

PORSCHE

Technical Manual

911 Carrera (996)

Technical Information

Repair

Contents:

Group 2

Fuel, exhaust, engine electronics

Foreword

The workshop documentation for the 911 Carrera (1996) model has the designation

"911 Carrera (1996)" Technical Manual

and contains **Technical Information** as well as instructions on **Repairs**.

The integration of the technical information published in the "911 Carrera (1996)" Technical Manual with the instructions on repairs provides the user with a complex reference work that combines into one book associated or cross-referenced material of relevance to workshops and originating from various information media.

The "911 Carrera (1996)" Technical Manual consists of 15 folders, subdivided into the following Groups

0	Entire vehicle – General
0	Diagnosis, part 1 (up to Repair Group 45) * ¹
0	Diagnosis, part 2 (as of Repair Group 61) * ²
1	Engine, part 1 (up to Repair Group 13) * ³
1	Engine, part 2 (as of Repair Group 15) * ⁴
2	Fuel, exhaust, engine electronics
3	Transmission, manual transmission
3	Transmission, automatic transmission
4	Running gear
5	Body
6	Body equipment, exterior
7	Body equipment, interior
8 / 9	Air conditioning / Electrics
9	Circuit diagrams, part 1 (up to and including the '99 model) * ⁵
9	Circuit diagrams, part 2 (as of the '00 model) * ⁶

*¹ The two folders with Group 0 are to be regarded as one folder; i.e. file the "Technical Information" notices only in front of the repair descriptions in the folder "Group 0 – Diagnosis, part 1" (**up to Repair Group 45**).

*² The **second folder** "Group 0 – Diagnosis, part 2" (**as of Repair Group 61**) includes the further Repair Groups belonging to Group 0.

*³ The two folders with Group 1 are to be regarded as one folder; i.e. file the "Technical Information" notices only in front of the repair descriptions in the folder "Group 1 – Engine, part 1" (**up to Repair Group 13**).

*⁴ The **second folder** "Group 1 – Engine, part 2" (**as of Repair Group 15**) includes the further Repair Groups belonging to Group 1.

- *5 The two folders with Group 9 are to be regarded as one folder; i.e. file the "Technical Information" notices only in front of the repair descriptions in the folder "Group 9 – Circuit diagrams, part 1" (**up to and including the '99 model**).
- *6 The **second folder** "Group 9 – Circuit diagrams, part 2" (**as of the '00 model**) includes the further circuit diagrams belonging to Group 9.

The "911 Carrera (1996)" Technical Manual has the same structure in each folder, with the following breakdown for all Groups:

Title page: "911 Carrera (1996)" Technical Manual

> Foreword

Title page: "Technical Information"

> Table of Contents, Technical information

> Technical information

Title page: "Repair"

> Repair Groups: overview

> Table of Contents, repairs

> General / technical data

> Instructions on repairs

As can be seen from the breakdown, the published Technical Information is in the front part of each folder – numbered according to the Groups. The Table of Contents assigned to each Group will be periodically updated.

Following the Technical Information, separated by a title page, the instructions on repairs – assigned according to the Groups or broken down into Repair Groups – are included in the folders.

The instructions on repairs will be extended and updated by means of supplements.

Note

Sheets that already exist in the "911 Carrera (1996)" Technical Manual and are updated or revised and thereby exchanged by a supplement are designated "replacement sheet". Revisions or technical modifications on pages of these replacement sheets are identified for the user with a vertical bar at the margin.

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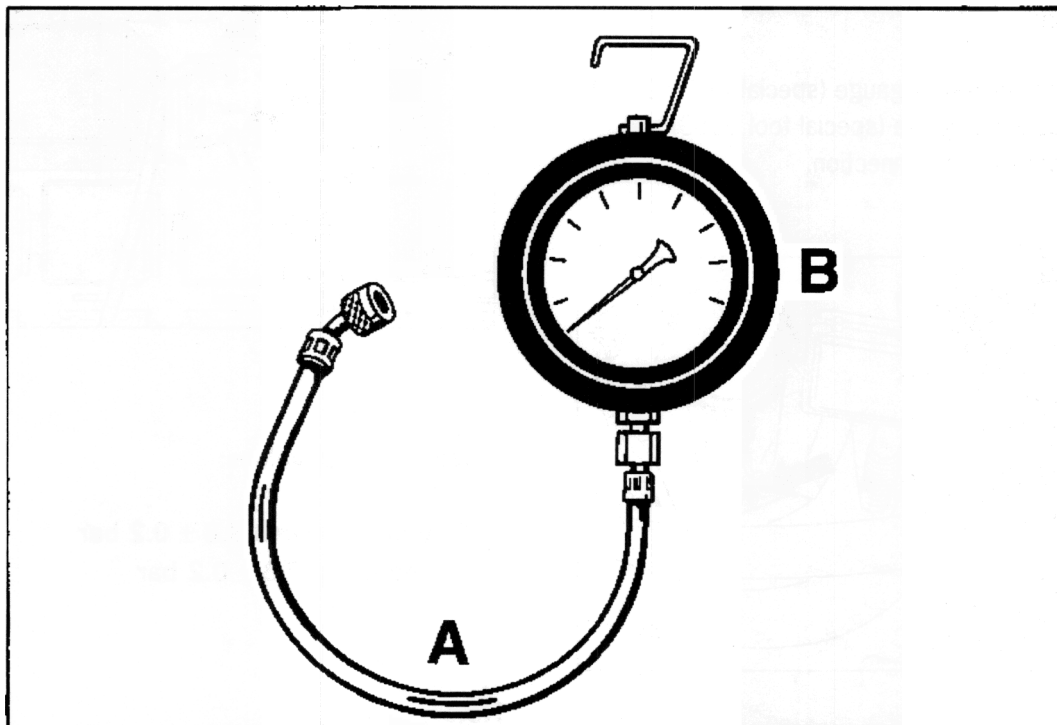
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20 02 01 Checking fuel pressure

Special tools



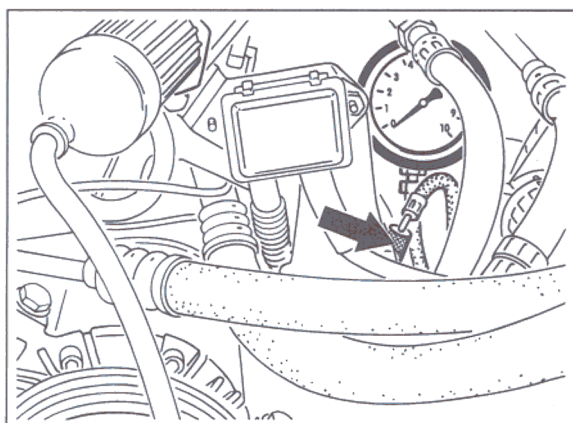
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Item	Designation	Special tool	Explanation
A	Pressure gauge	P 378a	
B	Connection line	9559	

Checking fuel pressure

Test

1. Undo covering cap on test connection of fuel collection pipe and remove (width across flats 13 mm).
2. Connect pressure gauge (special tool P 378a) with connecting line (special tool 9559) and connect to test connection.



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3. Actuate fuel pump, either

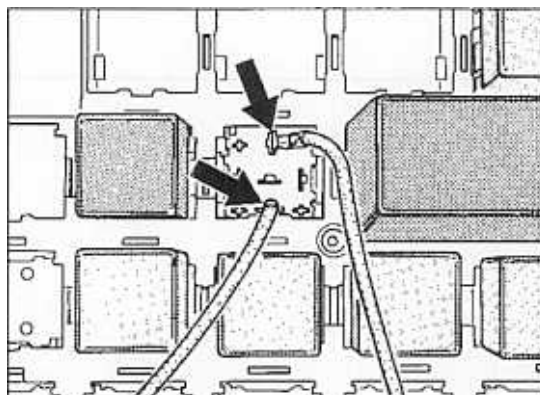
with Porsche System Tester 2:

The fuel pump can be actuated with the Porsche System Tester 2 or by bridging the fuel-pump relay.

or

via the fuel-pump relay without Tester:

Disconnect fuel-pump relay from the central electrical board and bridge contacts 30 and 87 (identified as 3 and 5 on the central electrical board) with a fused shop-made cable. The fuel pump must now operate or deliver fuel.



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4. Nominal test values:

Stationary engine 3.8 ± 0.2 bar

Engine idling 3.3 ± 0.2 bar

Note

The seal or sealing ring in the brass closure cap is **not** exchangeable. It must therefore be used only **once**.

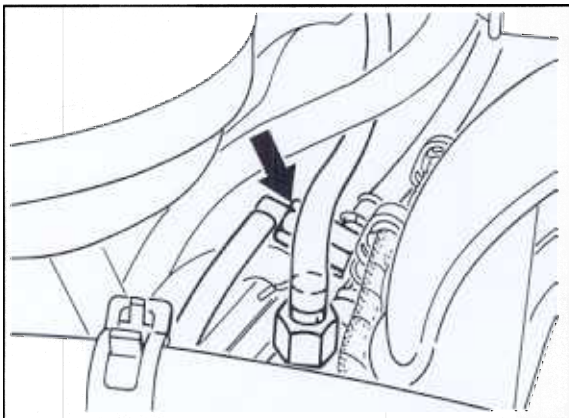
Tightening torque of the new brass closure cap
 2.5 ± 0.5 Nm. (2.0 ± 0.5 ftlb.).

20 66 01 Checking quantity delivered by fuel pump

Requirement:

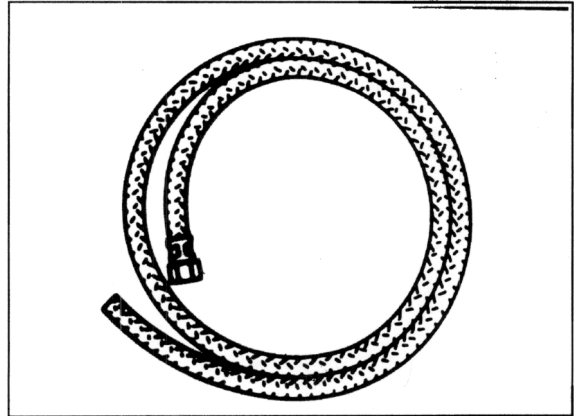
Fuel filter and electrical supply in order.

