixing ratio Antifreeze agent'water	
			-37 °C	-45 °C
1241'20 1	102	8,5	4,25/4,25	4,75/3,75
		9,5 ³⁾	4,75/4,75	5,25/4,25

1) See Service Product Specifications sheet 325.

2) See Service Product Specifications sheet 310.

3) With air conditioning/automatic climate control.

Notes

Disposing of coolant

Refer to municipal, county and state laws.

Coolant composition

See Factory Approved Service Product s sheet.

Water

Use clean water which is not too hard.

Drinking water may frequently meet these requirements, but not always. The content of dissolved substances in the water may be of significance for the *occurrence* of corrosion. In cases of doubt, the water should be analysed.

Corrosion protection/antifreeze agents

The purpose of corrosion protection/antifreeze agent is as follows:

- To provide adequate corrosion and cavitation protection for all components
- **Antifreeze** protection
- Increasing the boiling point

Approx. 50 % by vol. of corrosion protection/antifreeze agent must be added to the water. This concentration offers antifreeze protection down to approx. -37 °C.

A higher concentration is only advantageous at lower ambient temperatures.

More than 55 % by vol. corrosion protection/antifreeze agent reduces the antifreeze protection and impairs heat dissipation.

55 % by vol. corrosion protection/antifreeze agent offers antifreeze protection down to approx. -45 °C.

Corrosion protection/antifreeze agent increases the boiling point. This means that the coolant does not evaporate so rapidly. Discharge of coolant is avoided at high coolant temperatures. Use *only* approved corrosion protection/antifreeze agents (see Service Product Specifications sheet 325.1 and 325.2).

Operational monitoring of coolant

Before the start of the cold season of the year, check the antifreeze protection of the coolant. In countries with high outside temperatures, check the corrosion protection/antifreeze agent concentration once a year.

When topping up system (after loss of coolant), ensure that the share of corrosion protection/antifreeze agent in the coolant is 50 % by vol. to provide antifreeze protection down to -37 °C.

The antifreeze protection in the coolant reduces during engine operation. These coolants have a severely corrosive effect.

The maximum permissible period of use for the specified coolant in a car engine is 3 years.

Draining – filling up

1 Unscrew front bottom section of noise encapsulation, screw on.

2 Open pressure cap on expansion tank in stages.

Warning!

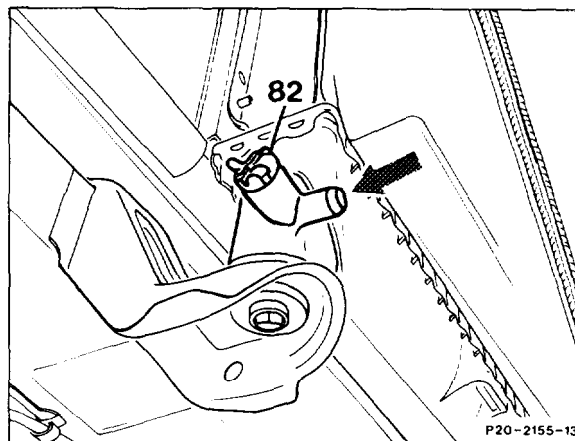
Do not open pressure cap until coolant temperature is below 90 °C.

3 Open drain plug (82) at the radiator, close. Tightening torque 1.5 Nm (reference value).

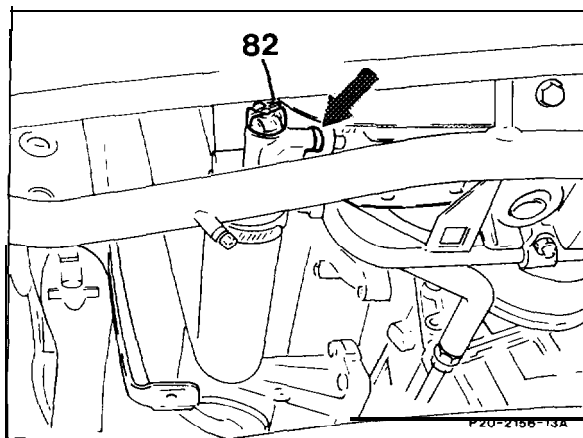
Note

A suitable extension hose can be fitted onto the drainage connection (arrow) for collecting the coolant.

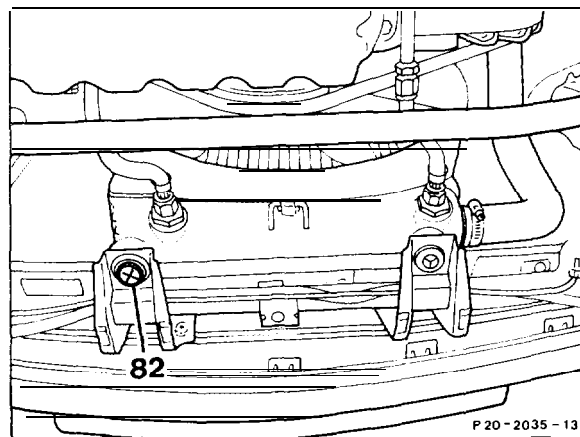
Dram plug Model 124 without air conditioning



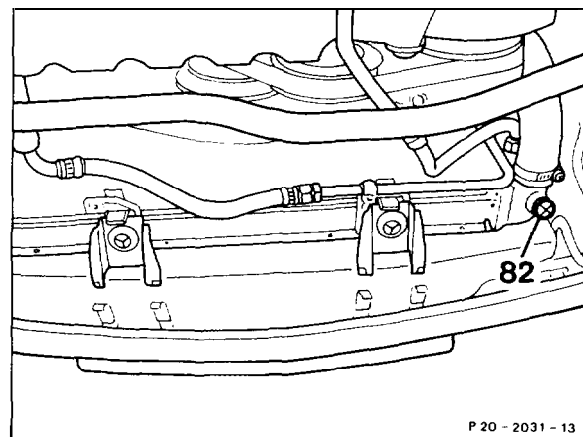
Model 124 with air conditioning



82 Downflow radiator dram plug Model 201 (vehicles without air conditioning, radiator 1st version)

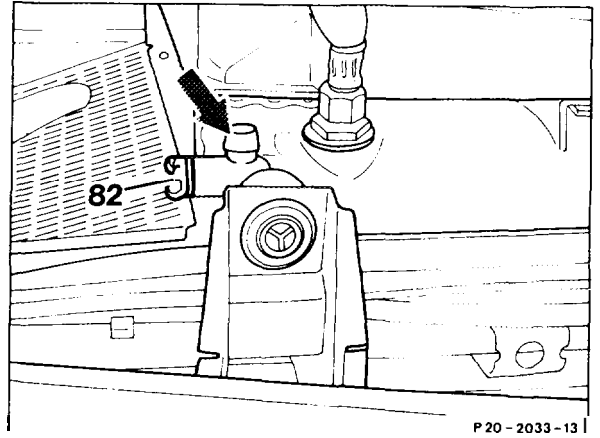


82 Crossflow radiator dram plug Model 201 (vehicles with air conditioning, radiator 1st version)

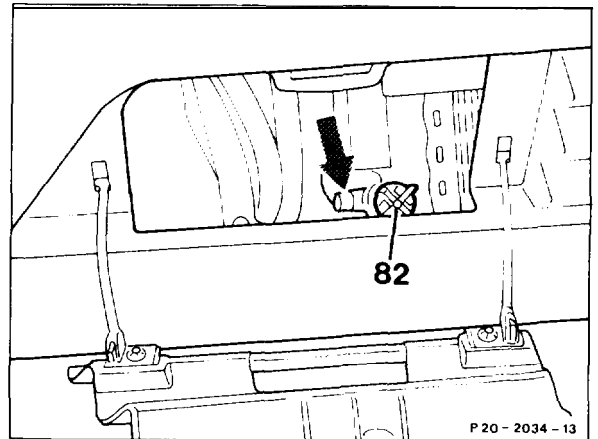


On **Model 201 with drain system 2nd version** fit a 12 mm Ø hose approx. 1500 mm long to the outlet connection (arrow) and run below the wheelhouse. Unscrew drain plug (82).

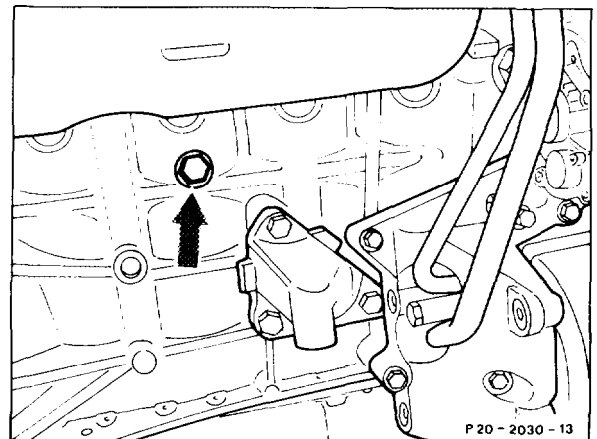
Downflow radiator Model 201 (vehicles without air conditioning)
Drain plug (82) on outside left in direction of travel, outlet connection (arrow) to the rear.



Crossflow radiator Model 201 (2nd version) drain plug (82) at front right in direction of travel, accessible from righthand flap for towing eye in front moulded skirt. Outlet connection (arrow) to the side right.



4 Unscrew drain plug (**arrow**) on crankcase, screw in.
Tightening torque 30 Nm.

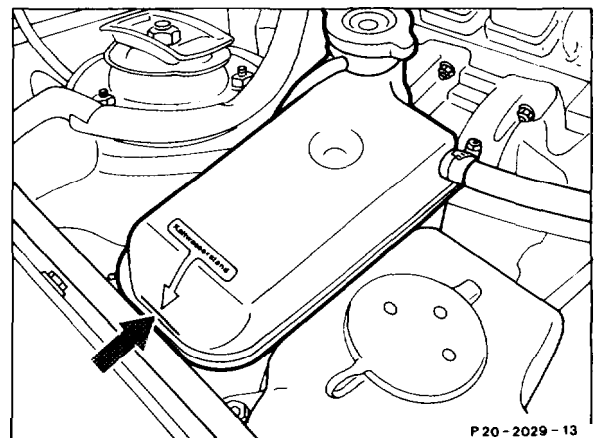


5 Fill in coolant up to the marking on expansion tank (arrow).

Note

Switch on heater and run engine until warm.

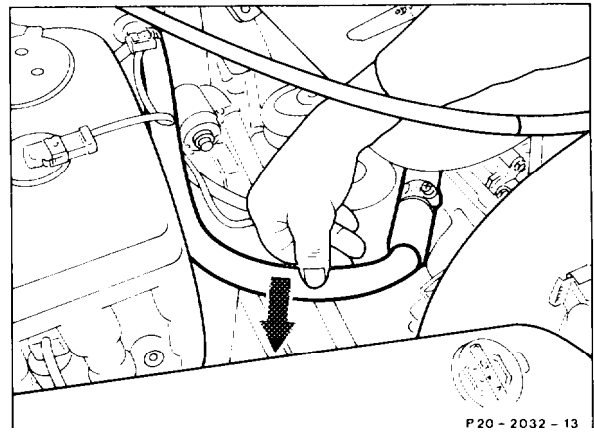
Close filler neck on expansion tank from a coolant temperature of approx. 60-70 °C.



Note

The filler hose can be pressed down for filling (arrow) to ensure the coolant flows more briskly from the expansion tank to the radiator or engine.

- 6 Check cooling system for leaks (20-017).

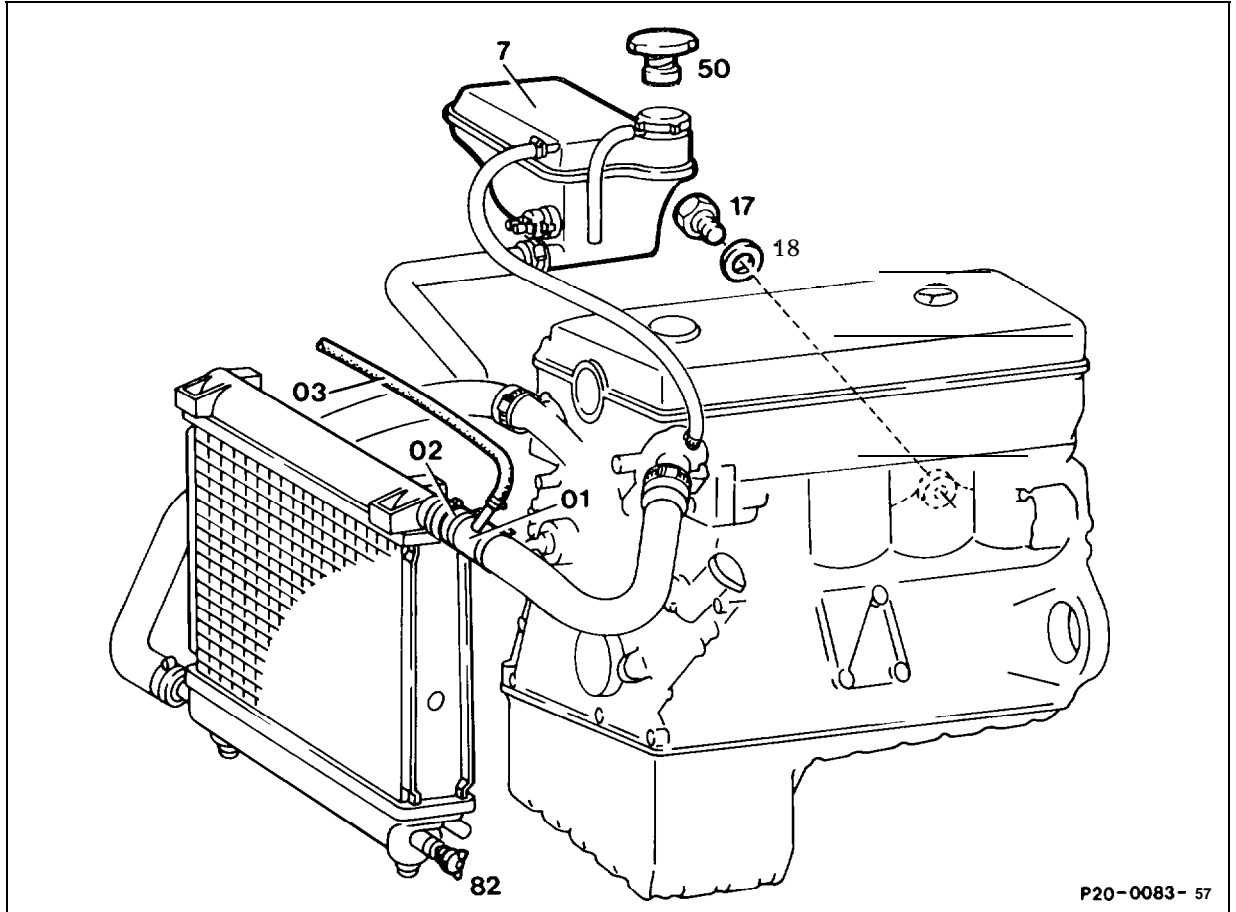


20-015 Cleaning, flushing engine cooling and heating system

Preceding work:

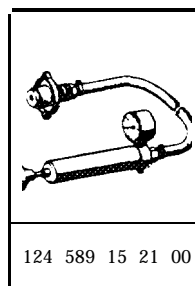
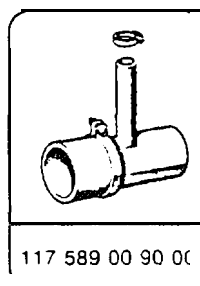
Bottom engine compartment panelling removed (01-006).

Coolant drained (20-010).



Coolant thermostat	.....	remove and install positive opening part No. 000 589 74 63 00, remove (step 1).
Flushing connection pipe (01)	.....	install and connect tap water hose (steps 2 and 3).
Cooling system	.....	flush (steps 4 to 20 and 22).
Coolant expansion tank (7)	.....	remove and install, flush out (step 21).
Cooling system	.....	check for leaks (20-017).

Special tools



Service products

Corrosion protection antifreeze agent	000 989 08 25
Citric acid powder (0.5 kg)	000 989 10 25

Note

High coolant temperatures and low heating capacity may also be caused among other things by deposits of corrosion products in the radiator or in the heat exchanger.

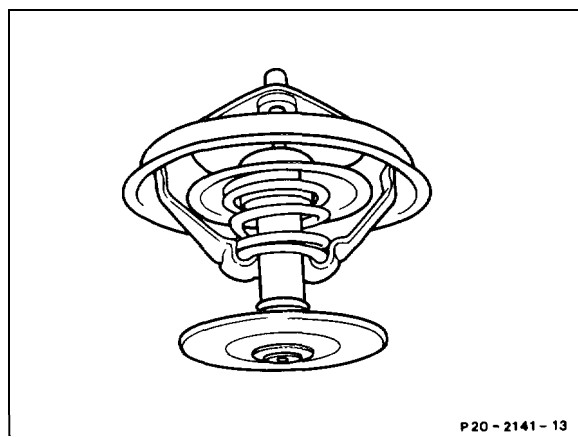
The deposits can be recognized from a gelly-like mass or, when the radiator is emptied and dry, from a grey layer on the radiator connection pipes.

In this case, the radiator and heating system should be cleaned with a 10% citric acid solution.

If the cooling pipes of the radiator are completely or partially blocked, the radiator must be renewed.

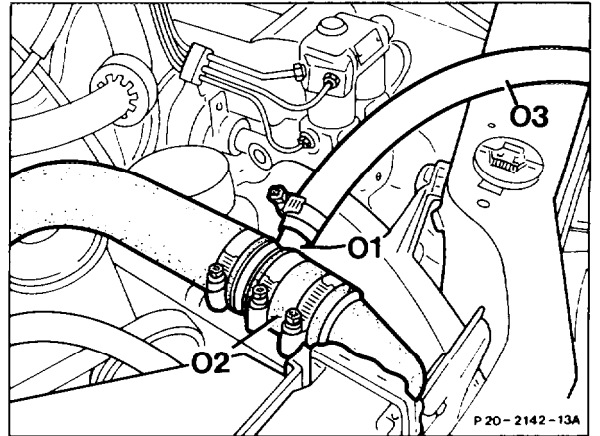
Scope of work

1 Remove coolant thermostat and install positive opening thermostat 000 589 74 63 00 with sealing ring.



2 Connect rinsing connection pipe (01)
117 589 00 90 00 with connection hose (02)
between radiator and coolant hose.

3 Connect a tap water hose (03) to the
flushing connection pipe (01).



4 Open pressure cap of expansion tank.

5 Set heater to "warm".

6 On vehicles with recirculation pump, switch
on recirculation pump.

This is done by switching on the ignition and:

- a) On vehicles with automatic heater control,
locking the temperature selectors to the
" Max" position.
- b) On vehicles with automatic climate control,
pressing the "Defrost" pushbutton.

7 Open vent valve of auxiliary heater.

8 Rinse cooling and heating system for approx.
5 minutes with flowing water and engine running
(approx. 2500 rpm) to flush out the remaining
coolant.



During the rinsing procedure, the cooling system
must always be completely filled.
Adjust feed quantity accordingly.

9 Allow flushing water in the radiator and
crankcase to drain out completely. Screw in
drain plugs (17 and 82).

10 Dissolve 1.5 kg citric acid powder (0.5 kg, Part No. 000 589 10 25) in approx. 5 liters of water in a suitable vessel.

11 Pour cleaning solution into the expansion tank and top up with water to the marking on the expansion tank.

12 Close bleeder screw of auxiliary heater.

13 Close pressure cap of expansion tank.

14 Run engine for 15 minutes at approx. 2500 rpm. The flushing liquid must flow through the heat exchanger when performing the step (step 6).

15 Following this, drain cleaning solution.



The cleaning solution (citric acid mixture) should be drained into a standard workshop oil and water separator.

16 Open bleeder screw of auxiliary heater.

17 Flush cooling and heating system for approx. 10 minutes with flowing water and engine running (2500 rpm). The flow must pass through the heat exchanger when performing the step (see steps 5 and 8).

18 Remove flushing connection pipe and connect coolant hose to radiator.

19 Install normal coolant thermostat with new seal.

20 Screw in coolant drain plug at radiator (82) and crankcase (17), renew seal (18).

21 Remove and install coolant expansion tank and flush out once again separately.

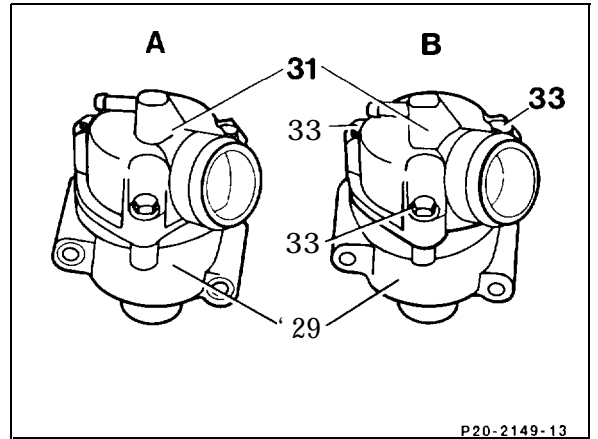
Note

Because of the pockets and recesses in the coolant expansion tank, not all of the solution is removed during draining.

22 On vehicles with auxiliary heater, connect plastic hose to vent valve and open valve.

23 Pour in new coolant (20-010)

24 Check cooling system for leaks (20-017).

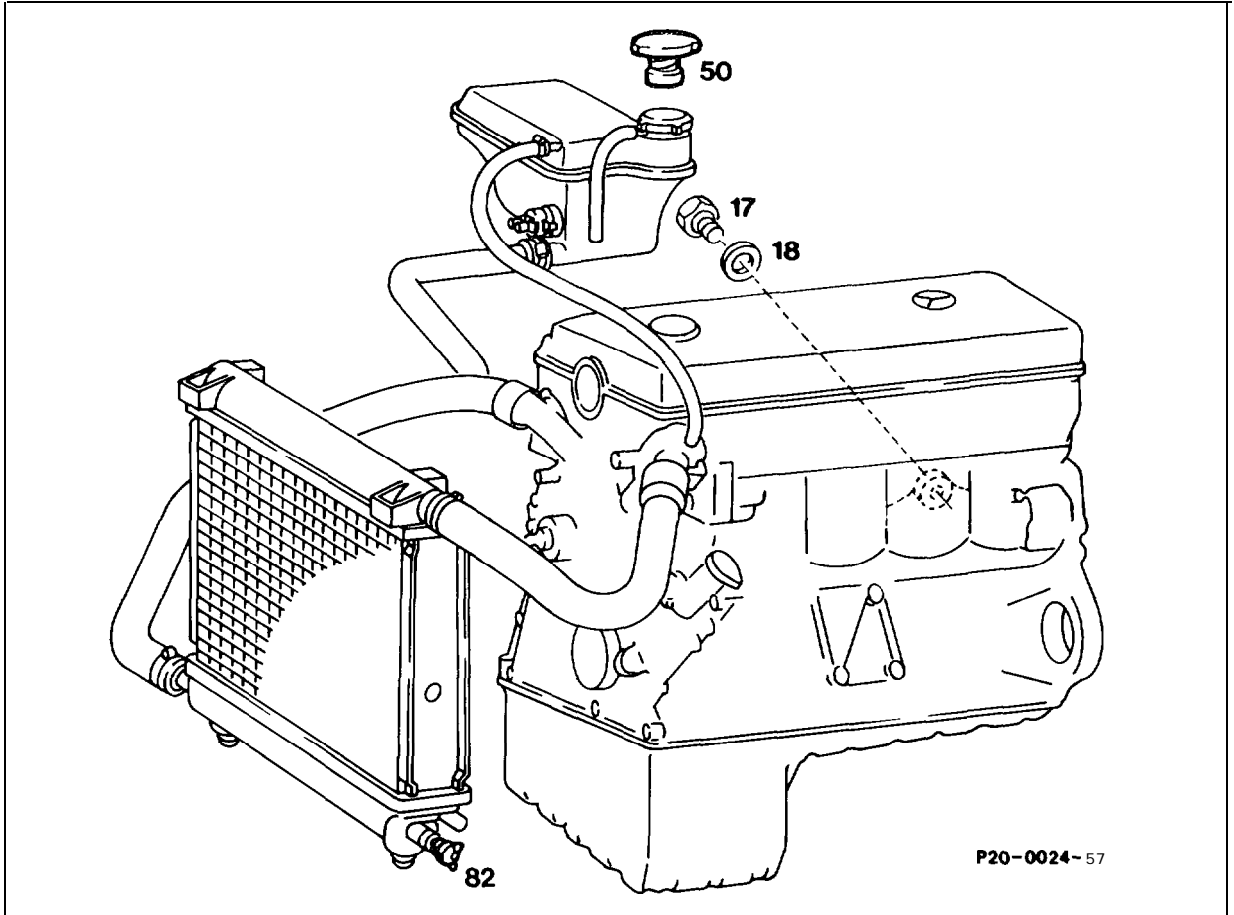


20-016 Removing oil from engine cooling and heating system

Preceding work:

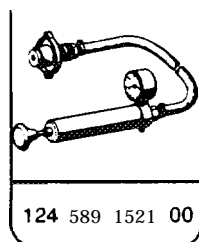
Engine coolant drained (20-0 10).

Engine coolant thermostat removed (20-I 10).



Heater controls	set to full capacity (step 1).
Engine cooling system	fill with a 5% solution (step 2).
Engine	raise to normal operating temperature and run for approx. 5 minutes (step 3).
Solution	drain flushing solution and fill engine cooling system twice with fresh water, run each time for approx. 5 minutes and drain completely (steps 5 and 6).
Engine cooling system	check for leaks (20-017).

Special tool



Removing oil

Note

It is necessary to remove oil from the engine cooling system if, for example, engine oil, gear oil in the case of an automatic transmission or hydraulic oil has got into the engine cooling system.

1 Set heater controls on vehicles with and without air conditioning to full capacity.

2 Fill the engine cooling system with a 5% solution of water and neutral cleaner or with a mild alkaline cleaner, e.g. **P3-Croni** (supplier: Henkel) or **Grisiron 7220** (supplier: Farbwerke Hoechst).

Caution!

Sharply alkaline cleaners, such as **P3 Standard** (supplier: Henkel) must not be used on these vehicles (light alloy radiator).

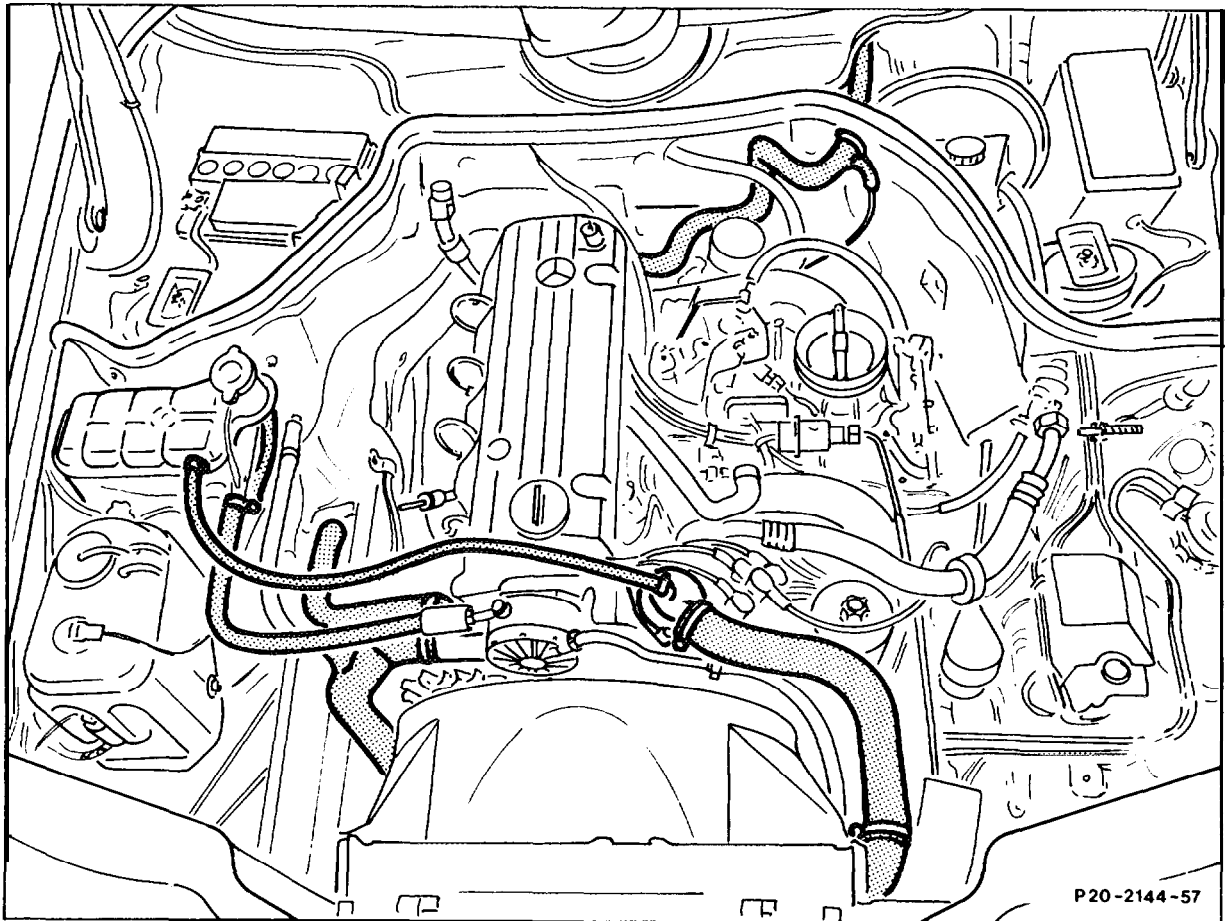
3 Warm up engine to approx. 80 °C at a moderate speed and maintain at this temperature for approx. 5 minutes.

4 Switch off engine and allow engine cooling system to cool down to approx. 50 °C.

5 Completely drain solution.

6 Immediately after this, fill engine cooling system twice with fresh water, run until warm (approx. 5 minutes) and drain.

20-017 Checking engine cooling system for leaks

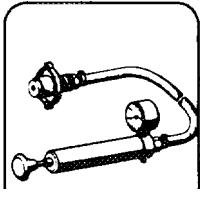


Pressure cap	turn to 1st detent to release pressure. Twist off to 2nd detent and remove (step 1).
Coolant level	check (step 2).
Tester	124 589 15 21 00, attach to expansion tank and pressurize engine cooling system to approx. 1.4 bar (step 3). Check all engine coolant and heater hoses and connection points for loss of engine coolant. Check condition of hose clips, tighten if necessary (step 4).

Note

The illustration shows connections which must be checked for leaks when pressure-testing the engine cooling system.

Special tool



124 589 15 21 00 |

Commercial tool

7 mm socket wrench hexagon on flexible shaft for hose clips with worm drive

e.g. Hazet, D-5630 Remscheid
Order No. 426-7

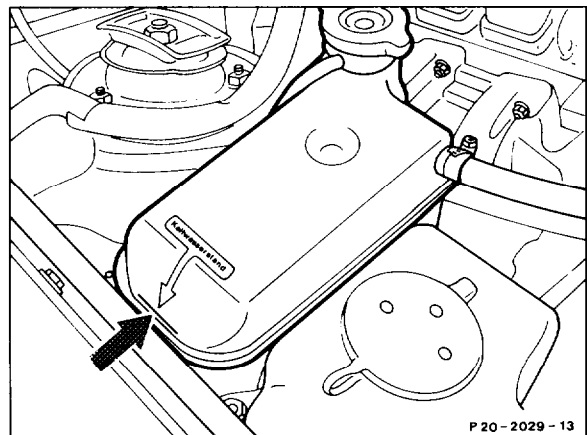
Checking leaktightness

1 Turn pressure cap to 1st detent and release system pressure. Then turn to 2nd detent and remove cap.

Warning!

Do not remove the pressure cap until enginecoolant temperature is below 90 °C.

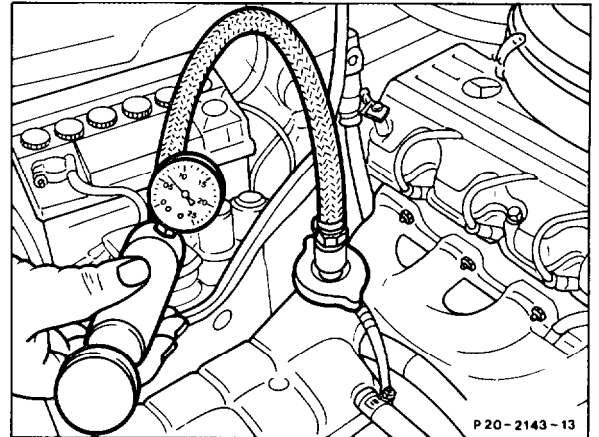
2 The engine coolant level must extend up to the marking on the expansion tank (arrow).