1. Relieve pressure in fuel tank by opening tank cap.
2. Connect Porsche System Tester 2.
3. Remove the complete air cleaner assembly.
4. Undo the fuel return line (width across flats 17 mm) in the engine compartment (left). **It is essential to counter at the same time** (width across flats 17 mm). Collect residual fuel. Observe the safety regulations.



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5. Connect fuel hose (shop-made, approx. 1.5 m long) to the connection piece and hold in a measuring device.

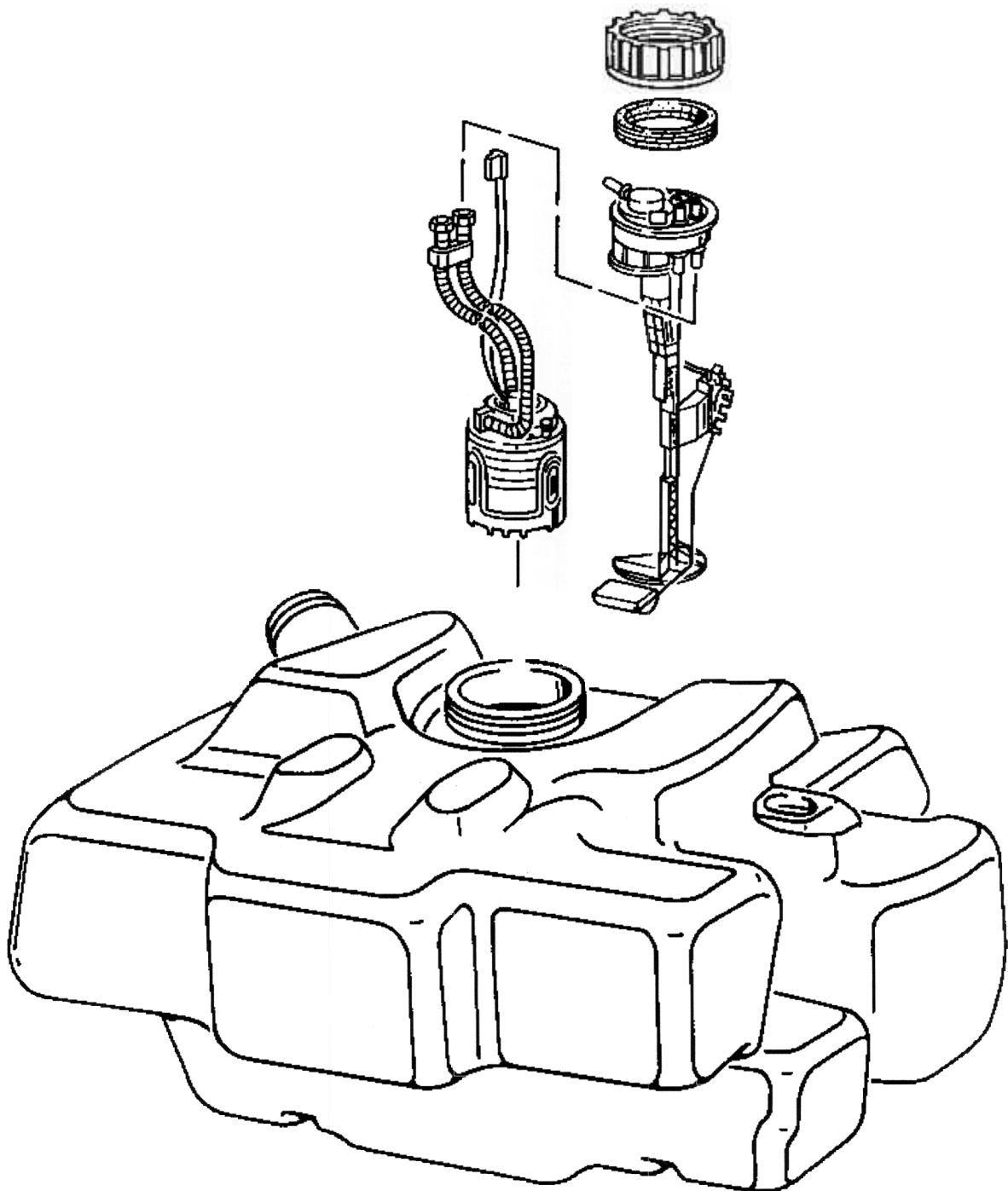


1742 - 20

6. Actuate fuel pump with the Porsche System Tester 2 and allow fuel to flow for 30 seconds into a measuring container.

Quantity supplied must be at least $850 \text{ cm}^3/30 \text{ s}$, i.e. after 30 seconds at least 850 cm^3 fuel must be present in the measuring container.

20 66 19 Removing and installing fuel pump

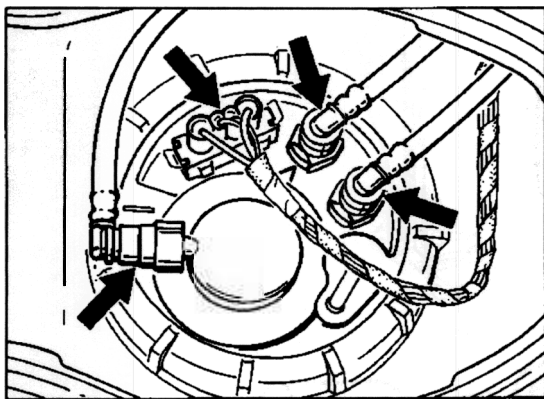


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Removing and installing fuel pump

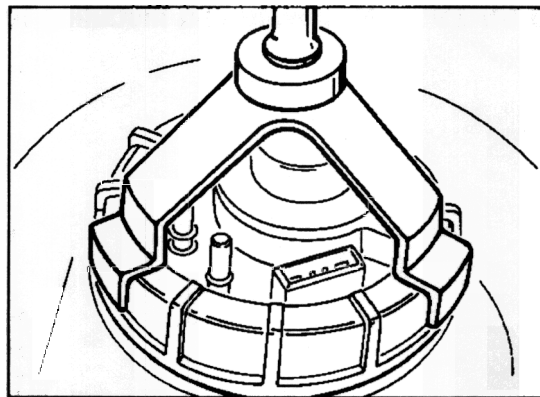
Removal

1. Undo battery terminals and battery holder. Lift battery out by holding strap.
2. Undo battery support cover (four hexagon nuts, wrench size 13).
4. Disengage fuel line and disconnect electrical plug connection.



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3. Undo union nut with VW special tool 3217.



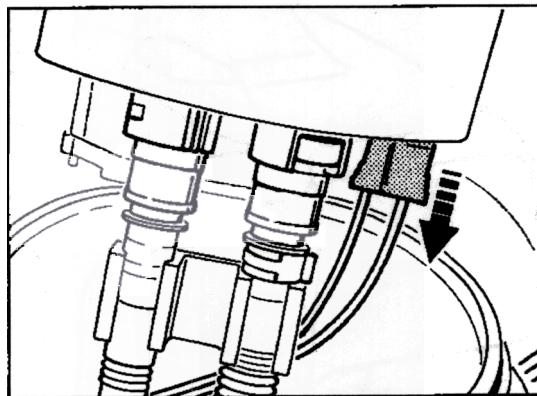
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5. Extract residual fuel.

Note

Observe the safety regulations.

6. Lift fuel tank sending unit and disconnect electrical plug connection and fuel pipes.

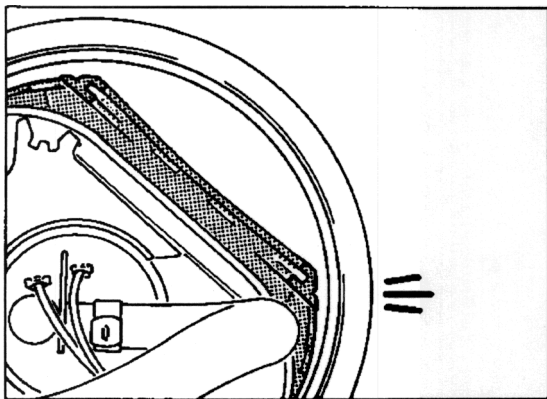


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6. Put on fuel-proof glove, hold the fuel pump fastened to tank floor, turn it to left (approx. 15°, bayonet lock) and remove fuel pump.

Installation

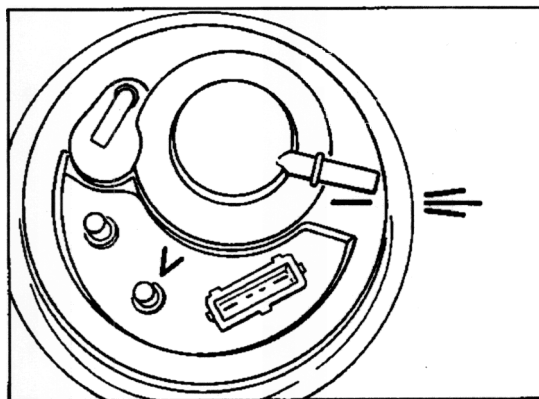
1. Position fuel pump; the edge of the fuel-pump housing faces the fuel tank sending unit installation-position markings.



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2. Place fuel pump in this position on tank floor bayonet fixture and turn fuel pump to the right as far as the stop. Then check proper seating of fuel pump by pulling it up.

3. Insert fuel tank sending unit and turn until the marking on the sending unit matches the marking on the fuel tank.



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4. Tighten union nut with special tool 3217. Tightening torque with new union nut and new sealing ring 70 Nm (52 ftlb.).
5. Attach fuel lines and electrical plug connection. The fuel lines must audibly engage. **Correct engagement must be checked with a gentle pull.** The colour-coded plug (green) must be fitted to the connection identified with "V".

20 15 01 Calibrating fuel level sensor system

Warning!
Danger of fire and injury!

- > Observe general safety regulations on the fuel system.
- > Wear protective gloves.

Note

Calibration is necessary after replacement of the fuel tank, fuel level sensor or instrument cluster.

Remove battery and detach battery cover.