3 Pressurize engine cooling system to approx. 1.4 bar with the tester 124 589 15 21 00.

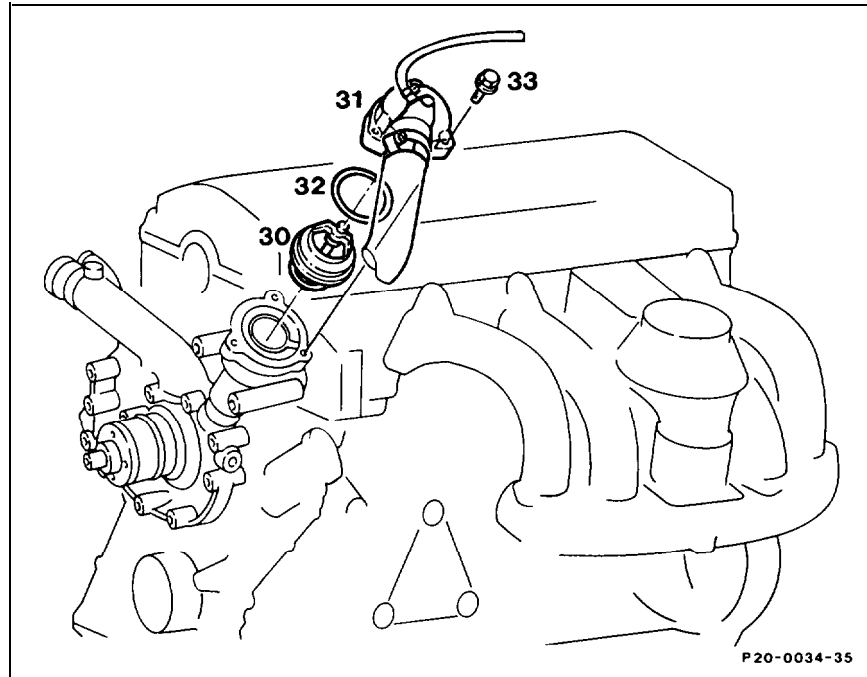
4 Check all engine cooling and heating water hoses and the connection points for loss of engine coolant.

Check condition of hose clips, replace or tighten as necessary.



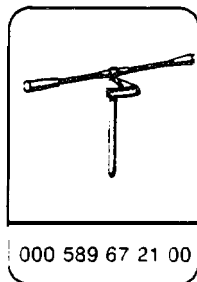
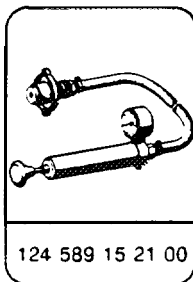
20-110 Removal and installation of engine coolant thermostat

Preceding work:
 Drain-fill in coolant (20-010).



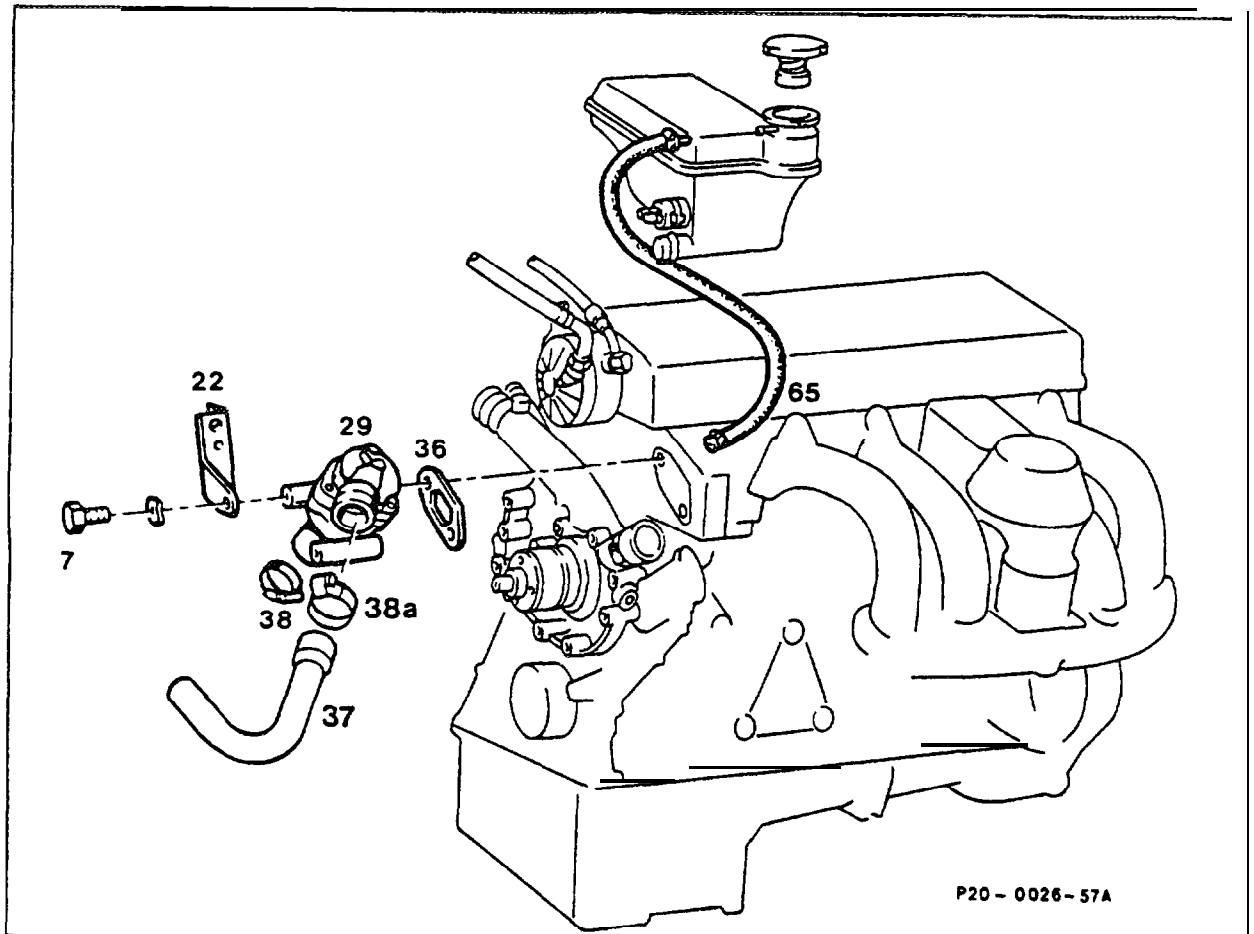
Cap (31)	unscrew with connected engine coolant hose, screw on, tightening torque for light alloy cap 10 Nm, plastic cap 8 Nm.
O-ring (32)	replace.
Engine coolant thermostat (30)	remove and install.
	Note Install the engine coolant thermostat so that the ball valve is at the highest point.
Engine cooling system	check for leaks (20-017).

Special tools



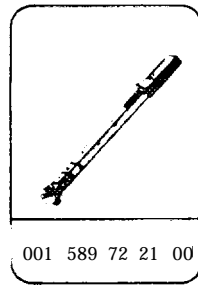
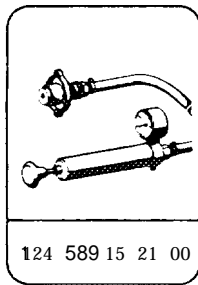
20-I 15 Removal and installation of engine coolant thermostat housing

Preceding work:
 Drain – fill in coolant (20-010).



Vent line (65)	disconnect, connect (step 2).
Lifting lug (22)	unbolt, bolt on. Tightening torque 25 Nm (step 3).
Hose clip (38, 38a)	at top of bypass hose, loosen, tighten (step 4).
Engine coolant thermostat housing (29)	unbolt, bolt on. Tightening torque 25 Nm (step 5).
Gasket (36)	replace (step 6).
Engine cooling system	check for leaks (20-017).

Special tools



Commercial tool

7 mm socket wrench hexagon on flexible shaft for hose clips with worm drive

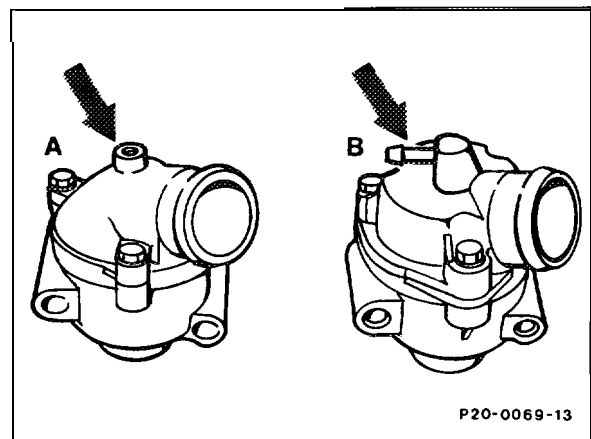
e.g. Hazet, D-5630 Remschetd
Order No. 426-7

Note

Since January 1985, Model 201 has been equipped with a plastic engine coolant thermostat housing.

The gasket to the cylinder head is manufactured from rubberized cork.

The vent line is pushed on with a hose clip; previously with hollow bolt (arrow).

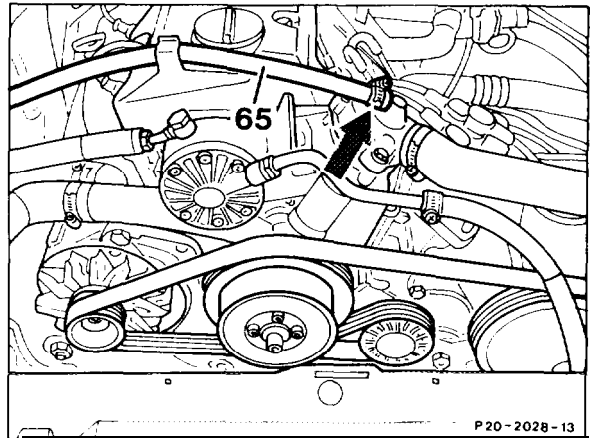


A 1st version
B 2nd version

Removal and installation

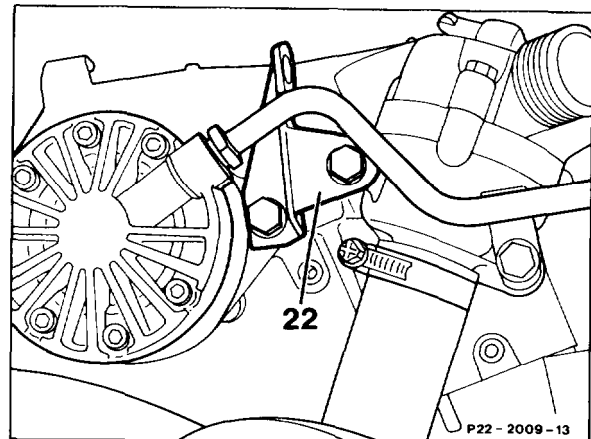
1 Draining – adding engine coolant (20-010).

2 Detach vent line (65) at the cap of the engine coolant thermostat housing, connect (arrow).

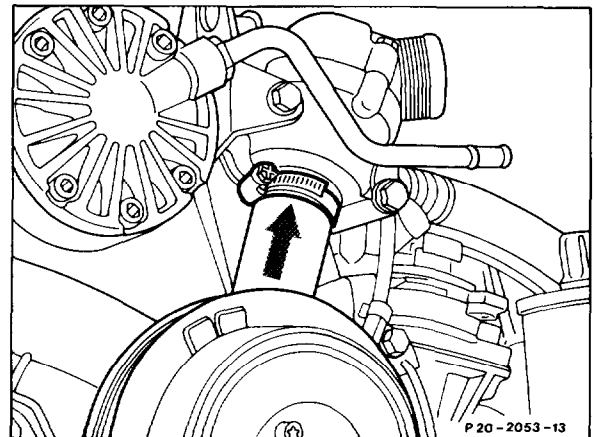


3 Unbolt lifting lug (22, only on engines with hydraulic oil pump), bolt on.

Tightening torque 25 Nm.



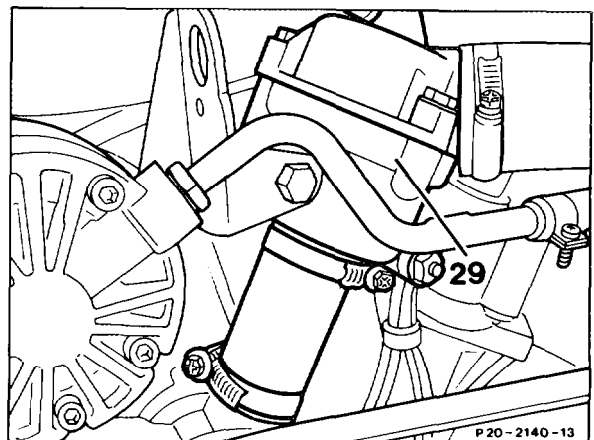
4 Loosen hose clip (arrow) at bypass hose, tighten.



5 Unbolt engine coolant thermostat housing (29), bolt on. Tightening torque 25 Nm.

6 Clean sealing surfaces, replace gasket.

7 Check engine cooling system for leaks (20-017).

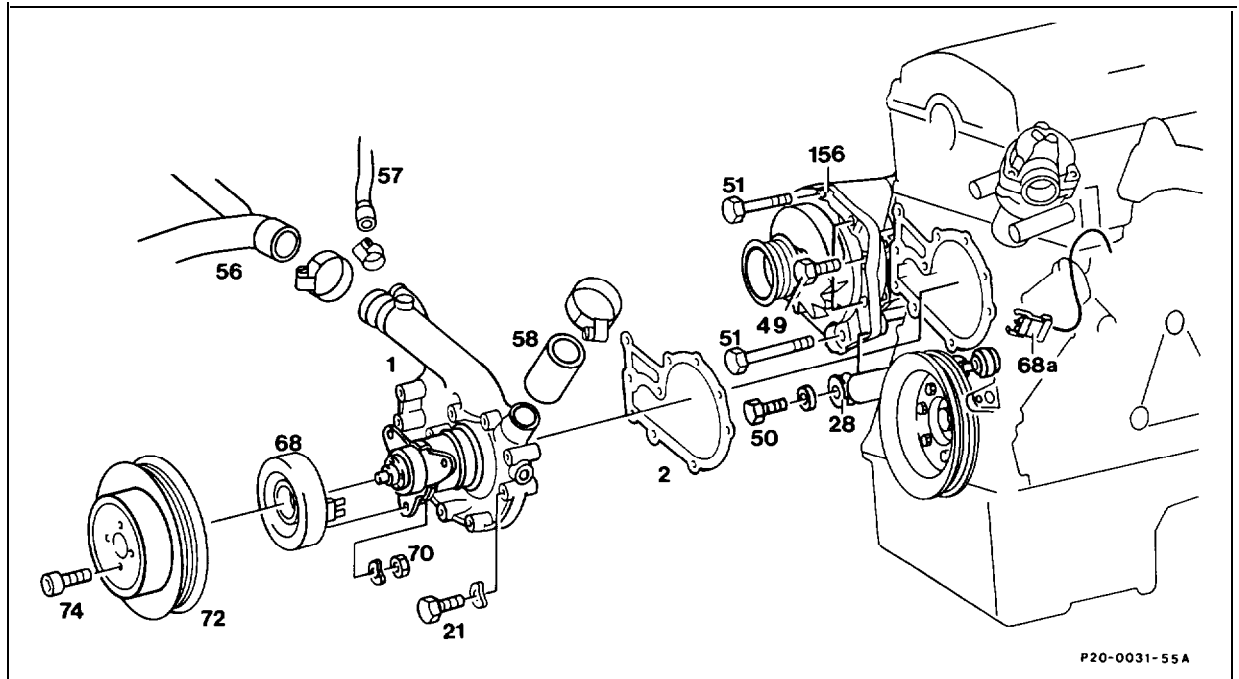


20-210 Removal and installation of engine coolant pump

Preceding work:

Draining—adding engine coolant (20-010).

Removal and installation of V-belt (13-342).



Belt pulley (72)	unbolt, bolt on, tightening torque of hex. socket bolt 10 Nm, Torx socket bolt 15 Nm (step 3).
Cable connector (68a)	detach from solenoid body, plug in (step 4).
Solenoid body	unbolt, bolt on, pay attention to installed position, tightening torque 10 Nm reference value (step 4).
Engine coolant hoses (56, 57 and 58)	detach, attach (step 5).
Bolt (50)	for shock absorber (28), unbolt, bolt on, tightening torque 25 Nm (step 6).
Bolts (51)	unbolt, bolt on. Place alternator with connected cable to the side (step 7).
Bracket (156)	detach, attach by removing bolts (49, 3 off), bolting on, tightening torque 25 Nm.

Coolant pump (1)

unbolt, bolt on, pay attention to bolt length, tightening torque 10 Nm. Clean sealing surfaces (step 10).

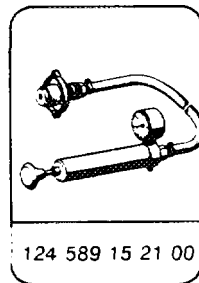
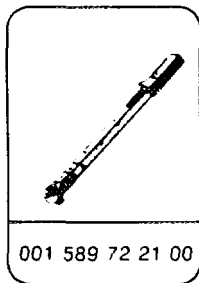
Note

Only use paper gasket 102 201 00 80 (2) if the timing case cover is sealed with liquid sealant. Otherwise seal engine coolant pump with sealant 002 589 00 20 10.