2. Remove fuel level sensor; refer to Serv. No. 20 66 19 (Removing fuel pump).
3. Using a fuel extractor, completely drain the fuel tank through the fuel level sensor opening. Fuel extractor: Refer to the Workshop Equipment Manual, Chapter 3 "Workshop Equipment".
4. Reinstall the fuel level sensor and, with "ignition off", fill the tank with **12 litres** of fuel.
5. Perform tank calibration with the Porsche System Tester 2.

Select vehicle type (911 Carrera)

Select control modules

- Select instrument cluster

Select menu item Tank calibration

- Confirm calibration

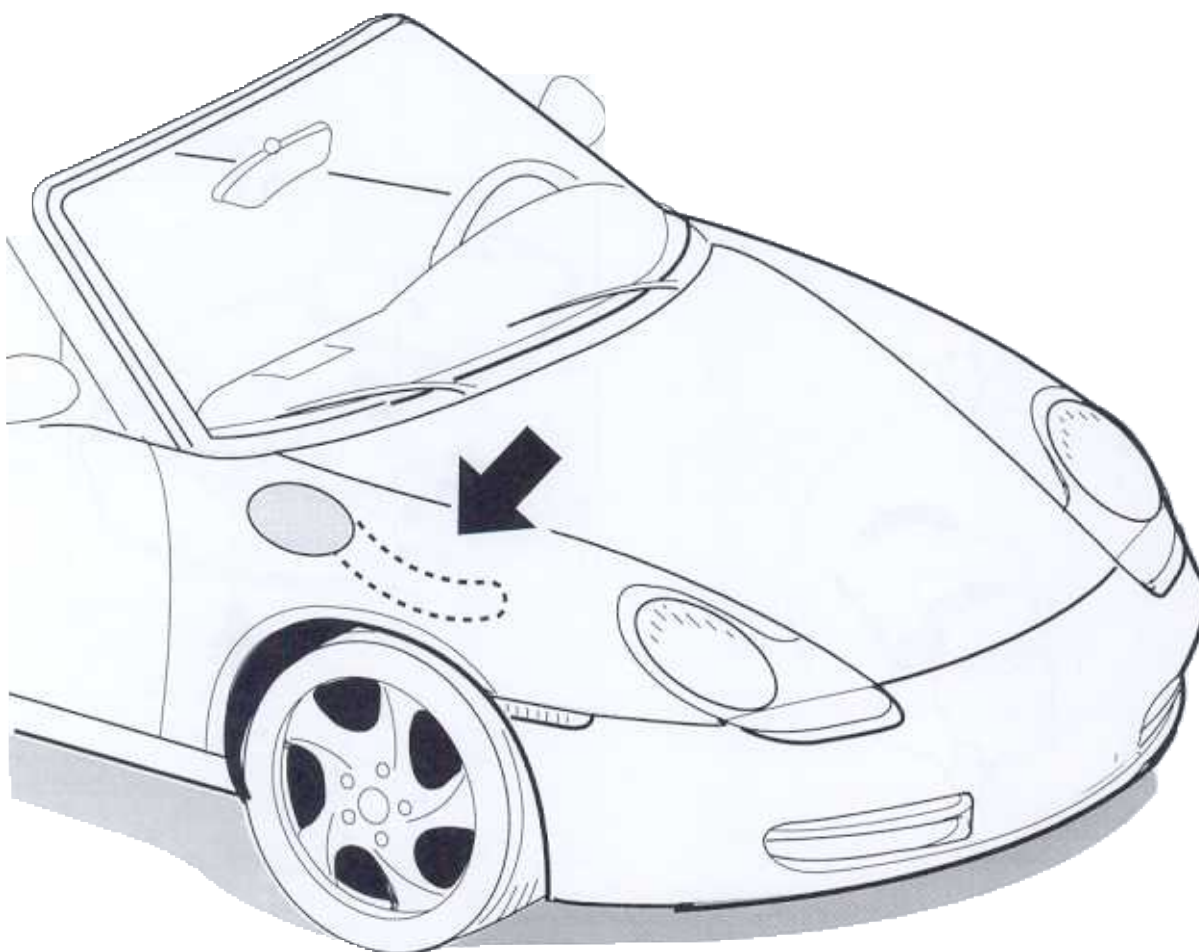
The fuel level sensor system has now been calibrated.

Note

The fuel level sensor system need not be calibrated if the battery was disconnected or a plug connection on the instrument cluster or fuel level sensor was removed. The values remain stored in the instrument cluster.

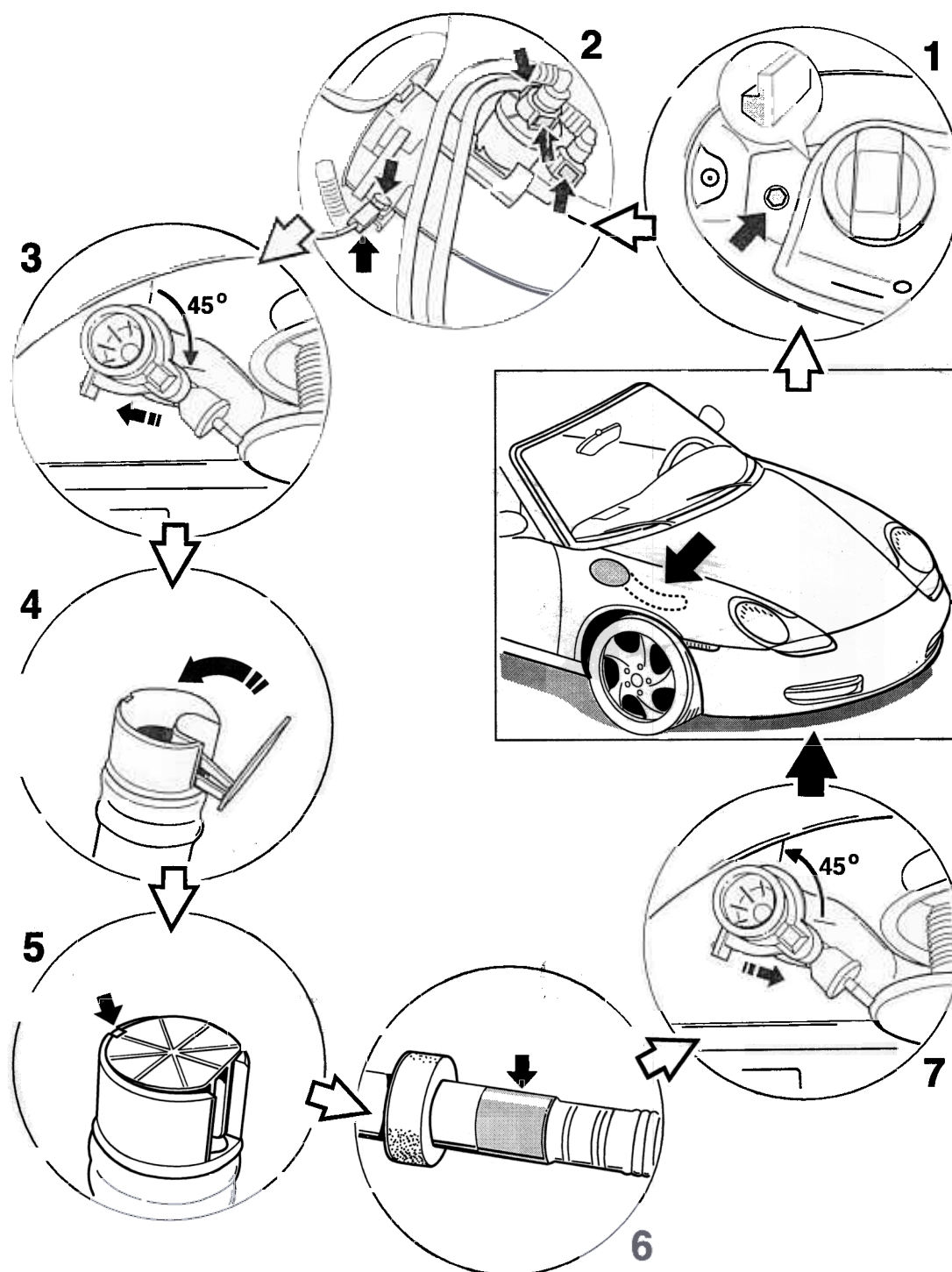
A range on remaining fuel of less than 15 km is not displayed in the instrument cluster.

20 07 19 Removing and installing filler neck



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Removing and installing filler neck



63_98

Removing filler neck

Warning:
Danger of fire and injury!

- > Observe general safety regulations on the fuel system.
- > Wear protective gloves.