Engine cooling system

check for leaks (20-017).

Special tools



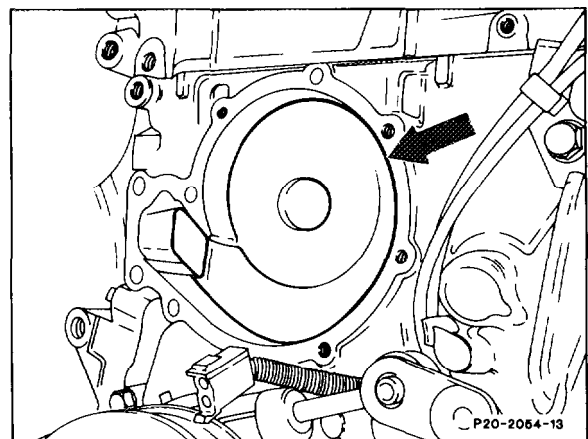
Commercial tool

7 mm wrench socket on flexible shaft for hose clips with worm drive

e.g. Hazet, D-5630 Remscheid
Order No. 426-7

Note

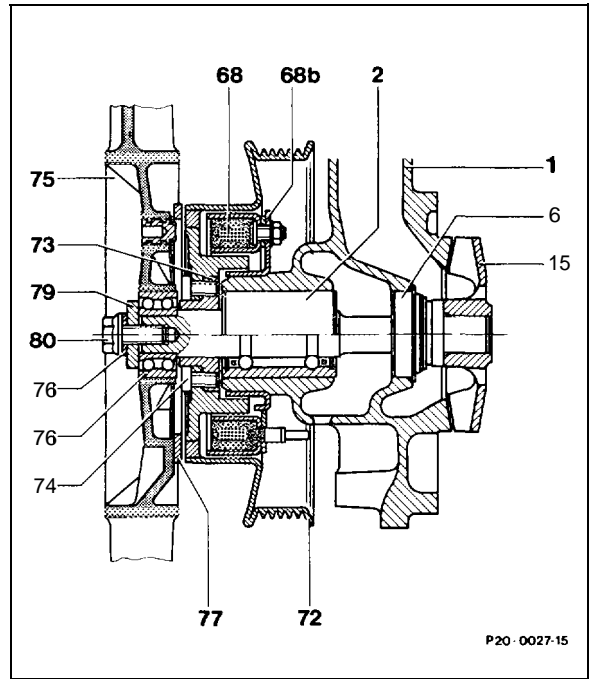
The pump chamber for the impeller of the engine coolant pump is located in the timing case cover (arrow).



Components

The bearing (2) of the engine coolant pump shaft and the cassette-type seal (6) are press-fit into the engine coolant pump housing.

- 1 Engine coolant pump housing
- 2 Engine coolant pump bearing
- 6 Cassette-type mechanical seal
- 15 Impeller
- 68 Solenoid body
- 68b Carrier
- 72 Belt pulley
- 73 Flange
- 74 Fastening bolts
- 75 Fan
- 76 Angular-contact ball bearing
- 77 Armature
- 78 Tensioning pulley
- 79 Pulley
- 80 Fastening bolt



P20-0027-15

To achieve added safety for the fastening bolts of the belt pulley at the engine coolant pump, M6 × 12 Torx bolts (previously M6 × 12 hex. socket bolts) are installed. Tightening torque 15 Nm.

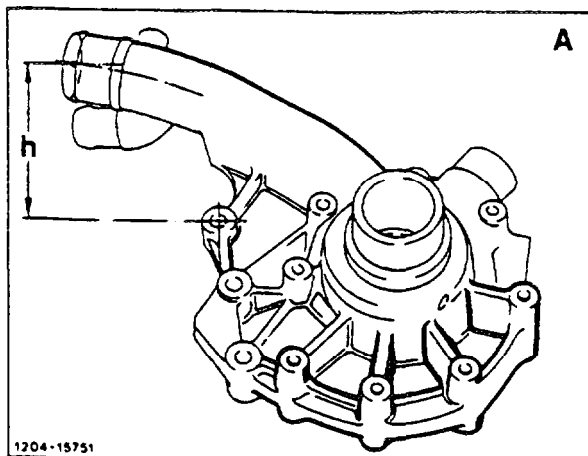
Produktion breakpoint: September 1985

Model	Engine	Engine end No.	
		Man. trm.	Autom. trm.
201.024 (USA)	102.985	002692	023655

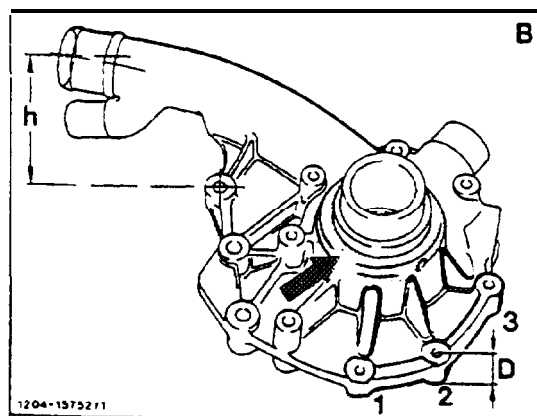
The engine coolant pump housing had to be modified with implementation of the top damper point of the belt tensioning device.

Modifications:

- a) Mounting eyes (Fig. B, 1, 2, 3) on engine coolant pump housing lowered, size "D" 18.4 mm (previously 42.4 mm), matching M6 × 30 bolt + washer assys (previously M6 × 55). This creates clearance for top shock absorber of belt tensioning device (P 13123).



- b) Engine coolant inlet connection lowered, size "h" = 90.5 mm (previously 100.5 mm).
- c) Housing wall strengthened in transition area from hub to housing flange (Fig. B, arrow).
- d) Bottom coolant hose (radiator to engine coolant pump) modified.
Identification: Modified Part No. on coolant hose.



Bottom coolant hose

Model 124	Part No.
Manual transmission	124 501 38 82
Automatic transmission	124 501 40 82
Automatic air conditioning	124 501 39 82

Model 201

Model	Version	Transmission		Air conditioning	Part No.
		manual	automatic		
201.028	USA			x	201 501 66 82

Temporary installation of a cassette-type mechanical seal with modified material (silicone carbide, previously ceramic).

Identification:
Red dot on coolant pump housing.

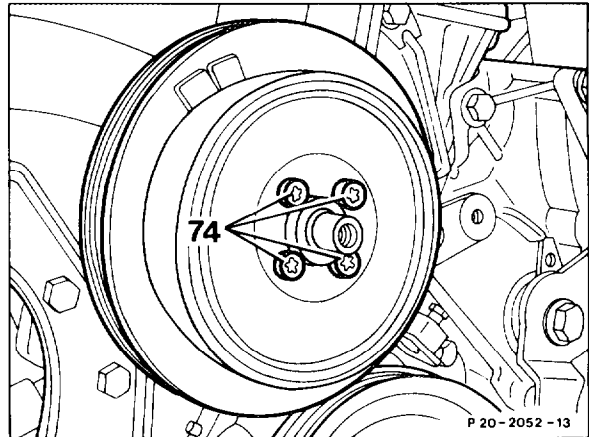
Removal and installation

- 1 Drain engine coolant, fill (20-010).
- 2 Remove and install V-belt (13-342).
- 3 Unbolt belt pulley for engine coolant pump.

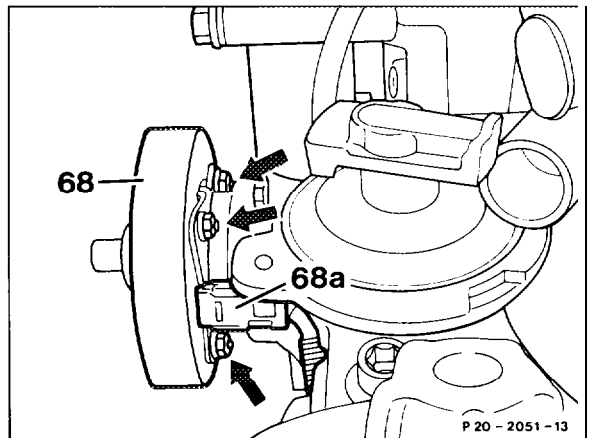
Note

Pay attention to bolt versions and tightening torques.

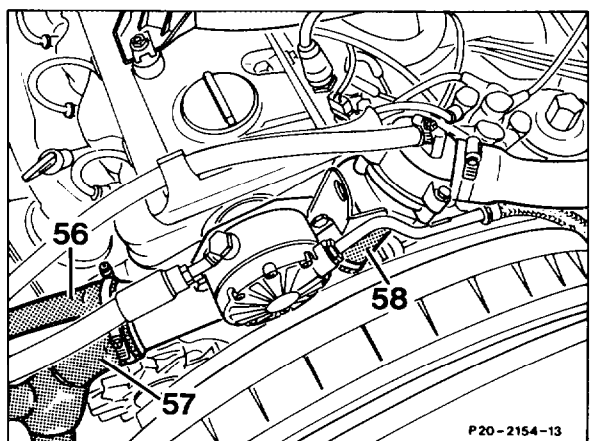
Hex. socket bolts	10 Nm
Torx socket bolts (as of 9/85)	15 Nm



- 4 Disconnect cable connector (68a), plug in, unbolt solenoid body (68), bolt on (arrows).



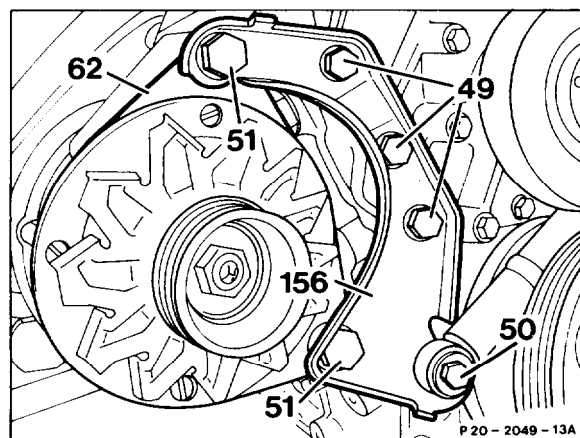
- 5 Detach engine coolant hoses (56 and 57) as well as bypass line (58), connect.



6 Remove bolt (50) for shock absorber of belt tensioning device, bolt on, tightening torque 25 Nm.

7 Unscrew bolts (51) and place alternator to the side.
Tightening torque 45 Nm.

8 Unscrew bracket (156), screw on, tightening torque 25 Nm. For this step, remove bolts (49, 3 off), screw on, tightening torque 25 Nm.



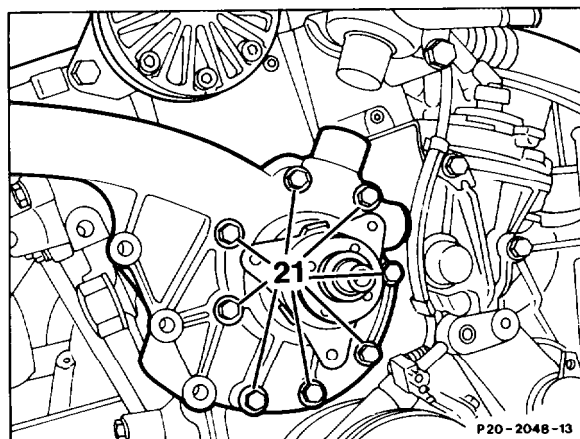
9 Detach engine coolant pump, attach. For this step, remove bolts (21), bolt in, tightening torque 10 Nm. Pay attention to bolt length.

10 Clean sealing surfaces.

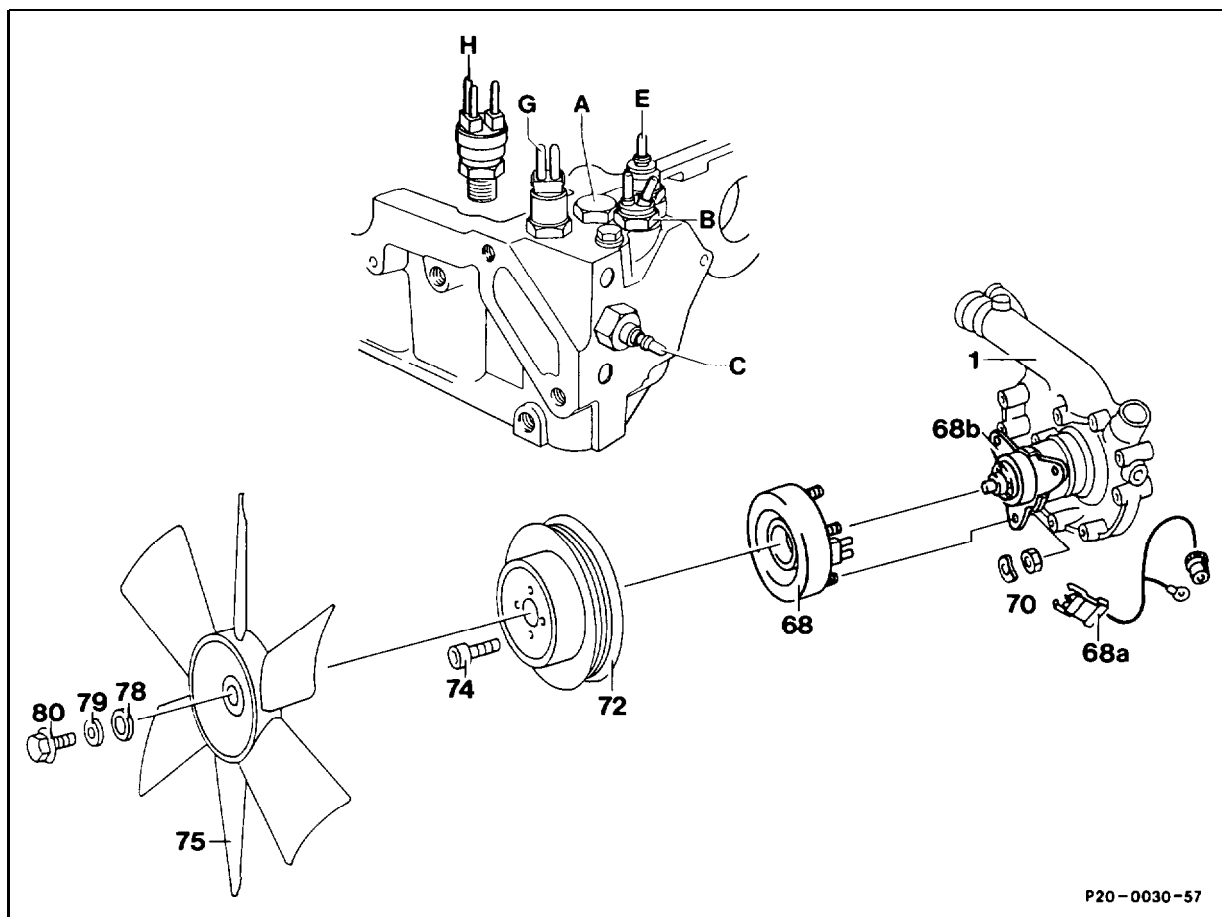
Note

A paper gasket Part No. 102 201 00 80 is supplied in the parts sector as a seal of the engine coolant pump at the timing case cover. This gasket may only be installed if it is assured that the timing case cover is sealed only with liquid sealant. Otherwise use sealant 002 589 00 20 10.

11 Check engine cooling system for leaks (20-017).



20-330 Solenoid fan coupling



- | | |
|-----|---|
| 1 | Engine coolant pump |
| 66 | Solenoid body |
| 66a | Connector with cable for solenoid body |
| 66b | Carrier for solenoid body |
| 72 | Belt pulley with steel ring insert |
| 74 | socket bolt or M6 x 12 Torx bolt M6 x 12 hex. |

- | | |
|----|---|
| 75 | Fan with armature ring |
| 78 | Spacer disk |
| 79 | Tensioning disk |
| 80 | Collar bolt |
| G | Temperature switch for solenoid fan coupling, red 100 °C |
| H | Temperature switch for solenoid fan coupling and 2-stage auxiliary fan, 110 °C, red for air conditioning or automatic climate control |

General

The engines have a temperature-controlled electromagnetic fan coupling.