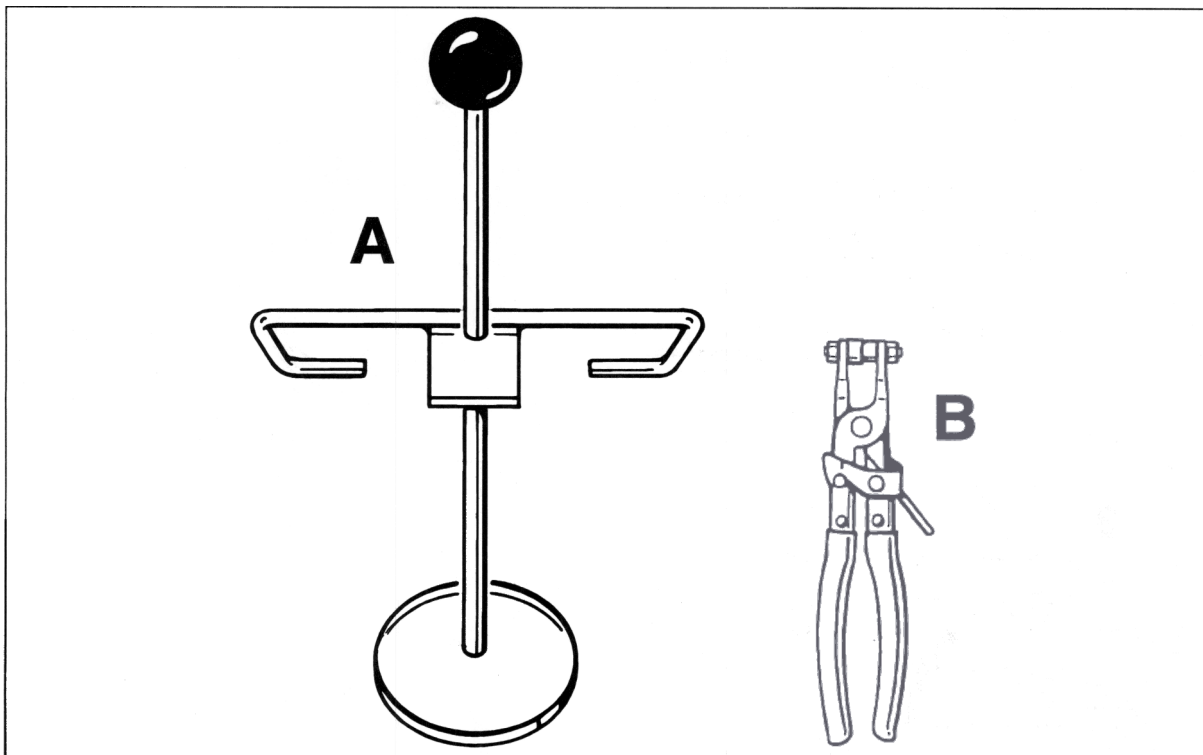
Removing filler neck

No.	Procedure	Instructions
	Disconnect battery	Detach negative terminal of battery (a/f 10 mm) and cover the terminal or battery. Remove right front wheel. Remove right front wheel housing liner.
1	Detach filler neck	Remove cap. Undo hexagon-head bolt. Unclip seal.
2	Detach fuel lines and ground strap	Press release buttons and simultaneously pull the lines apart. Pull off the ground strap.
3	Remove filler neck	Turn the filler neck clockwise by approx. 45° and pull out carefully. The open surge flap must not be damaged when pulling out the filler neck.

Installing filler neck

No.	Procedure	Instructions
4 + 5	Close the surge flap	Close the surge flap before fitting the filler neck. Engage surge flap at the locking lug.
6	Filler neck	To facilitate installation, apply a thin coat of engine oil on the indicated area (arrow).
7	Fit filler neck	Carefully push the filler neck into take-up flange on the fuel tank. Turn the filler neck anticlockwise by approx. 45°. Fit fuel lines and ground strap Fit seal in correct position. Ensure that the locking tabs are seated correctly. Fasten the hexagon-head bolt. Coat seat of the cap seal with Vaseline.

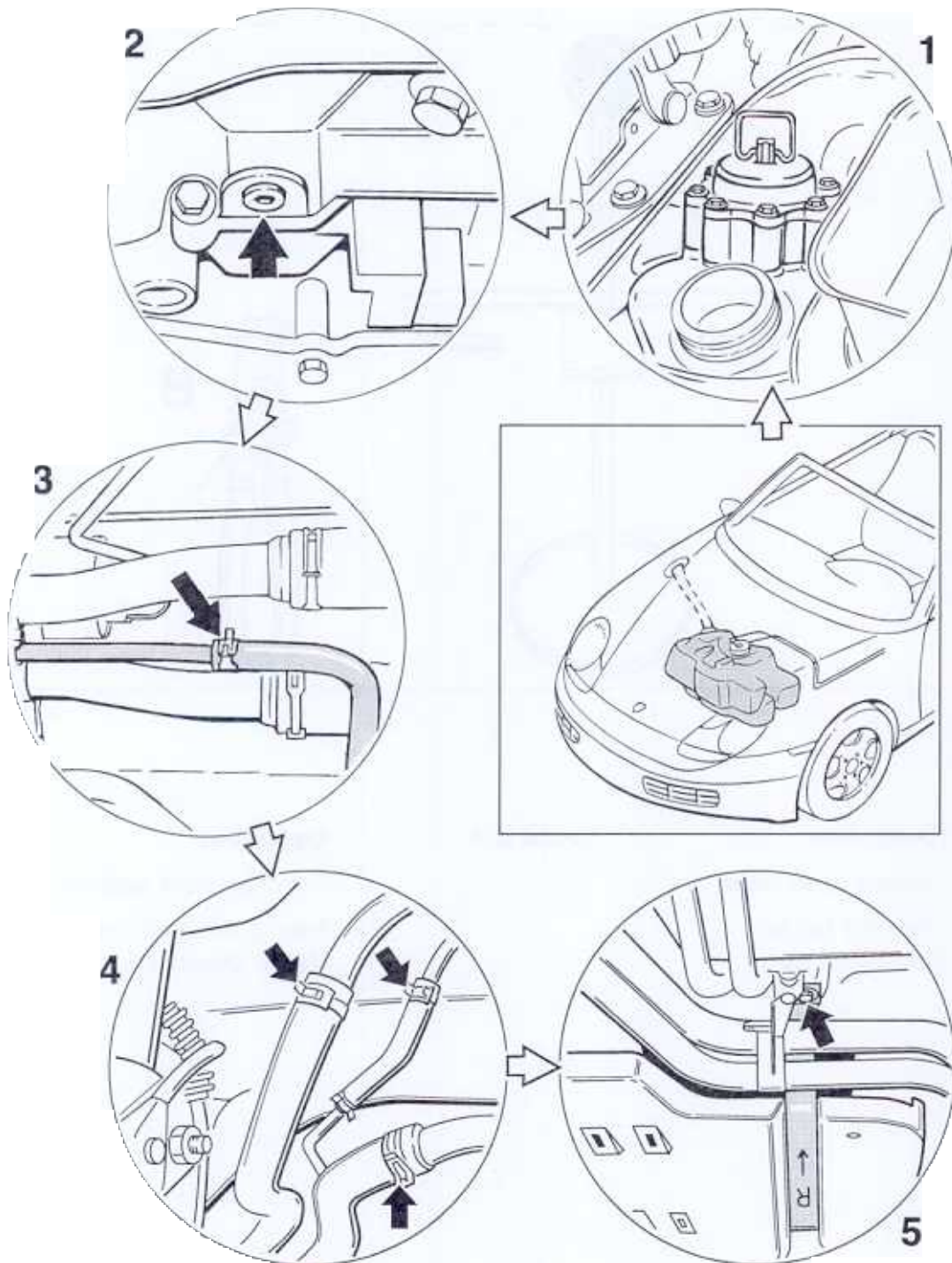
20 10 19 Removing and installing fuel tank



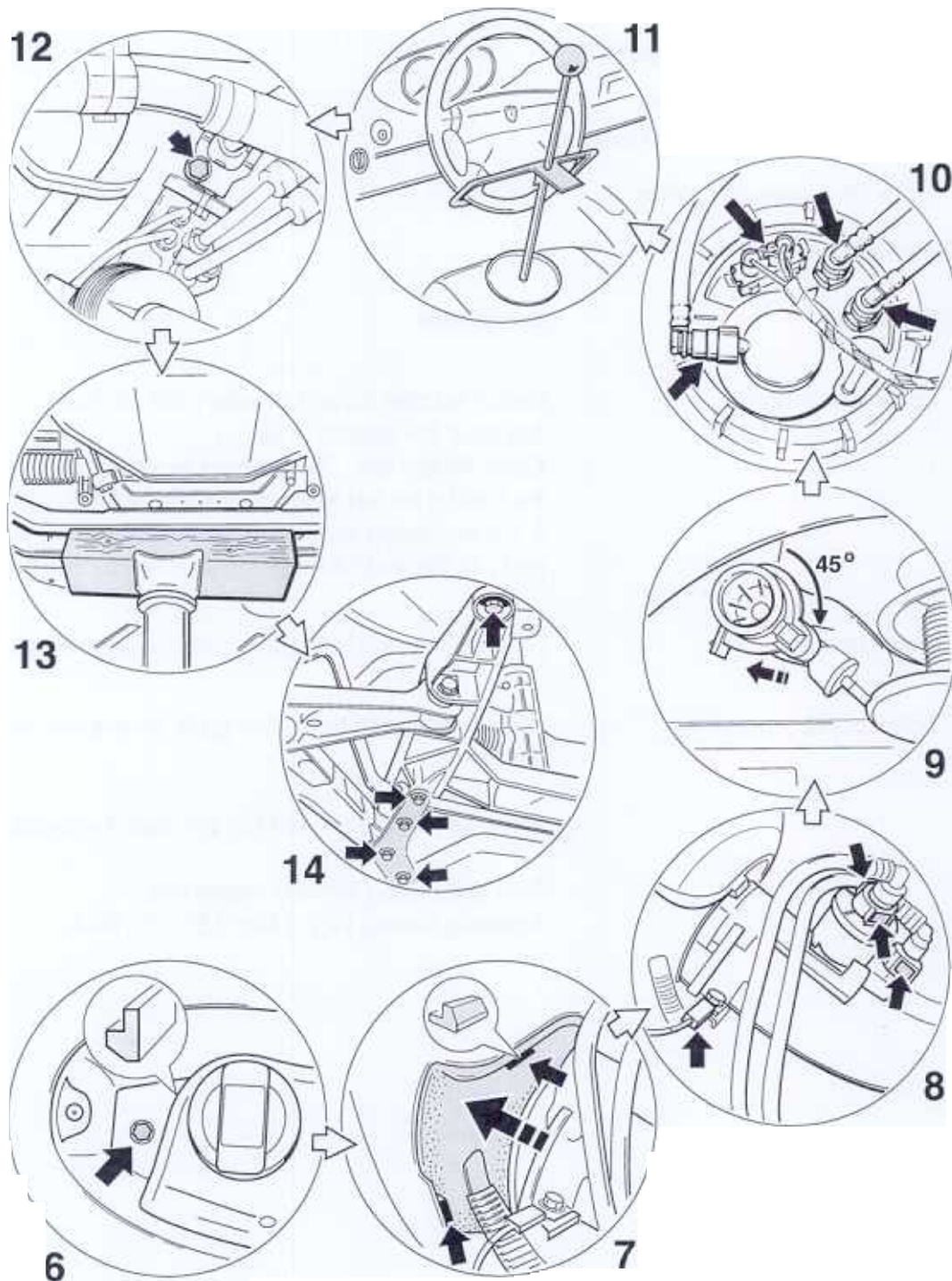
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Item	Designation	Special tool	Explanation
A	Steering wheel holder		Part of the wheel alignment tester
B	Assembly tool for spring-band clamps		Refer to Workshop Equipment Manual, Chapter 2.4, No. 72

Removing fuel tank



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47_99

Removing fuel tank**Warning:****Danger of fire and injury!**

- > Observe general safety regulations on the fuel system.
- > Wear protective gloves.

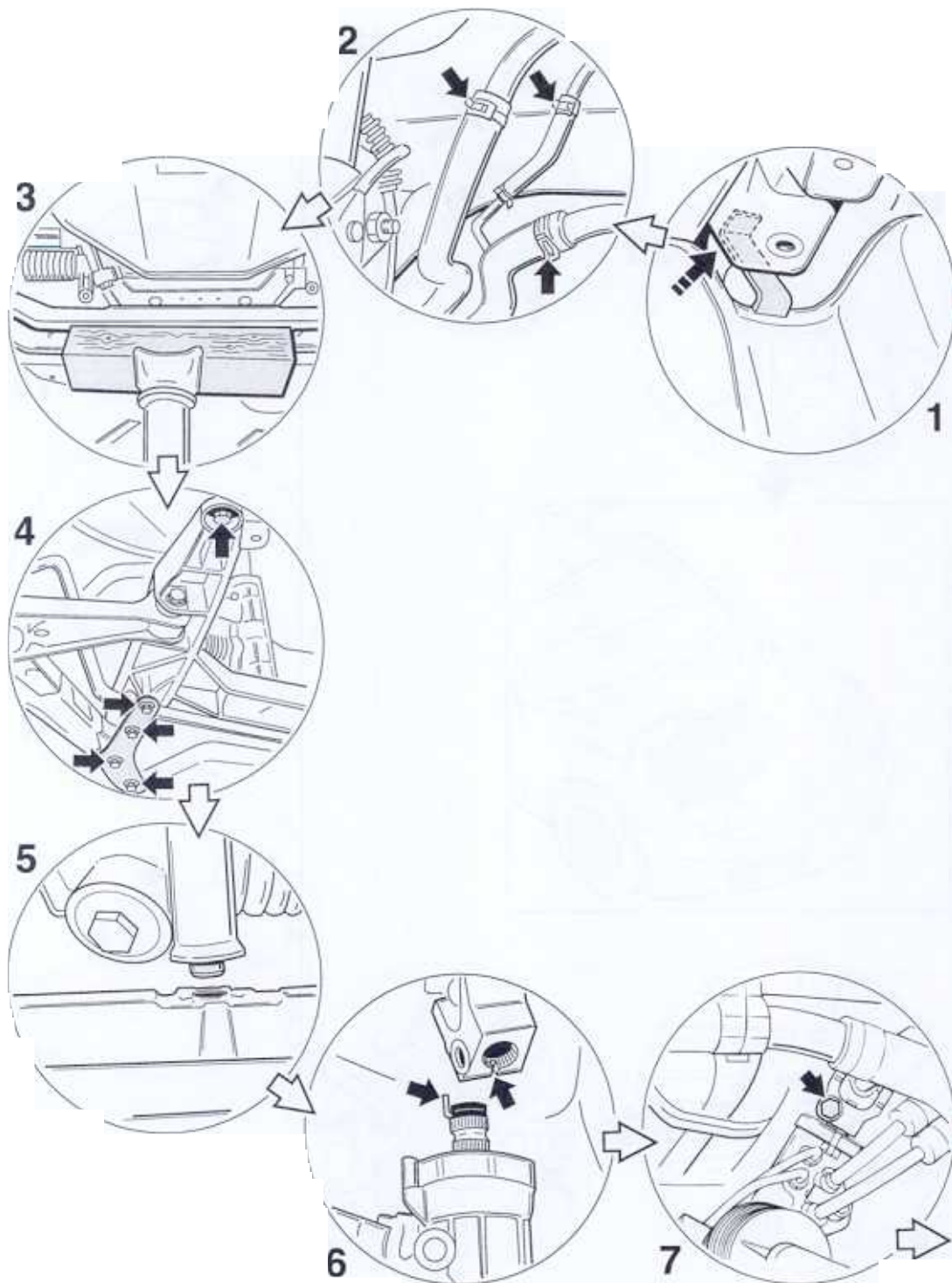
Removing fuel tank

No.	Procedure	Instructions
	Disconnect battery	Detach negative terminal of battery (a/f 10 mm) and cover the terminal or battery. Empty the fuel tank. The fuel must be sucked out through the hole for the fuel level sensor in the fuel tank. It is impermissible to suck out the fuel through the filler neck, as this would damage the inner flap on the filler neck.
	Open tank cap	Open the rear lid. Remove cap. Lift bow on bleeder valve.
2 + 3	Drain coolant	Undo drain plug on the coolant guide housing and drain the coolant. Additionally detach the vent line and drain the coolant. Then fit drain plug with new sealing ring. Tightening torque: 10 + 5 Nm (7.5 + 3.5 ftlb.)

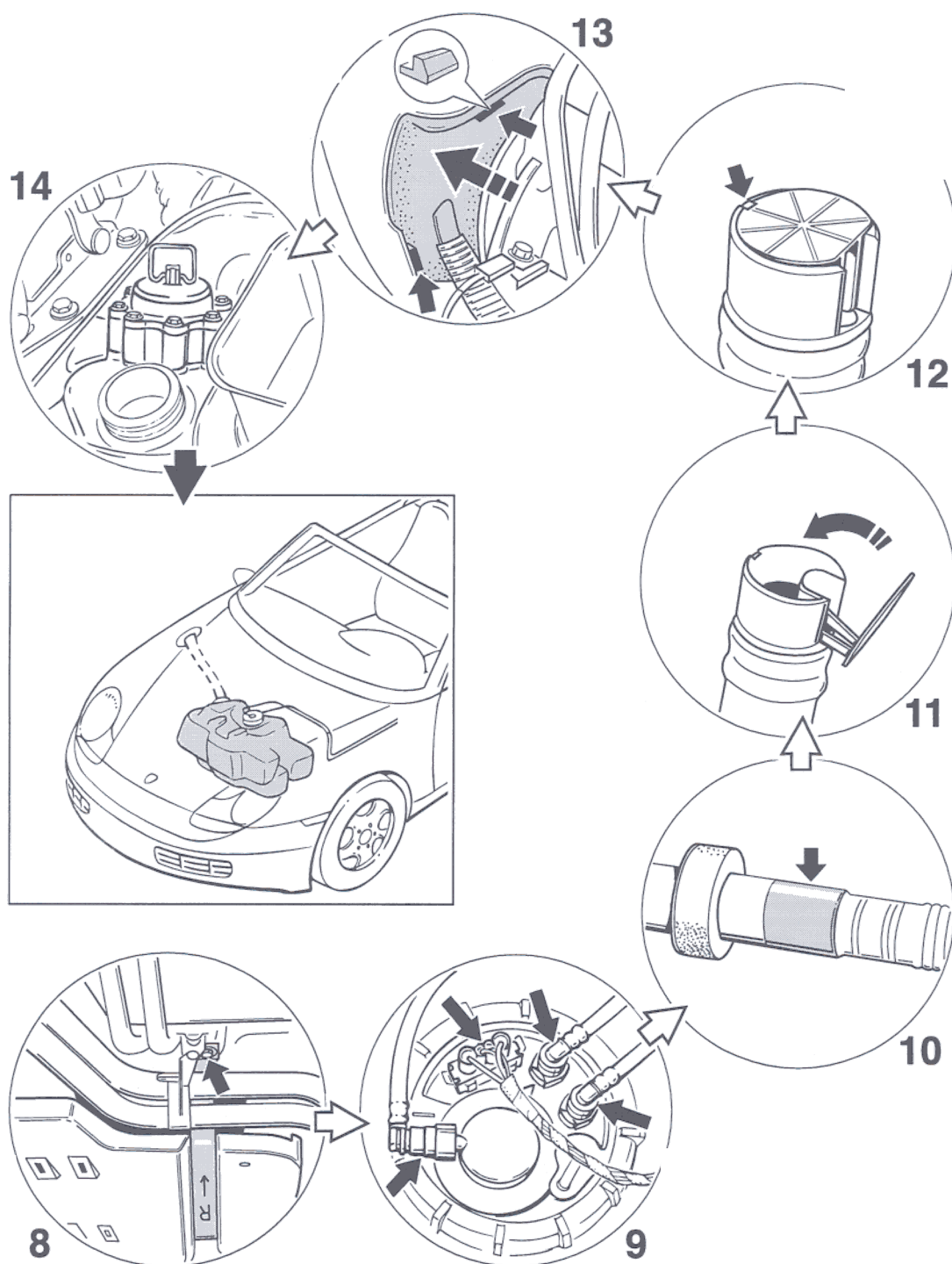
No.	Procedure	Instructions
4	Detach coolant lines	Remove front wheels. Open spring band clamps on both sides and pull off the coolant lines. Remove underbody covers. Remove all coolant lines.
5	Detach restraining straps on the fuel tank	Remove diagonal braces between body and side members. Detach restraining straps. Remove bottom guard of fuel tank and the restraining straps.
6 + 7	Detach filler neck	Remove cap. Undo hexagon-head bolt. Unclip seal.
8	Detach fuel lines and ground strap	Press release buttons and simultaneously pull the lines apart. Pull off the ground strap.
9	Remove filler neck	Turn the filler neck clockwise by approx. 45° and pull out carefully. The open surge flap must not be damaged when pulling out the filler neck. Close the opening in the fuel tank, e.g. with the cap of a spray can (ø 5 cm).
10	Remove connections on the fuel level sensor	<p>Disconnect fuel lines and electrical plug connection. To do this:</p> <p>press the release button on the fuel lines and pull off the fuel lines.</p> <p>press the release button on the electrical plug connection and disconnect the plug connection.</p>
11	Lock the steering wheel	
12	Detach the universal joint	<p>Move steering wheel to centre position and lock it with the steering wheel holder.</p> <p>Loosen universal joint (steering shaft) at steering gear. Take out the clamping screw and push the universal joint upwards.</p>

No.	Procedure	Instructions
13	Support cross member	Detach steering gear from the cross member. Support cross member with a workshop jack.
14	Detach cross member (side member)	Undo hexagon-head bolts at the front and rear, and lower the cross member or the complete front axle by approx. 15 cm. Detach fuel tank restraining strap from the body. Disengage the fuel tank and take it off in downward direction.