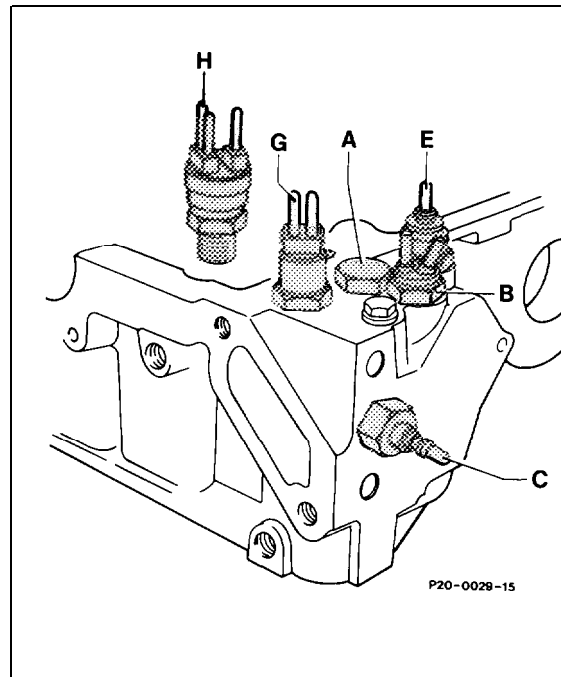
It is engaged or disengaged by a temperature switch (100 °C, G) inserted into the sensor box on the cylinder head.

The same function is performed on vehicles with air conditioning system or automatic climate control by a 110 °C temperature switch (H).

The electromagnetic fan coupling is maintenance-free.

Fan

The fan (75) is mounted on a stud on the engine coolant pump bearing and is attached by a collar bolt (86).



Matching

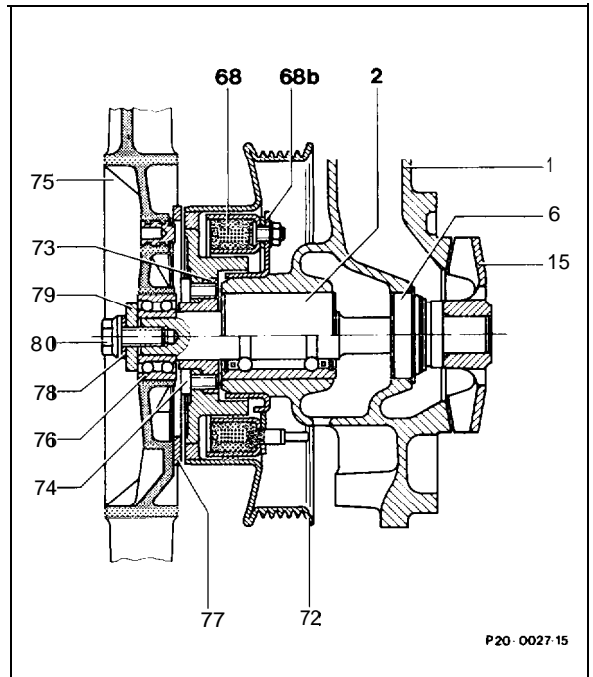
Model	Engine	Air conditioning/ Automatic climate control		Fan dia.	No. of blades	Capacity %
		with	without			
201	102.961		x	380	6	100
		x		430	5	100
	102.985	Man. transmission	x	380	6	100
		Autom. transmission	x	430	5	100
		x		430	5	100

Design of electromagnetic fan coupling

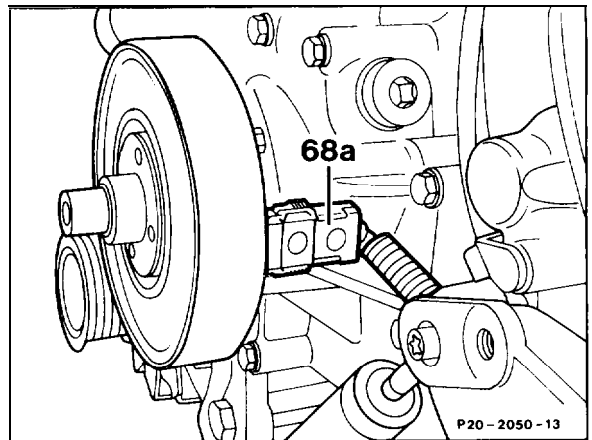
The solenoid body (68) is attached to the solenoid carrier (68b) by 3 nuts (70).

The solenoid carrier is bonded to the engine coolant pump housing.

- 1 Engine coolant pump housing
- 2 Engine coolant pump bearing
- 6 Cassette-type mechanical seal
- 15 Impeller
- 68 Solenoid body
- 68b Carrier
- 72 Belt pulley
- 73 Flange
- 74 Fastening bolts
- 75 Fan
- 76 Angular-contact ball bearing
- 77 Armature
- 78 Tensioning pulley
- 79 Pulley
- 80 Fastening bolt

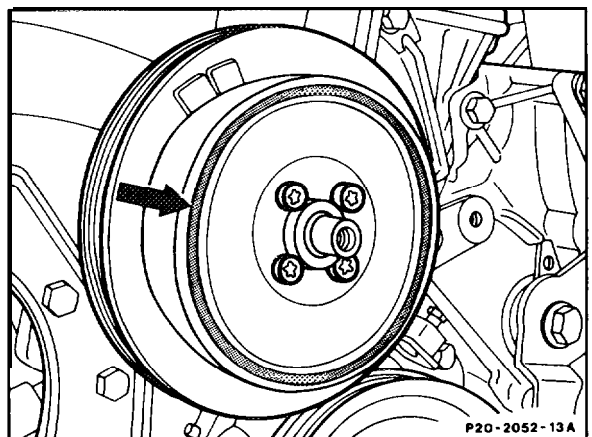


The electric cable is connected to the solenoid body by a connector (68a).

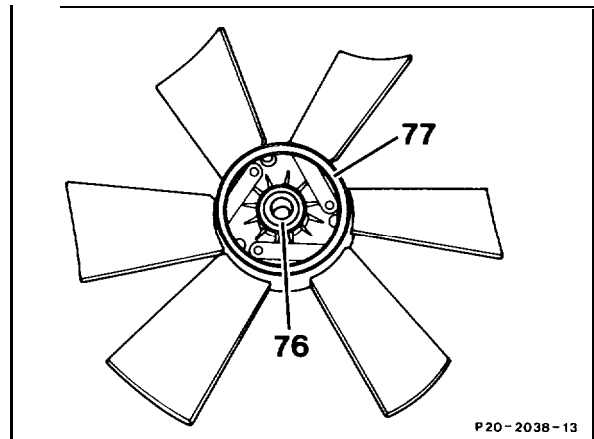


The belt pulley is located on the engine coolant pump shafts ahead of the solenoid body.

A steel ring is inserted in the belt pulley which attracts the armature ring on the fan when the fan coupling is engaged (arrow).



The armature ring (77) and the angular-contact roller bearing (76) are installed on or in the fan, respectively.



Function

The fan is engaged only when the ignition is switched on and at a engine coolant temperature above 98-102 °C.

A constant positive exists at the solenoid body (68).

Below a engine coolant temperature of 98-102 °C, the fan is switched off and only rotates as a result of the airstream or as a result of the bearing friction.

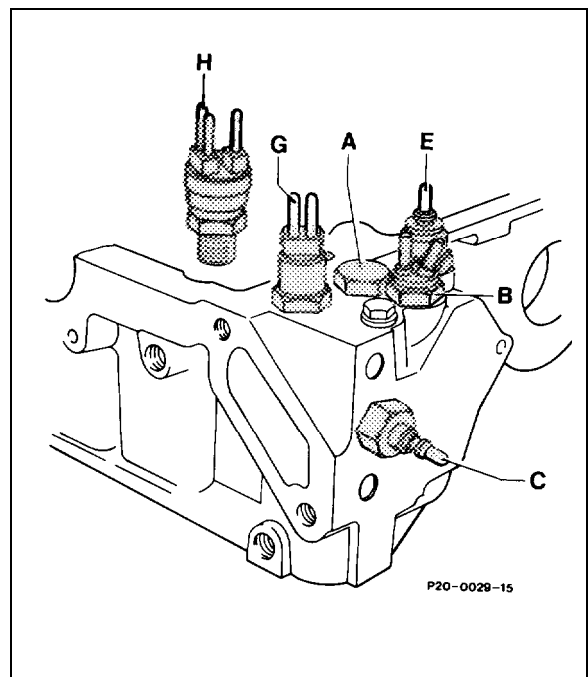
Minus is engaged at a engine coolant temperature of not more than 102 °C through the temperature switch (G or H) at the sensor box.

The armature (76) is attracted by the solenoid body (68) and presses against the end face of the belt pulley.

The fan is now rigidly connected to the belt pulley and rotates in line with the engine coolant pump speed.

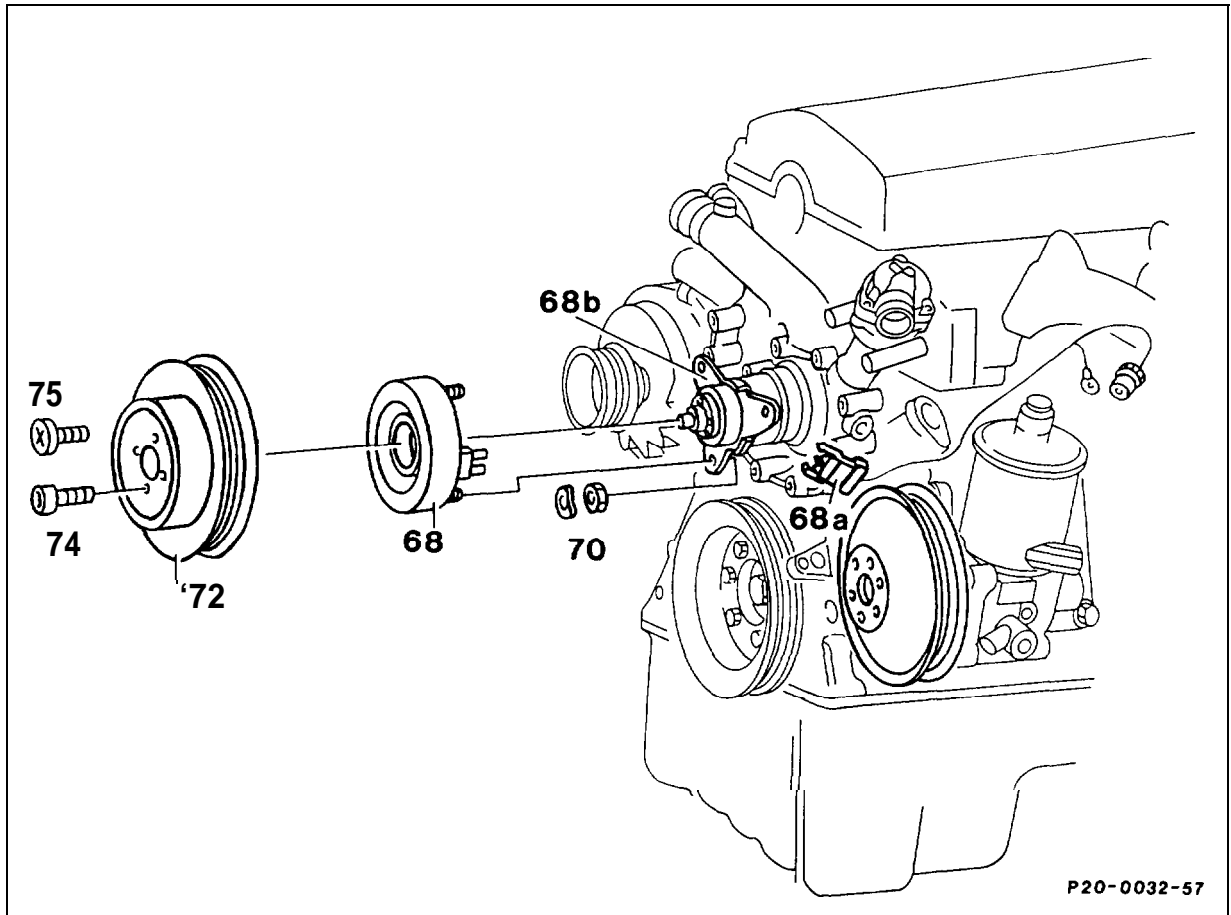
If the engine coolant temperature drops below 93-98 °C, the temperature switch opens and the armature (76) is lifted off the belt pulley by the leaf springs.

On vehicles equipped with automatic air conditioning, the fan and the electric auxiliary fan are engaged by a double-contact relay which is activated by the triple temperature switch (H).



20-335 Removal and installation of solenoid fan coupling

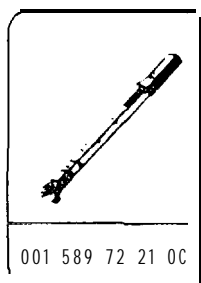
Preceding work:
Removing and installing V-belt (13-342).



Belt pulley (72)	unbolt, bolt on, tightening torque hex. socket bolts 10 Nm, hex. Torx bolt 15 Nm (step 2).
Cable connector (68a)	detach from solenoid body, plug in (step 3).
Solenoid body (68)	unbolt, bolt on, pay attention to installed position, tightening torque 10 Nm (reference value, step 4).

Note
The carrier (68b) for the solenoid body is bonded to the engine coolant pump, do not pull off. Stick on loose carriers with adhesive 001 989 47 20.

Special tool



Note

Hex. Torx bolts (M6 × 12) are fitted instead of hex. socket bolts to achieve greater security against slackening or fracturing of the belt pulley fastening bolts.

Standard implementation: September 1985

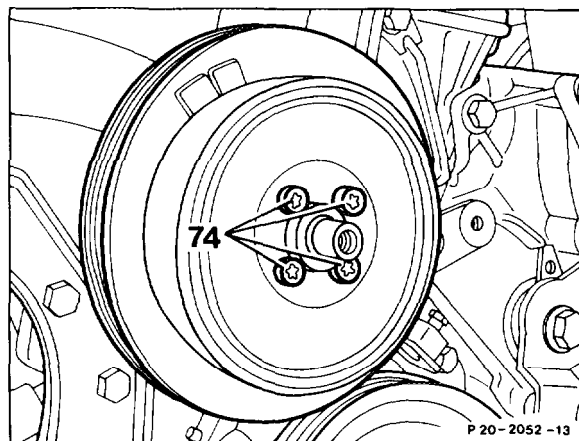
Model	Engine	Engine end No.	
		Man. trm.	Autom. trm.
201.028 (USA)	102.985	002692	023655

Removal and installation

- 1 Remove and install V-belt (13-342).
- 2 Unbolt belt pulley for **engine coolant pump**, bolt on.

Tightening torques:

Hex. socket bolts	10 Nm
Hex. Torx bolts	15 Nm

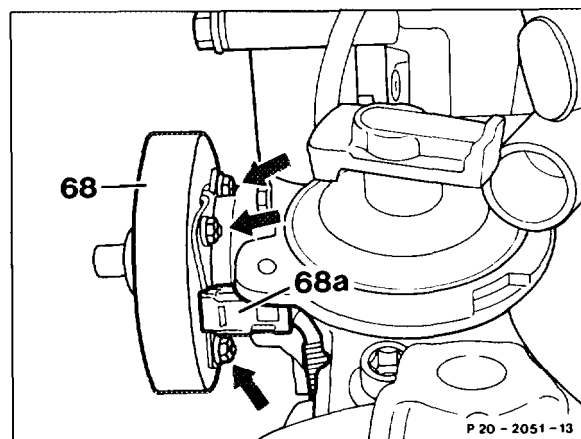


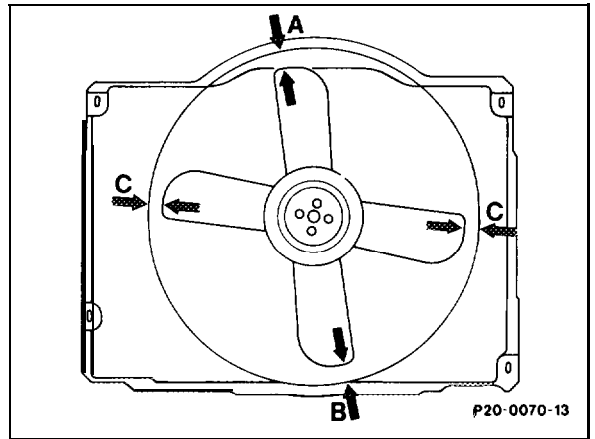
3 Detach cable connector (68a) from solenoid body, plug in.