Installing fuel tank



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Installing fuel tank

No.	Procedure	Instructions
	Fasten fuel tank	Lift the fuel tank and engage it on the support lugs on the floor of the body. Fasten the restraining strap (transverse) on the floor of the body. Tightening torque: 25 Nm (19 ftlb.)
2	Fit coolant lines	Fit all coolant lines before lifting the front axle.
3 + 4	Fasten front axle	Lift front axle with the workshop jack and fasten. Tightening torques
5	Fasten steering gear	Make sure the roll pin (13 x 14) is present and seated properly in the left fastening bore of the steering gear. Fasten steering gear with new M10 x 1.5 x 45 hexagon-head bolts. Tightening torque: 65 Nm (48 ftlb.)
6 + 7	Fit universal joint	Push universal joint (steering shaft) onto the steering gear. The lug of the rotary plastic clip must engage in the clamping slot of the universal joint. Fit new M8 x 35 fastening screw in the retaining groove. Tightening torque: 23 Nm (17 ftlb.)
8	Fasten fuel tank	Fit bottom guard and the restraining straps. The restraining straps are identified by "R" (right) and "L" (left).
9	Make connections on the fuel level sensor	Fasten fuel lines and electrical plug connector on the fuel level sensor.

No.	Procedure	Instructions
10	Fit filler neck	To facilitate installation, apply a thin coat of engine oil on the indicated area (arrow). Remove protective cap. Carefully push the filler neck into take-up flange on the fuel tank. Turn the filler neck anticlockwise by approx. 45°.
13	Fit seal	Fit seal in correct position. Ensure that the locking tabs are seated correctly. Fasten the hexagon-head bolt. Coat seat of the cap seal with Vaseline.
14	Bleed coolant system	Lift bow on bleeder valve, fill in coolant and bleed the system; refer to page 19 of Group 19, Serv. No. 19 38 17. Perform tightness test. Perform suspension alignment.

20 15 01 Calibrating fuel level sensor system – GT3

Warning!
Danger of fire and injury!

- > Observe general safety regulations on the fuel system.
- > Wear protective gloves.

Note

Calibration is necessary after replacement of the fuel tank, fuel level sensor or instrument cluster. The fuel tank is the same part as for the 911 Carrera 4.

Disconnect the battery and cover terminal or battery. Remove cap over the fuel level sensor system.

2. Remove fuel level sensor; refer to Serv. No. 20 66 19 (Removing fuel pump).
3. Using a fuel extractor, completely drain the fuel tank through the fuel level sensor opening. Fuel extractor: Refer to the Workshop Equipment Manual, Chapter 3 "Workshop Equipment".
4. **Make sure that the two recesses on the left and right-hand sides of the tank are emptied completely.**
5. Reinstall the fuel level sensor and, with "ignition off", fill the tank with **23 litres** of fuel.

6. Perform tank calibration with the Porsche System Tester 2.

- Select vehicle type (911 Carrera)

- Select control modules

Select instrument cluster

- Select menu item Tank calibration

- Confirm calibration

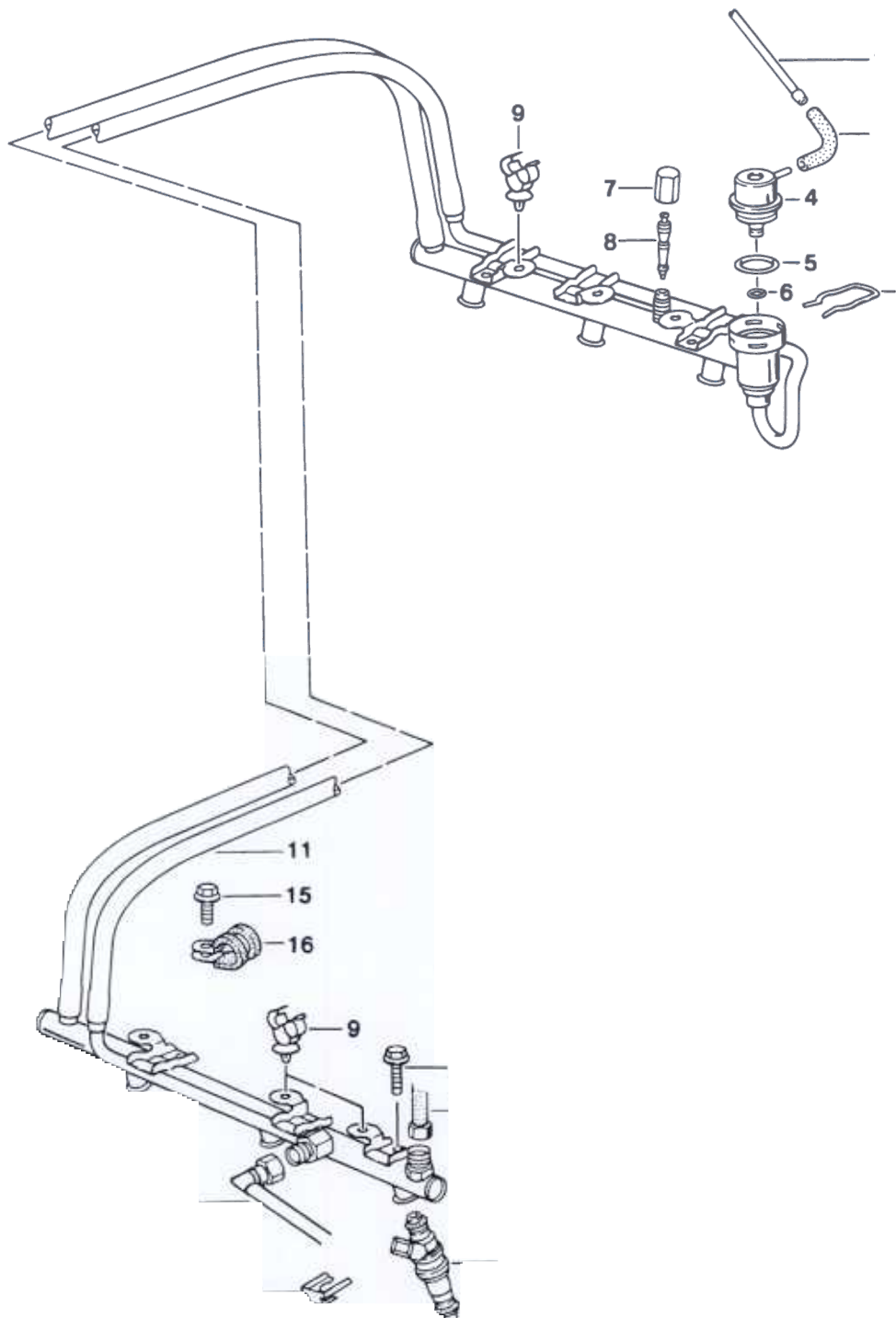
The fuel level sensor system has now been calibrated.

Note

The fuel level sensor system need not be calibrated if the battery was disconnected or a plug connection on the instrument cluster or fuel level sensor was removed. The values remain stored in the instrument cluster.

A range on remaining fuel of less than 15 km is not displayed in the instrument cluster.

Disassembling and assembling fuel ring pipe



Disassembling and assembling fuel ring pipe

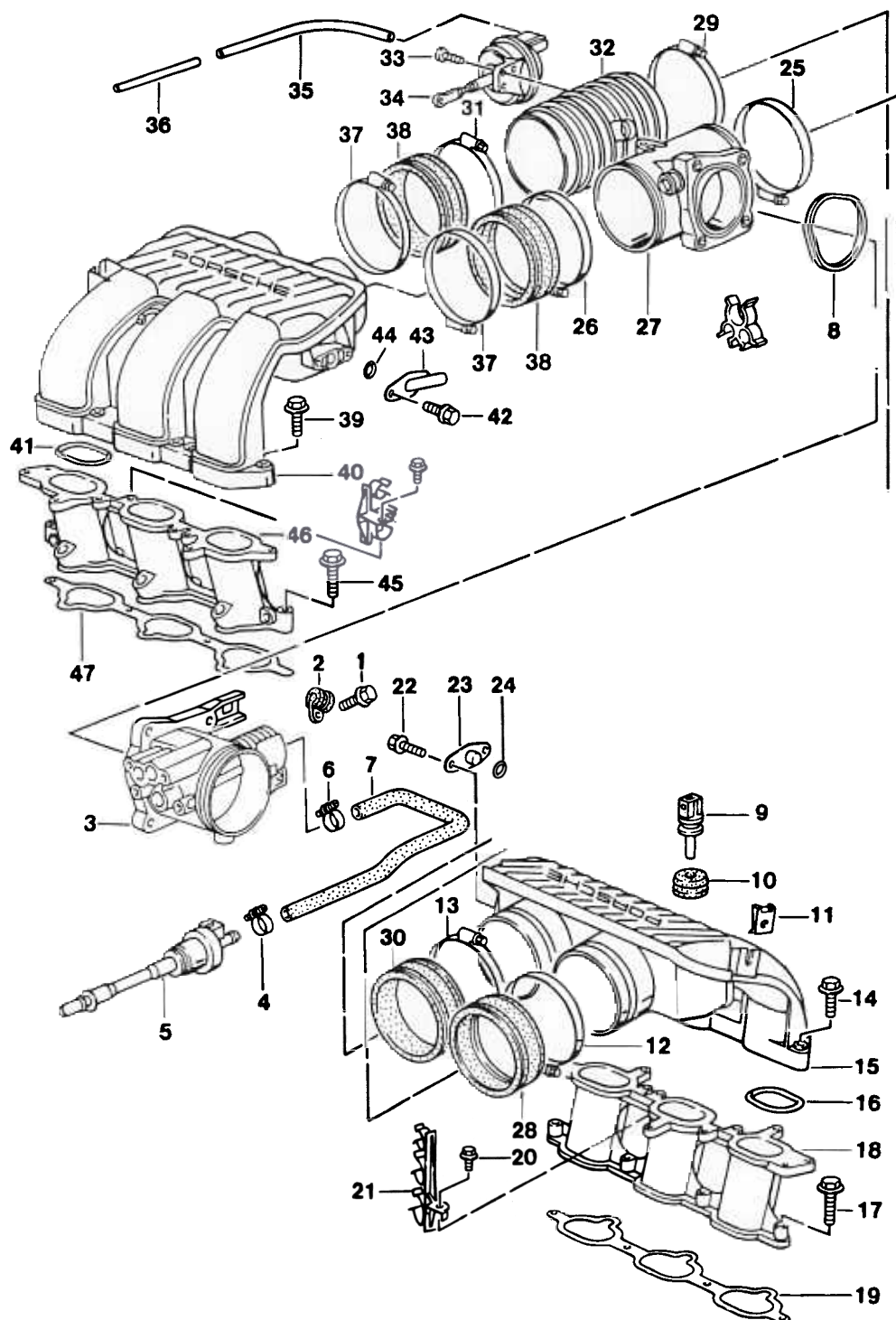
No.	Designation	Qty.	Removal	Note:
				Installation
1	Protective sheath	1		
2	Pipe 4 x 1 (420 mm long)			
3	Clamp	1		Ensure correct seating
4	Pressure regulator	1		
5	O-ring	1		Replace
6	O-ring	1		Replace
7	Closure cap	1		Note The seal or sealing ring in the closure cap is not exchangeable. It must therefore be used only once . Tightening torque: 2.5 ±0.5 Nm (2.0 ±0.5 ftlb.) (Wrench size 13 mm)
8	Valve	1	Unscrew using a commercially available valve tool	Screw in using a commercially available valve tool
9	Cable retainer	3		
10	Hexagon-head bolt	4		
11	Fuel ring pipe	1		
12	Clamp	6		Ensure correct seating
13	Injection valve	6		
14	O-ring	6		Replace
15	Hexagon-head bolt			
16	Fastening clamp			