4 Unbolt solenoid body (68), bolt on, pay attention to installed position, tightening torque 10 Nm (reference value).

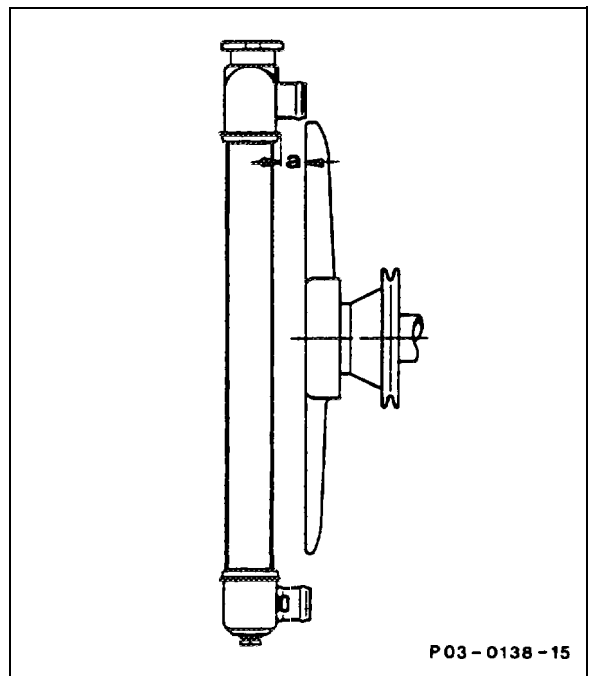
Note

The carrier for the solenoid body is bonded to the engine coolant pump housing. Attach loose carrier with adhesive 001 989 47 20.





Fan cowl/Fan



Radiator/Fan

Installation measure for radiator, fan and fan cowl

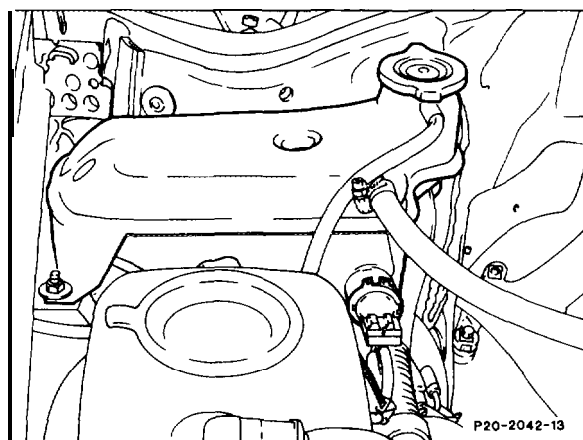
Model	Engine	Distance "a" from fan to radiator, approx. mm	Distance from fan to cowl, approx. mm		
			A	B	C
201.024	102.961	36	22	28	20
201.028	102.985				

1) Fan cowl 1 24 500 05 55 (2nd version) on vehicles with manual transmission.

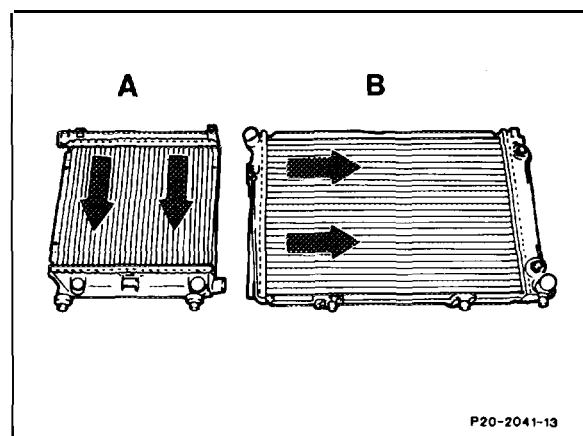
Radiator expansion tank

The expansion tank is attached to the right wheelhouse.

Different radiators are installed depending on the vehicle equipment.

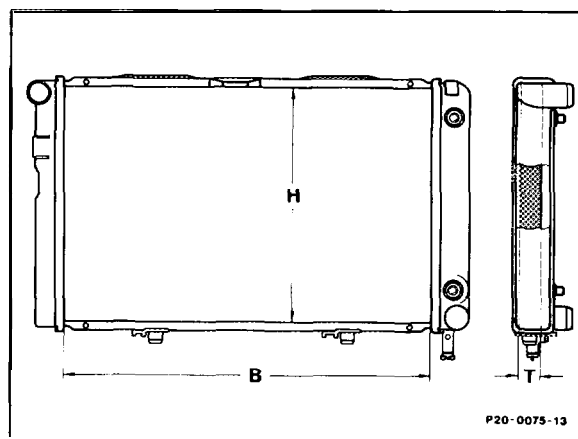


On vehicles with air conditioning, automatic climate control, crossflow radiators (B), arrows, are installed.



Radiator with air conditioning, automatic climate control

Radiator block:: Width „B” = 410 mm
 Height „H” = 388 mm
 Depth „T” = 42 mm



Fan cowl

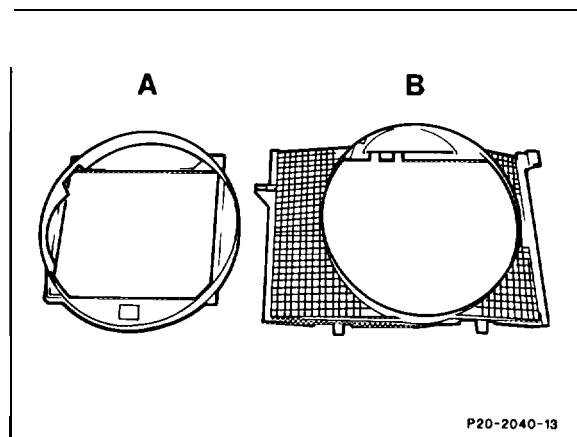
There are different fan cowl versions depending on the various radiator design.

Version "A"

On vehicles without air conditioning (narrow radiator non-USA vehicles).

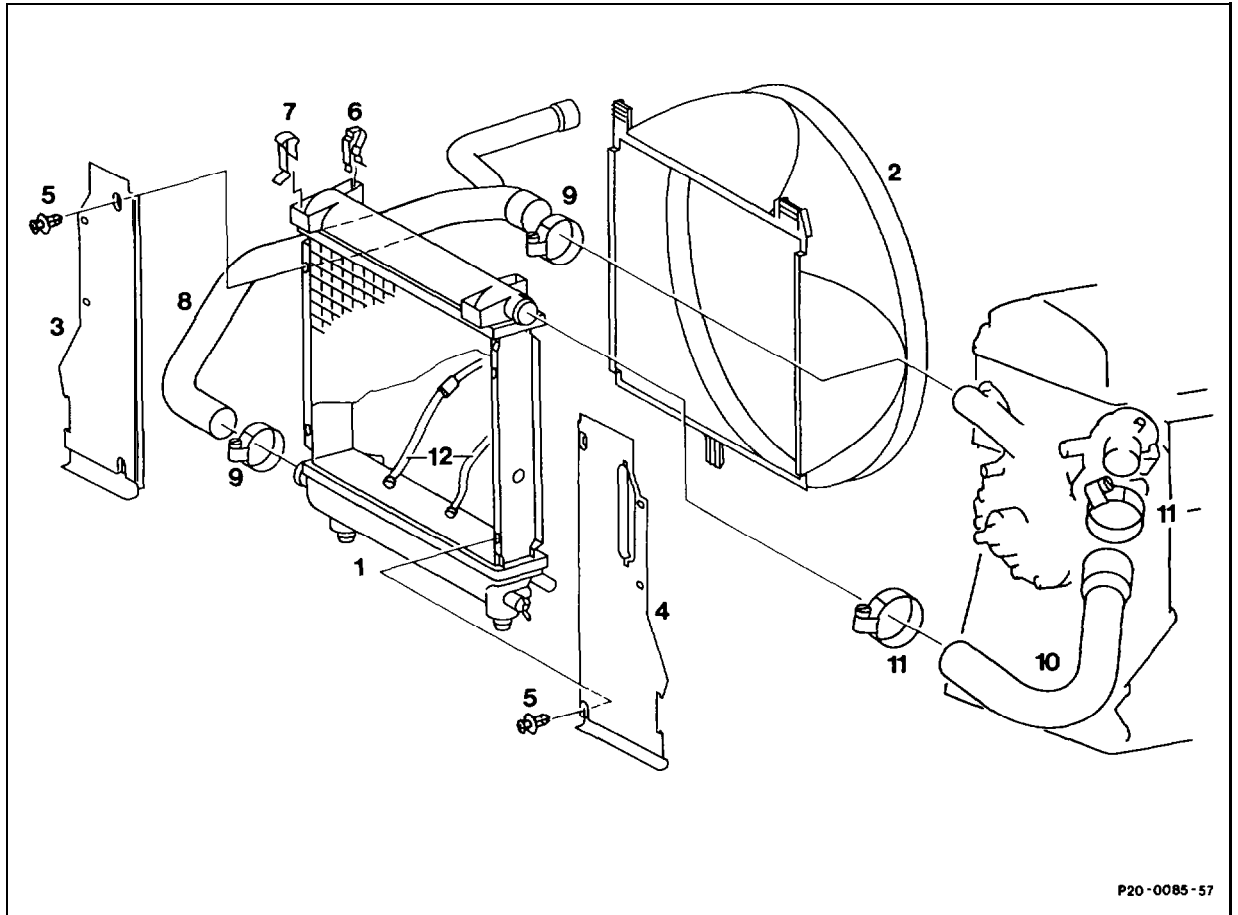
Version "B"

On vehicles with air conditioning (wide radiator).



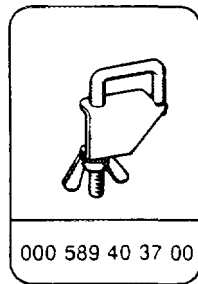
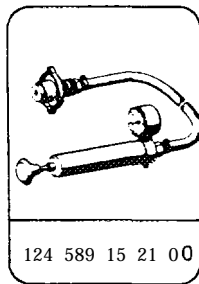
20-420 Removal and installation of radiator

Preceding work.
Draining and adding coolant (20-101).



Engine coolant hose (8 and 10)	at radiator, detach, attach (step 1).
Fan cowl (2)	detach and place over fan (step 2).
Clip (5)	on vehicles without air conditioning, remove, install (step 3).
Transmission oil lines (12)	on vehicles with automatic transmission, detach, attach. Pinch lines with clamp 000 589 51 21 00 (step 4).
Retaining clips (7)	remove and install and lift out, insert radiator (step 5).
Engine cooling system	check for leaks (20-017).
Oil level	in automatic transmission, adjust to correct level (Op. No. 27-010).

Special tools

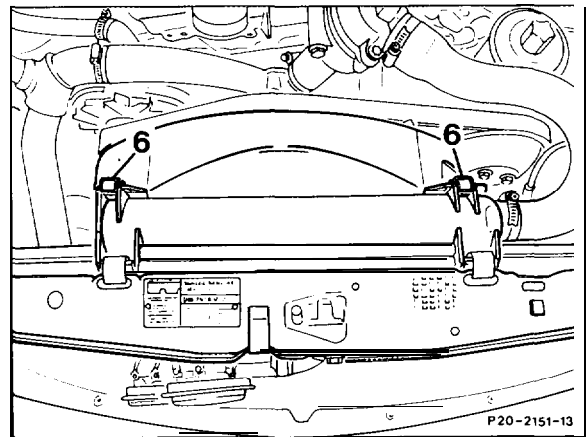


Commercial tool

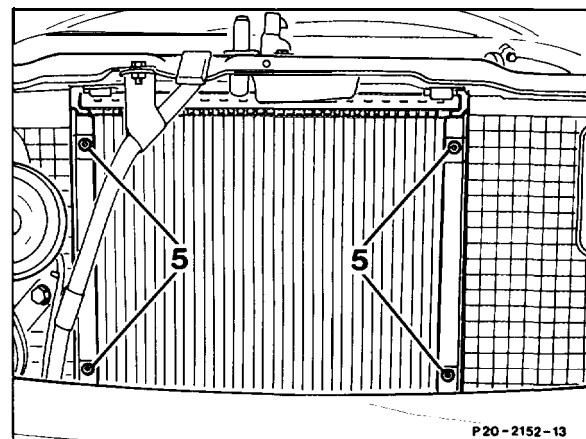
7 mm wrench socket on flexible shaft for hose clips with worm drive

e.g. Hazet, D-5630 Remscheid
Order No. 426-7

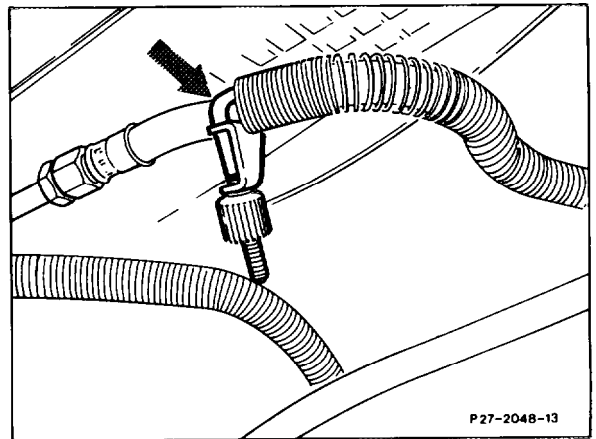
- 1 Detach engine coolant hoses at radiator, attach.
- 2 Pull off clips (6), install and place fan cowl over fan.



- 3 On vehicles without air conditioning/ automatic climate control, remove clips (5) on front of radiator, insert.



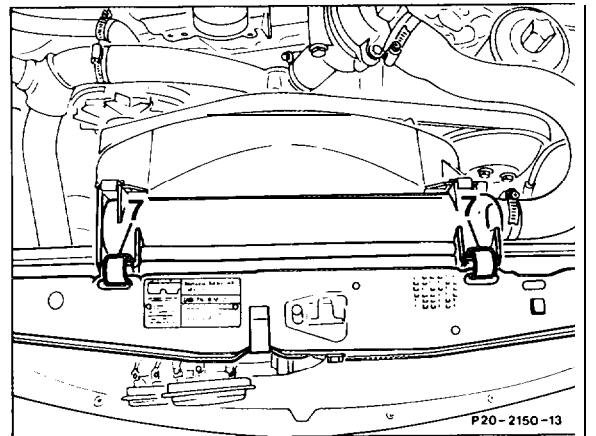
4 On vehicles with automatic transmission, detach oil cooler lines, attach, pinch with the clamps 000 589 40 37 00.



5 Remove retaining clips (7) for radiator, fit on and lift out, insert radiator.

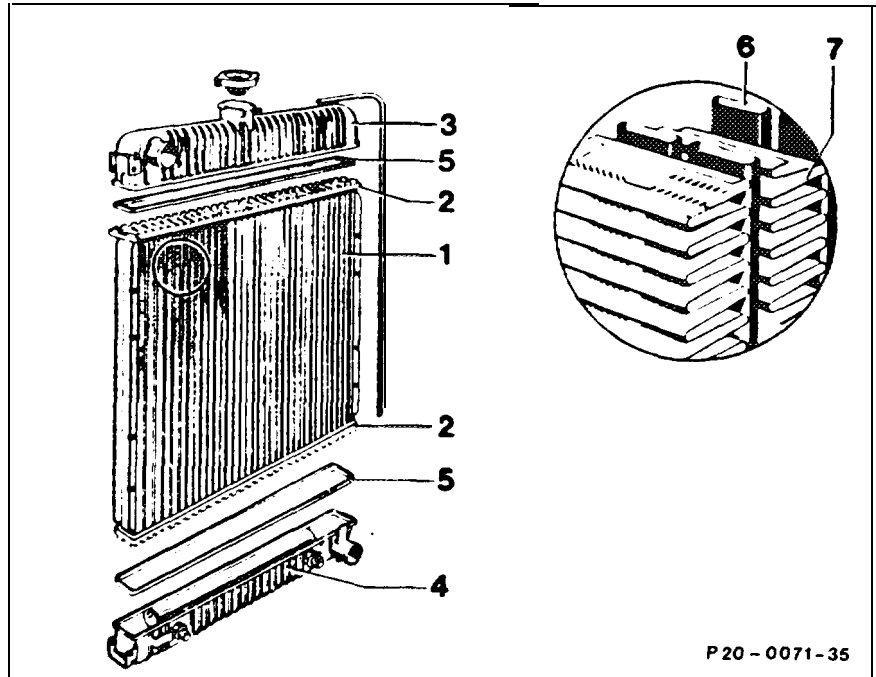
6 Check engine cooling system for leaks (20-017).

7 Adjust oil level in automatic transmission to correct level (27-010).

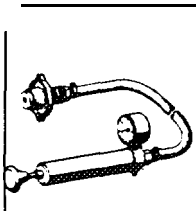


20-425 Repairing radiator

- 1 Radiator honeycomb
- 2 Tube bottom
- 3 Top water tank
- 4 Bottom water tank
- 5 Gasket
- 6 Cooling tubes
- 7 Fins



Special tool



124 589 15 21 00

Commercial tool

7 mm wrench socket with flexible shaft for hose clips with worm drive

e.g. Hazet, D-5630 Remscheid
Order No. 426-7

Note
Light alloy radiators with plastic water tanks cannot be repaired by soldering.

The different sealing compound versions and the priming liquid are combined in a repair kit, Part No. 123 989 00 20.