No.	Designation	Qty.	Removal	Note:
				Installation
17	Fuel supply line M16 x 1.5	1	Ensure it is countered with a wrench while being loosened	Tightening torque: 30 + 5 Nm (22 + 3.5 ftlb.). (Wrench size 19 mm) Counter with a wrench while tightening, wrench size 19 mm.
18	Fuel return line M14 x 1.5	1	Ensure it is countered with a wrench while being loosened	Tightening torque: 25 ± 5 Nm (19 ± 3.5 ftlb.). (Wrench size 19 mm) Counter with a wrench while tightening, wrench size 17 mm.

Note on No. 13 (injection valve)

As of **Y-range** (model year 2000) modified injection nozzles with improved injection spray. Identified by plug housing with different colour (colour: light green). Old injection valves (colour: blue) must no longer be installed in engines manufactured from model year 2000 onwards. Mixed configuration is permissible for all engines manufactured before model year 2000.

Disassembling and assembling intake distributor



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Disassembling and assembling intake distributor

No.	Designation	Qty.	Removal	Note:
				Installation
1	Hexagon-head bolt 6.0 x 16	4		
2	Fastening clamp	1		
3	Throttle body	1		
4	Hose clamp	1		
5	Fuel evaporative valve	1		
6	Hose clamp	1		
7	Vent line	1		
8	Sealing ring	1		Check, replace if necessary
9	Temperature sensor for engine compartment	1		Check for correct seating
10	Grommet	1		Check for correct seating
11	Sheetmetal nut M6	1		
12	Hose clamp	1		
13	Hose clamp	1		
14	Hexagon-head bolt 6 x 35	6		
15	Intake distributor on cylinder bank 4 - 6	1		
16	Gasket	3		Replace
17	Hexagon-head bolt M6 x 35	4		
18	Intake fitting on cylinder bank 4 - 6	1		
19	Gasket	1		Replace
20	Hexagon-head bolt	1		

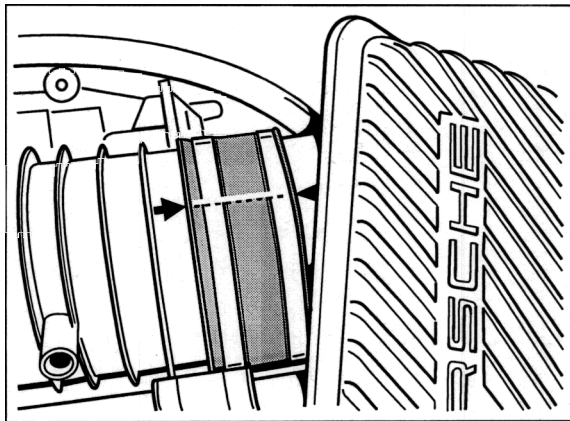
No.	Designation	Qty.	Removal	Note:	
				Installation	
21	Holder				
22	Hexagon-head bolt 6.0 x 16	2			
23	Closure cap				
24	O-ring 11 x 2.5	1		Replace	
25	Hose clamp	1			
26	Hose clamp				
27	Adapter	1			
28	Rubber sleeve	1		Check, replace if necessary	
29	Hose clamp	1			
30	Rubber sleeve	1		Check, replace if necessary	
31	Hose clamp				
32	Adapter with tuning flap	1		Position facing intake distributor	
33	Screw M5 x 16	2			
34	Vacuum modulator				
35	Hose	1			
36	Pipe 4 x 1 (420 mm long)	1			
37	Hose clamp	2			
38	Rubber sleeve	2		Check, replace if necessary	
39	Hexagon-head bolt M6 x 35	6			
40	Intake distributor on cylinder bank 1 - 3	1			
41	Gasket	1			
42	Hexagon-head bolt 6.0 x 16	1			

No.	Designation	Qty.	Removal	Note:
				Installation
43	Adapter	1		
44	O-ring	1		Replace
45	Hexagon-head bolt M6 x 35	4		
46	Intake fitting on cylinder bank 1 - 3	1		
47	Gasket	1		

Assembly instructions

Position adapter (tuning part) to face the intake distributor.

Turn the adapter accordingly until the arrow on the adapter is lined up with the arrow on the intake distributor.



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24 70 Programming DME control module

General

When a DME control module is replaced, the new DME control module must be programmed. This sets the new DME control module to the catalytic converter version installed, among other things.

Three catalytic converter versions are available in the Porsche System Tester 2:

1. OBD II control module
2. RoW control module
3. German control module
(tri-metal catalytic converter)

Note:

The OBD II control module is installed only in **USA vehicles**.

Work preparation

The following vehicle data must be provided before programming of the new DME control module can begin:

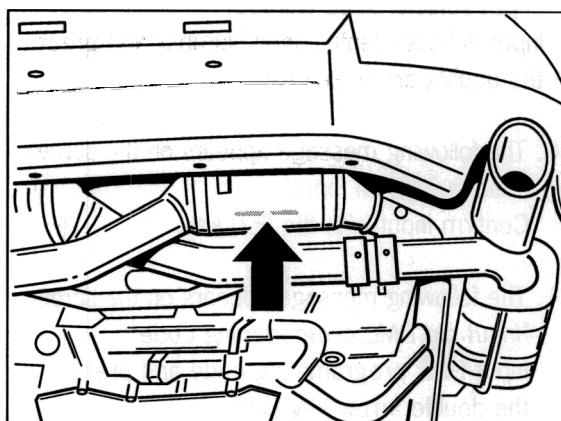
Vehicle Ident. No.

Catalytic converter item No. corresponding to the catalytic converter version used

DME and immobilizer programming codes (from the Porsche IPAS system)

With the information about the *Vehicle Ident. Number* and *catalytic converter item number*, the associated programme can be selected from the allocation table.

Figure 307_98 shows where the catalytic converter item number can be found on the vehicle.




Catalytic converter item number

307_98

Programming

1. Connect and switch on the Porsche System Tester 2 and switch on the ignition.
2. Select **911 (996)** in the *Vehicle type* menu.
3. Select **DME** in the *Control unit* menu and press the double arrow key [$>>$].
4. Select *Program control unit* in the *DME function selection* menu and press the double arrow key [$>>$].

5. Select "Read control units" and press the double arrow key [➤].
 6. Install new DME control module.
 7. Select **Program control unit** in the *Control unit programming* menu and press the double arrow key [➤].
 8. Ensure that all requirements requested on the screen are fulfilled and then press the double arrow key [➤].
 9. The following message appears on the screen:
"Input Vehicle Ident. Number".
Input Vehicle Identification Number and press the double arrow key [➤].
 10. The following message appears on the screen:
"Please confirm input"
Confirm input with the [F7] key.
 11. The following message appears on the screen:
"Input old DME programming code"
Input DME programming code and press the double arrow key [➤].
 12. The following message appears on the screen:
"Please confirm input"
Confirm input with the [F7] key.
 13. The following message appears on the screen:
"Input new programming code"
Input new DME programming code and press the double arrow key [➤].
 14. The following message appears on the screen:
"Please confirm input"
Confirm input with the [F7] key.
 15. The following message appears on the screen:
"Input new immobilizer code"
Input immobilizer code and press the double arrow key [➤].
 16. The following message appears on the screen:
"Please confirm input"
Confirm input with the [F7] key.
 17. The following message appears on the screen:
"Select data record"
Select data record according to the allocation table and press the double arrow key [➤].
- The control module will now be programmed.
Programming will take approx. 5 minutes.
-  **Warning:**
> Never interrupt the programming process
18. The following message will appear after the programming time has elapsed:
"Programming was completed successfully"
Press the double arrow key [➤], switch the ignition off and then on again.
- This completes programming of the DME control module.

Catalytic converter version	Vehicle Ident. Number	Catalytic converter item number
OBD II control module	WP0xx2xxxWxxxxxxx	996.113.021.53 996.113.022.53
RoW control module	WP0ZZZxxxWxxxxxxx	996.113.021.52 996.113.022.52
German control module (tri-metal catalytic converter)	WP0ZZZxxxWxxxxxxx	996.113.021.54 996.113.022.54
OBD II control module	WP0xx2xxxXxxxxxxx	996.113.021.53 996.113.022.53
RoW control module	WP0ZZZxxxXxxxxxxx	996.113.021.52 996.113.022.52
German control module (tri-metal catalytic converter)	WP0ZZZxxxXxxxxxxx	996.113.021.54 996.113.022.54

Allocation table

Note:

The DME control module can also be reprogrammed using the Porsche System Tester 2.