Because of the different access possibilities to the radiator (e.g. more difficult in the honeycomb than at the water tank), sealing compounds are available in diluted and undiluted form.

Designation	Application
Priming liquid	Preparation of primer
Undiluted sealing compound	For sealing easily accessible points
Diluted sealing compound	For sealing difficult-to-reach points (e.g. on side of cooling tubes)

Sealing compound and priming liquid can be kept for approx. 1 year provided they are always sealed airtight after use.

Fractured or torn fastening straps, tears at the connection fittings or splintering cannot be repaired.

Priming liquid which has become cloudy should not be reused.

On heavy metal radiators with plastic water tanks, soldering may be performed on the honeycomb only up to a distance of 20 mm from the water tank otherwise the gasket (5) and the water tank (3 and 4) will be damaged as a result of the high soldering temperature. Leaks which are closer to the water tank, should be sealed only with the sealing compound.

The following individual parts or points in the coolant circuit can be sealed with the sealing compound:

- a) Plastic water tanks (3 and 4).
- b) Heavy metal water tanks (holes up to 1.5 mm dia.).
- c) Light and heavy metal cooling tubes (6).
- d) Tube bottom (2).
- e) Beaded collar (connection point between radiator honeycomb and water tank).
- f) Heat exchanger of heater system.

It is not necessary to remove the radiator for sealing. In this case, it is sufficient to drain the coolant and after sealing the cooling system, to pressure-test with the tester (1.0-1.2 bar gauge pressure).

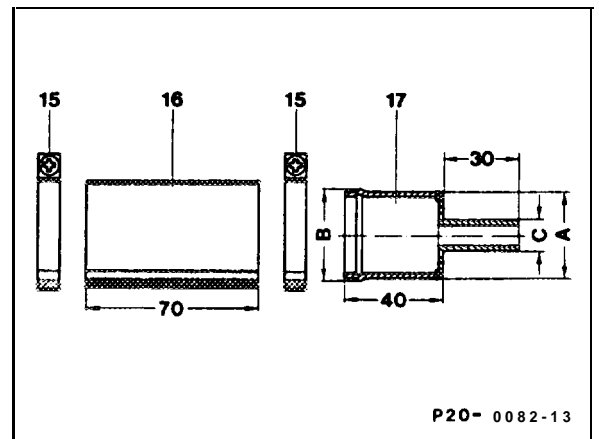


The priming liquid is easily combustible (observe safety regulations, Hazards Class A1).

Acetic acid is released until the sealing compound has completely set. For this reason, avoid skin contact. Clean affected areas immediately with soap and water. Rinse out eyes with water. Consult a doctor, if necessary.

Sealing

- 1 If it is not possible to locate the leak point properly when the radiator is installed, remove radiator (20-420).
- 2 Clean radiator.
- 3 Plug hose connections with the shop-made caps.

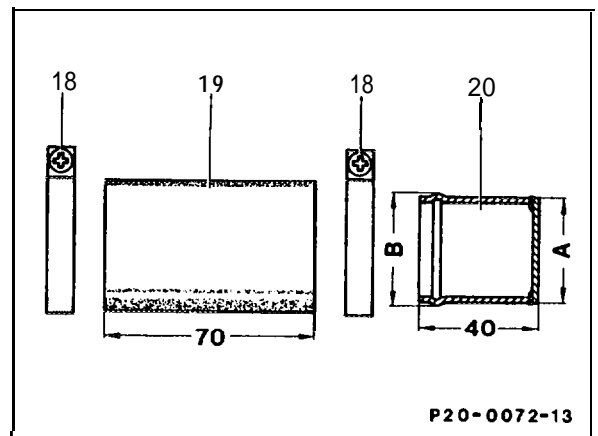


Parts required for the top hose connection:

- 15 2 clips L36-46, Part No. 916026 036000
- 16 Piece of hose, Part No. 201 501 38 62
- 17 Reducer made of two tubes
- A 35 mm \emptyset
- B 39 mm \emptyset
- C 12 mm \emptyset

Parts required for the bottom hose connection:

- 18 2 clips L36-46, Part No. 916026 036000
- 19 Piece of hose, Part No. 201 501 38 82
- 20 Cap from a tube
- A 35 mm \emptyset
- B 39 mm \emptyset



4 Seal connections of transmission oil cooler with plastic caps or plugs from old oil cooler line. To do this, cut off the oil cooler lines just behind the nipple and close by soldering.

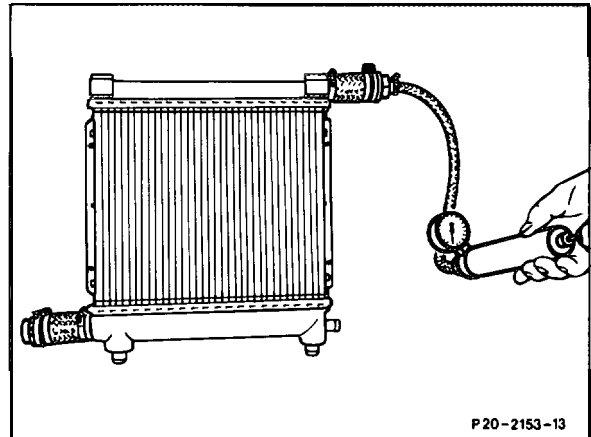
5 Connect tester to radiator.

6 Place radiator in a water bath.

7 Pressurize radiator with the tester and check where air bubbles rise.

8 Mark leak point.

9 Remove radiator and release pressure.



10 Blow radiator dry with compressed air.

11 Clean point to be sealed with a commercial cleaner (e.g. Tri or cleaner's naphtha). Always clean more than the point to be sealed (e.g. approx. 20-30 mm beyond the ends of cracks).

It is not necessary to remove the paint. Following this, blow the radiator dry at the affected point with compressed air.

There must not be any dust or grease residues present after performing the step.

12 Apply a very thin and even coat of priming liquid with a brush.

In the same way as for cleaning, apply the priming liquid beyond the point to be sealed. Pour the quantity of priming fluid required for the repair into a separate vessel to avoid the remaining priming fluid in the container being contaminated.

⚠ Warning!

Observe safety instructions!

13 Allow priming liquid to dry for approx. 10 minutes at room temperature.

14 Position radiator so that the sealing compound cannot run off the point to be sealed.

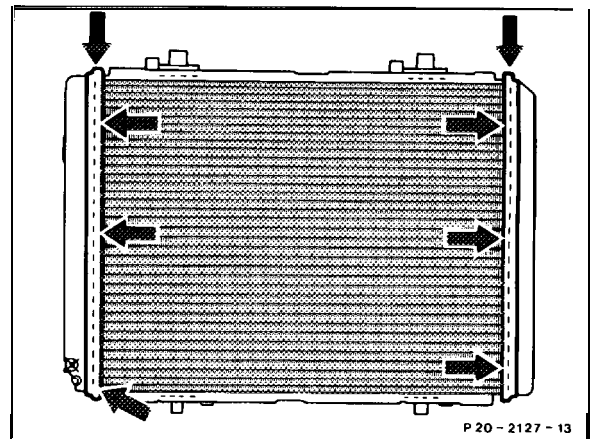
15 Depending on accessibility, apply diluted or undiluted sealing compound. Use a brush, spatula or similar to spread the sealing compound.

Caution!

Ensure that no air is entrapped in the compound when applying and spreading it.

As for cleaning and priming, apply the sealing compound beyond the point to be sealed. If there are several leakage points at the beaded collar (arrows), it is recommended to seal the beaded collar all-round.

Seal leaks in the honeycomb from both sides.



After completion of the sealing operation, immediately close tube. Acetic acid is released until the sealing compound is completely set. Avoid skin contact. Clean affected points immediately with soap and water. Rinse out eyes with water. Consult a doctor, if necessary.

16 Place radiator down, or position upright, for at least 3 hours to allow sealing compound to dry. Depending on the quantity of sealing compound applied and on the size of the point sealed, it may take up to 24 hours at room temperature for the sealing compound to set completely to form a durable elastic joint.

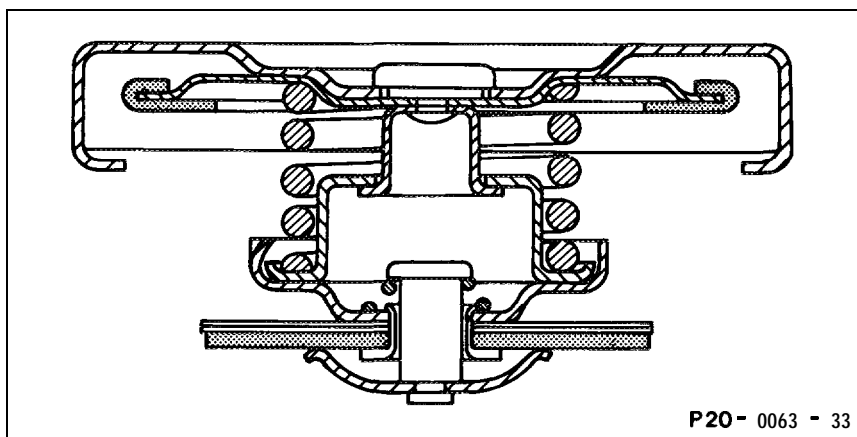
17 Pressure-test radiator in water bath for approx. 5 minutes at 1.5 bar gauge pressure.

If there are still leaks present, repeat sealing operation as from step 7.

18 Remove tester and plugs.

19 After re-installing radiator, check engine cooling system for leaks (20- 017).

20-430 Testing radiator or expansion tank pressure cap

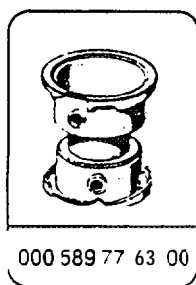
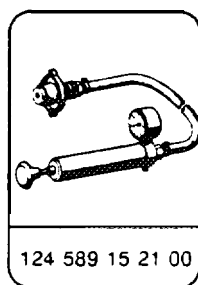


Double connection	attach 000 589 77 63 00 to tester 124 589 15 21 00, remove (step 1).
Pressure cap	fit onto double connection (step 2).
Overpressure valve	test opening pressure by pumping (step 3). See table for test pressure.
Vacuum valve	test. It must be resting against rubber seal, must rise easily and spring back after being released (step 4).

Pressure cap

Code number		120
Overpressure valve opens at bar gauge pressure	new pressure cap	1,2 + 0,1
	used pressure cap	1,2-0,1
Vacuum valve opens from	vacuum	0,1

Special tools

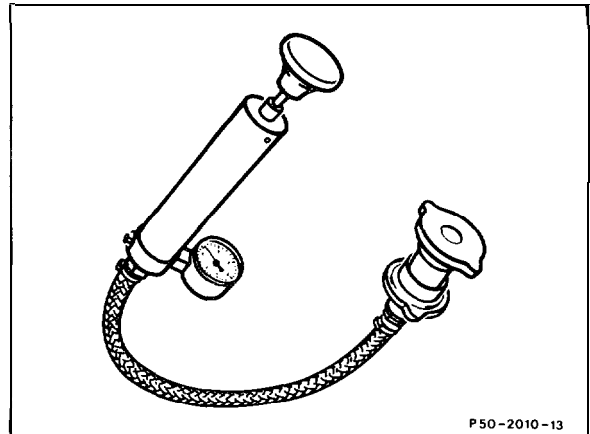


Note

Replace pressure cap if corrosion is present on radiator or expansion tank cap.

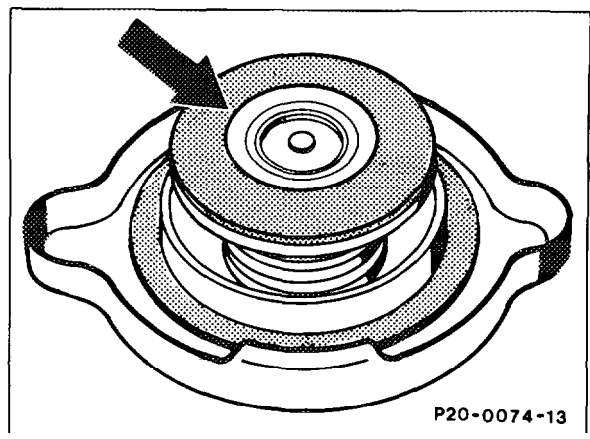
Testing overpressure valve

- 1 Attach double connection to tester.
- 2 Fit pressure cap onto double connection.
- 3 Test the opening pressure by pumping.



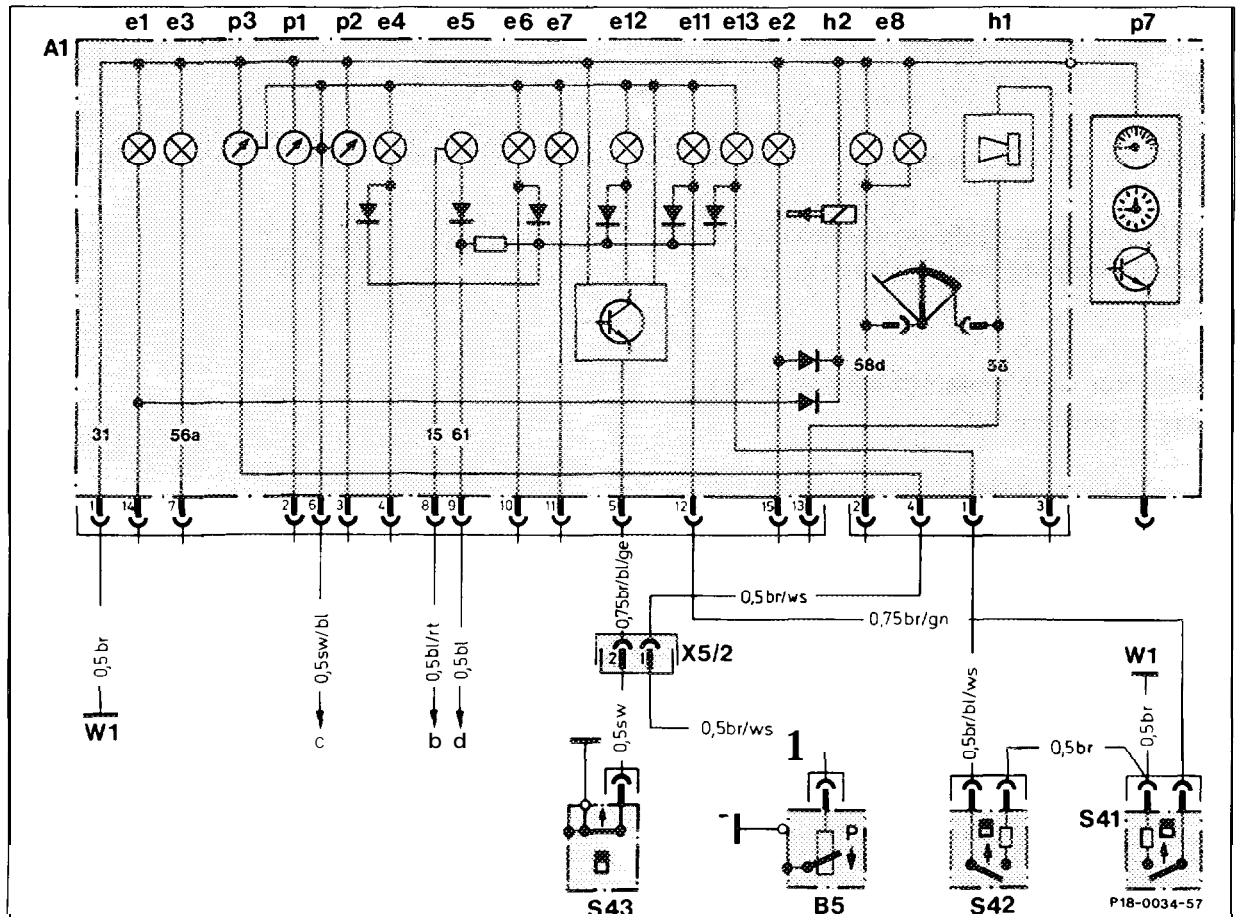
Testing vacuum valve

- 4 The vacuum valve (arrow) must be resting against the rubber seal, must rise easily and spring back after being released.



20-440 Checking engine coolant level indicator

Model 201



Wiring diagram engine oil level indicator, coolant level indicator, windshield washer level indicator

A1	Instrument cluster	h1	Warning buzzer
e1	Left turn-signal indicator	h2	Acoustic turn-signal indicator
e2	Right turn-signal indicator	B5	Oil pressure gauge sensor
e3	High beam indicator	S41	Coolant level indicator lamp switch
e4	Fuel reserve warning lamp	S42	Windshield washer level indicator lamp switch
e5	Battery charge indicator	S43	Oil level indicator lamp switch
e6	Brake pad wear indicator lamp	W1	Main ground (behind instrument cluster)
e7	Brake fluid and parking brake indicator lamp	X5/2	Connector, interior/starter 4-pin
e8	Instrument lighting		
e11	Coolant level indicator lamp	b	Electrical center connector contact 15 terminal 15 unprotected
e12	Oil level indicator lamp	c	Electrical center connector D contact 2 terminal 15 fuse a
e13	Windshield washer indicator lamp	d	Electrical center connector D contact 6 alternator terminal 61
p1	Coolant temperature gauge		
p2	Fuel gauge		
p7	Electronic clock/tachometer		

Test data

Resistance at coolant level sensor at "max" coolant level	$\infty \Omega$
Resistance at coolant level sensor at "min" coolant level	approx. 5Ω
Battery voltage	approx. 12 V

Commercial tool

Multimeter	e.g. Sun, DMM-5
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Note

If problems occur such as:

- A. Indicator lamp lights up constantly when engine running and coolant at correct level.
- B. Indicator lamp does not light up when key in position "2".
- C. Indicator lamp does not light up when engine running and coolant below "min" level.

Test

- A. Malfunction indicator lamp lights up constantly with engine running and coolant at correct level.

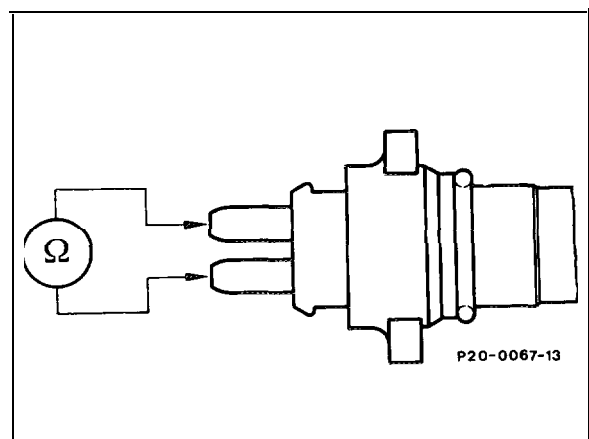
Test coolant level sensor. Detach connector. Connect both pins to multimeter and test resistance.

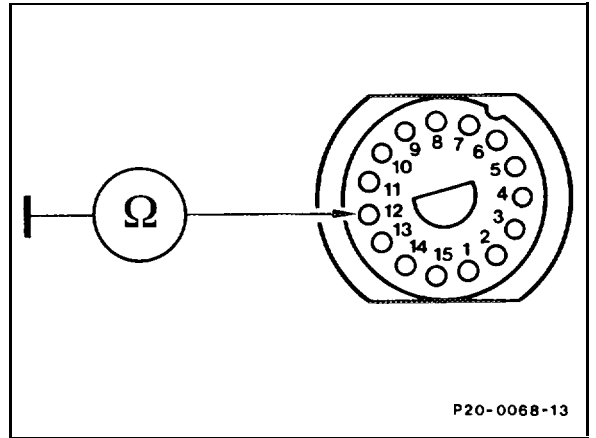
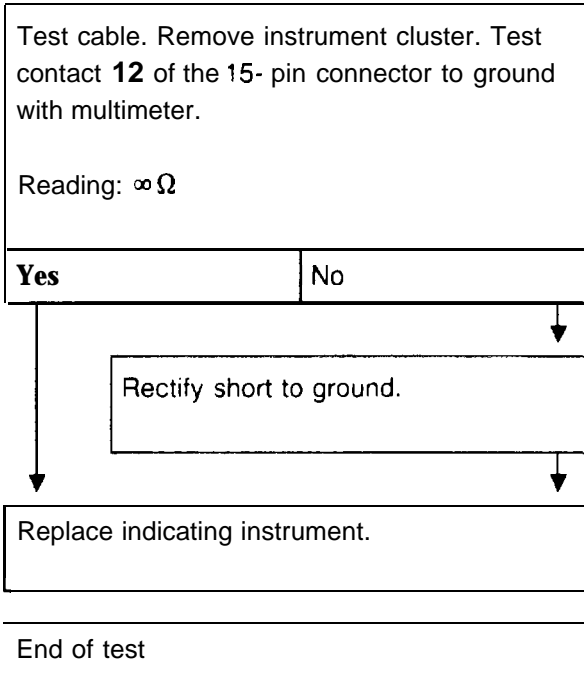
Reading: $\infty \Omega$

Yes

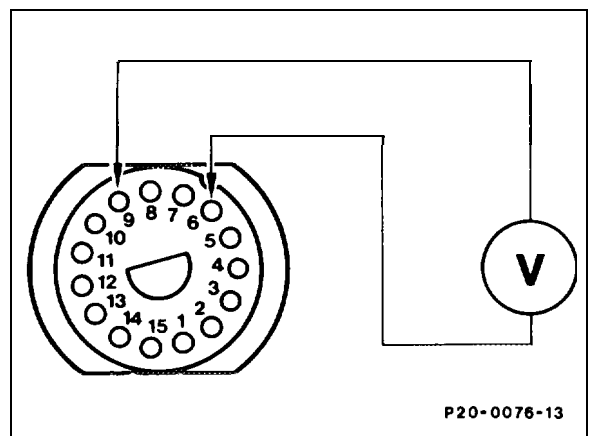
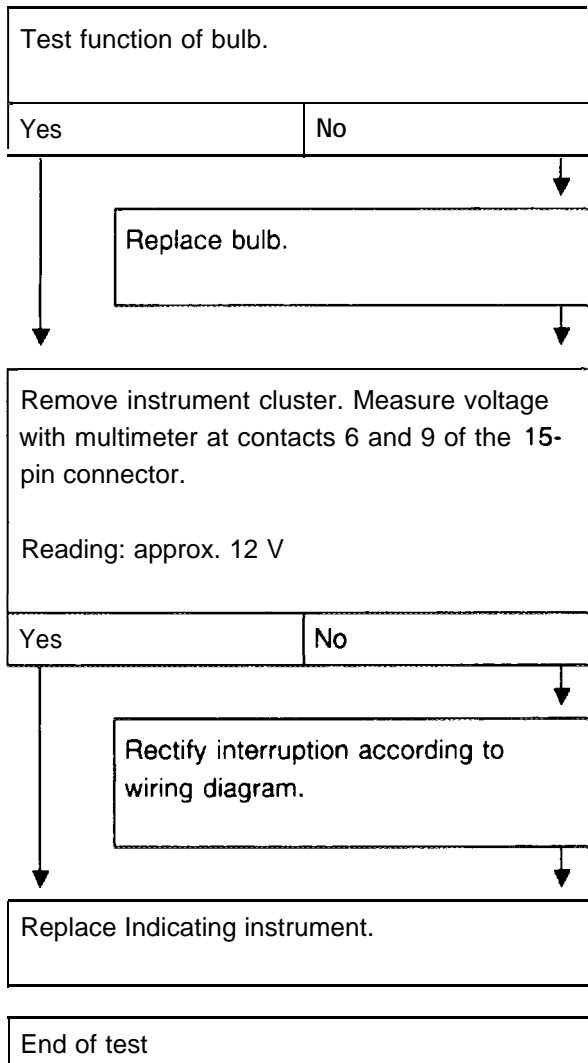
No

Replace coolant level sensor.

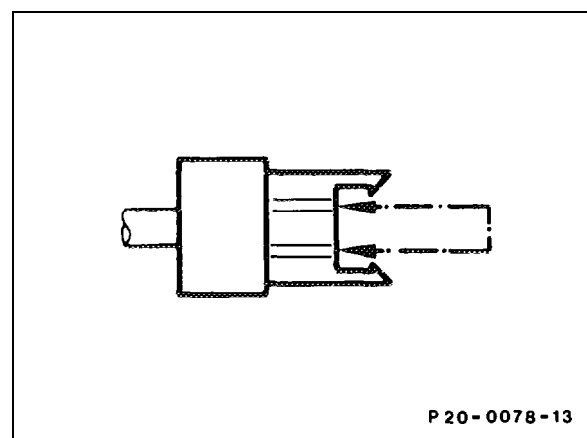
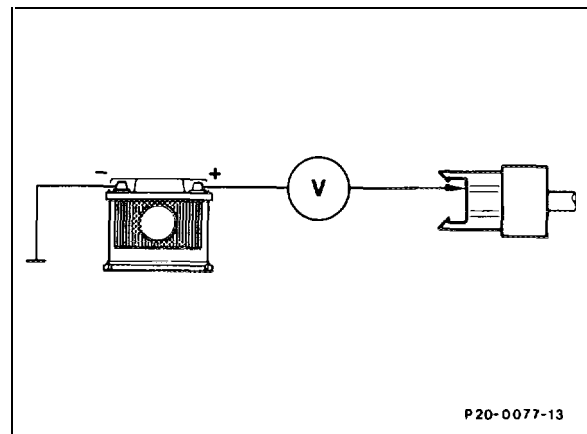
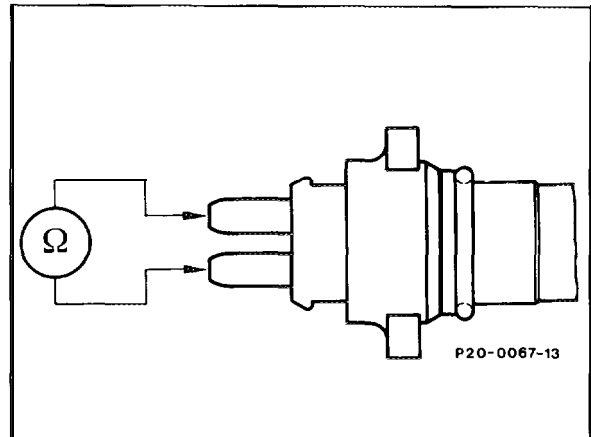
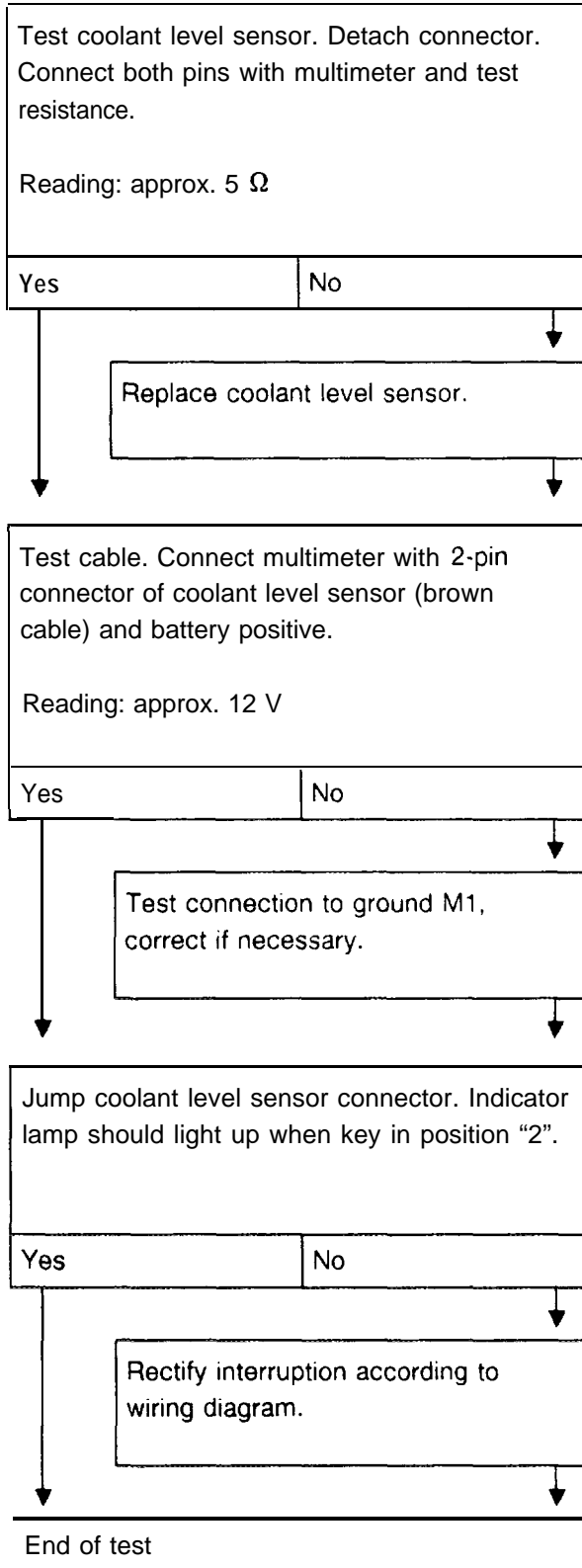




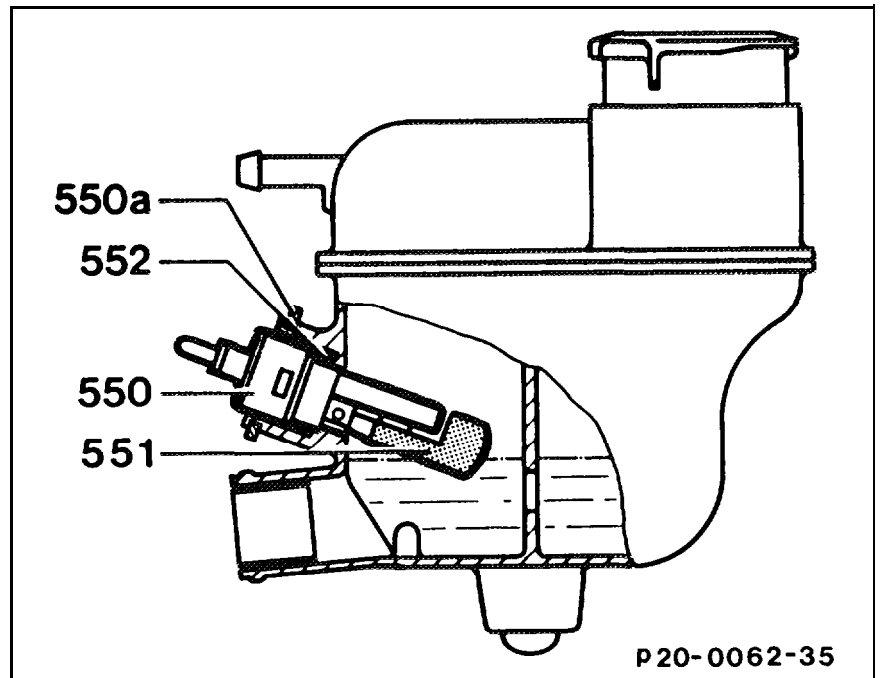
8. indicator lamp does not light up when key in position "2".



C. Indicator lamp does not light up when engine running and coolant below "min" level. Check function section "B" in order.



20-445 Function of engine coolant level indicator



- 550 Engine coolant level sensor
- 550a Locking ring
- 551 Float
- 552 O-ring

General

The dynamic engine coolant level indicator monitors the engine coolant level in the expansion tank when the engine is running.

When the ignition is switched on, the engine coolant level indicator lights up (check function) and goes out as soon as the engine is running.

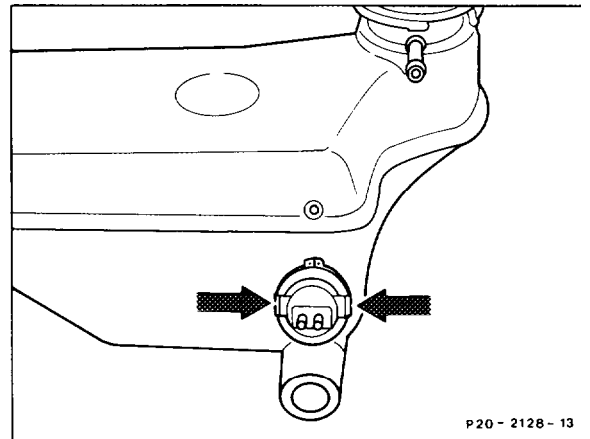
The engine coolant level indicator shows a weak light for the check function and a bright light if a fault exists.

Components

- Engine coolant level sensor (550) in expansion tank.
- Indicator lamp in instrument cluster.
Symbol: radiator.

The engine coolant level sensor has two lugs of different width which fit into appropriate slots on the expansion tank (arrows) to ensure that it is not incorrectly installed.

It is pressed into the expansion tank and sealed with an O-ring (552). Remove locking ring to withdraw engine coolant level sensor.



Function

When the ignition is switched on (key position 2), the indicator lamp shows a weak light and goes out when the engine is running (function check of bulb).

The engine coolant level in the expansion tank is sensed by a float (551) with permanent magnet which is attached to the engine coolant level sensor.

From a certain engine coolant level on, the contact is closed and the indicator lamp lights up.

Depending on the driving style, the indicator lamp will light up briefly at first and then later show a steady light. If the indicator lamp lights up, top off engine coolant.