In this case, the old data record will be overwritten by a new record (e.g. RoW instead of Germany)

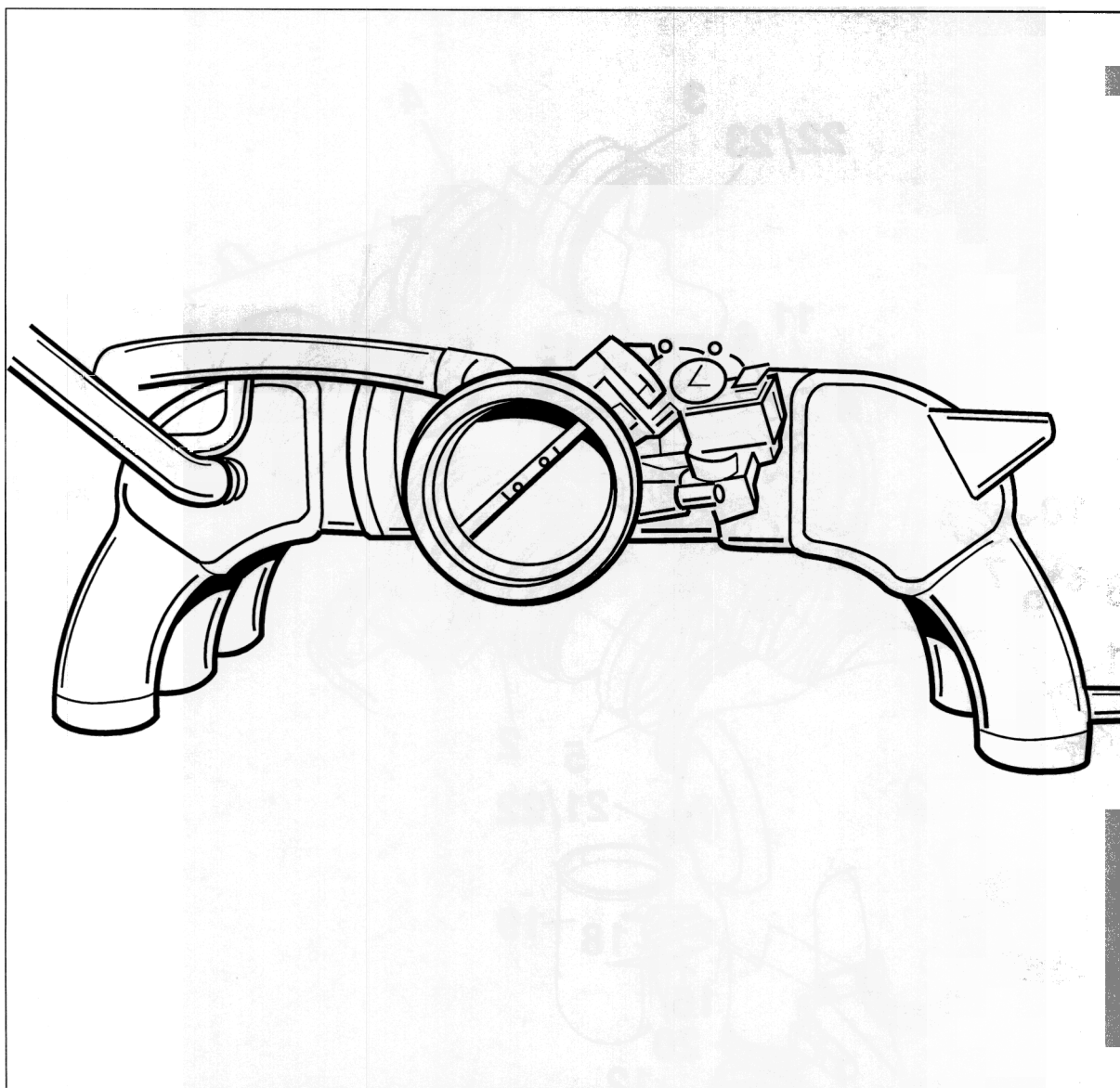
Program map/data must be selected in Step 7 if reprogramming is necessary.

**Warning:**

Risk of damage if allocation is incorrect

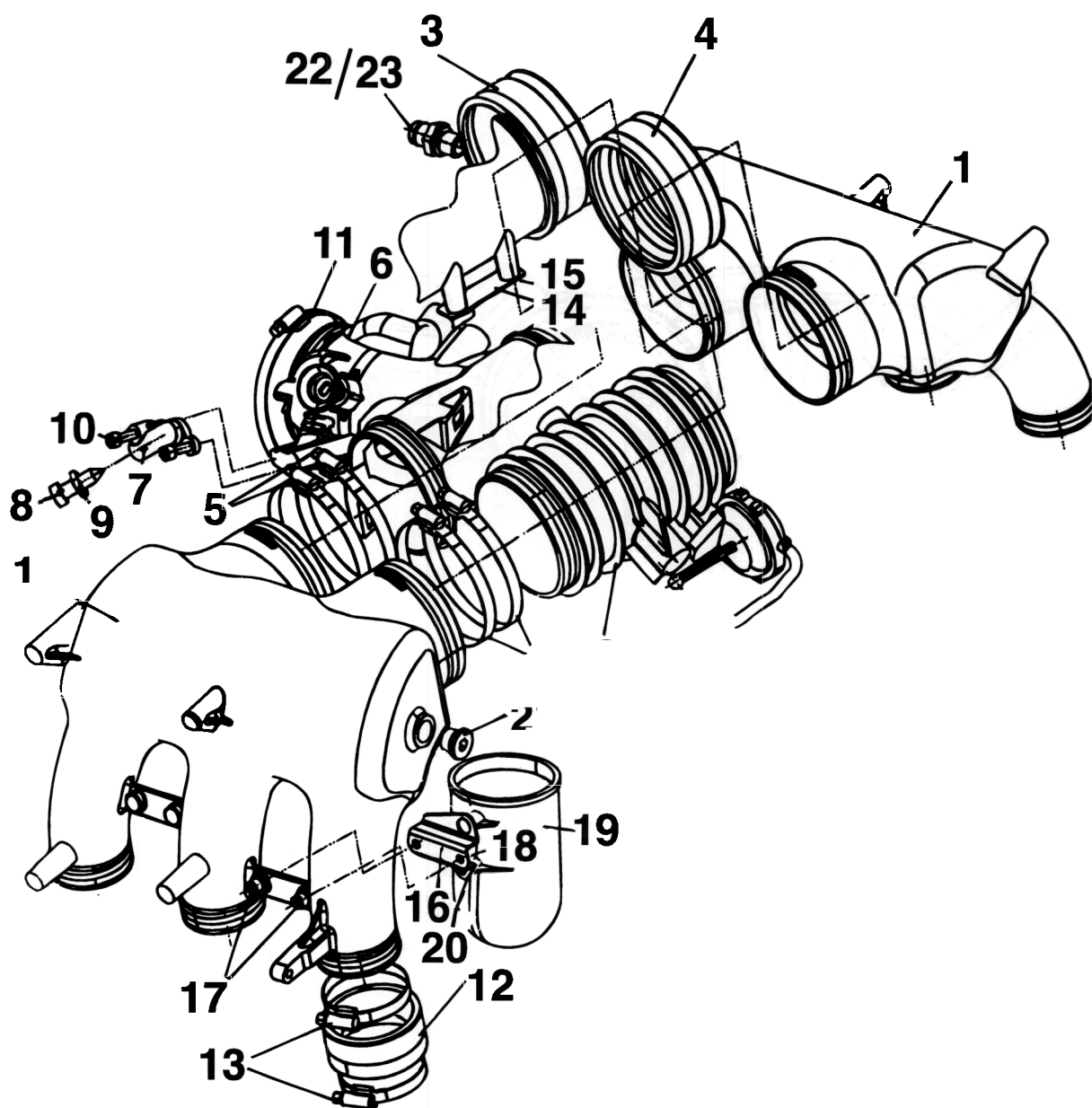
- > Ensure correct allocation of the data record in the control module to the installed catalytic converter (refer to the allocation table)

24 46 37 Disassembling and assembling intake distributor – GT3



275_99

Disassembling and assembling intake distributor – GT3



353_99

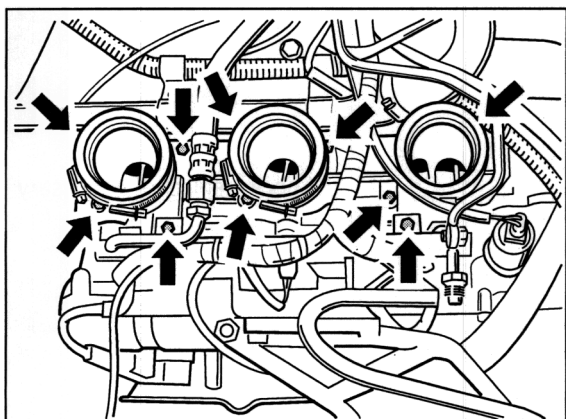
Disassembling and assembling intake distributor – GT3

No.	Designation	Qty.	Removal	Note:	Installation
	Intake distributor, left/right	2			
2	Tuning pipe	1			
3	Rubber sleeve	1			Check, replace if necessary
4	Rubber sleeve	3			Check, replace if necessary
5	Hose clamp 90 - 150	8			
6	Throttle body				
7	Idle speed control housing	1			
8	Adjusting screw	1			
9	Hexagon nut M12	1			
10	Combination screw M6 x 20	2			
11	Hose clamp 70 - 90	2			
12	Rubber sleeve D-48	6			Check, replace if necessary
13	Hose clamp 50 - 70	12			
14	Switch-over valve holder	1			
15	Combination screw M6 x 12	2			
16	Vacuum tank retaining bracket	1			
17	Combination screw M6 x 35	2			
18	Collar nut M6	2			
19	Vacuum tank	1			
20	Oval-head screw 5 x 22	2			
21	Screw plug M16 x 1.5	1			
22	Sealing ring 16 x 20 (aluminium)	1			Replace

No.	Designation	Qty.	Removal	Note:	installation
23	Flange for vacuum	1			

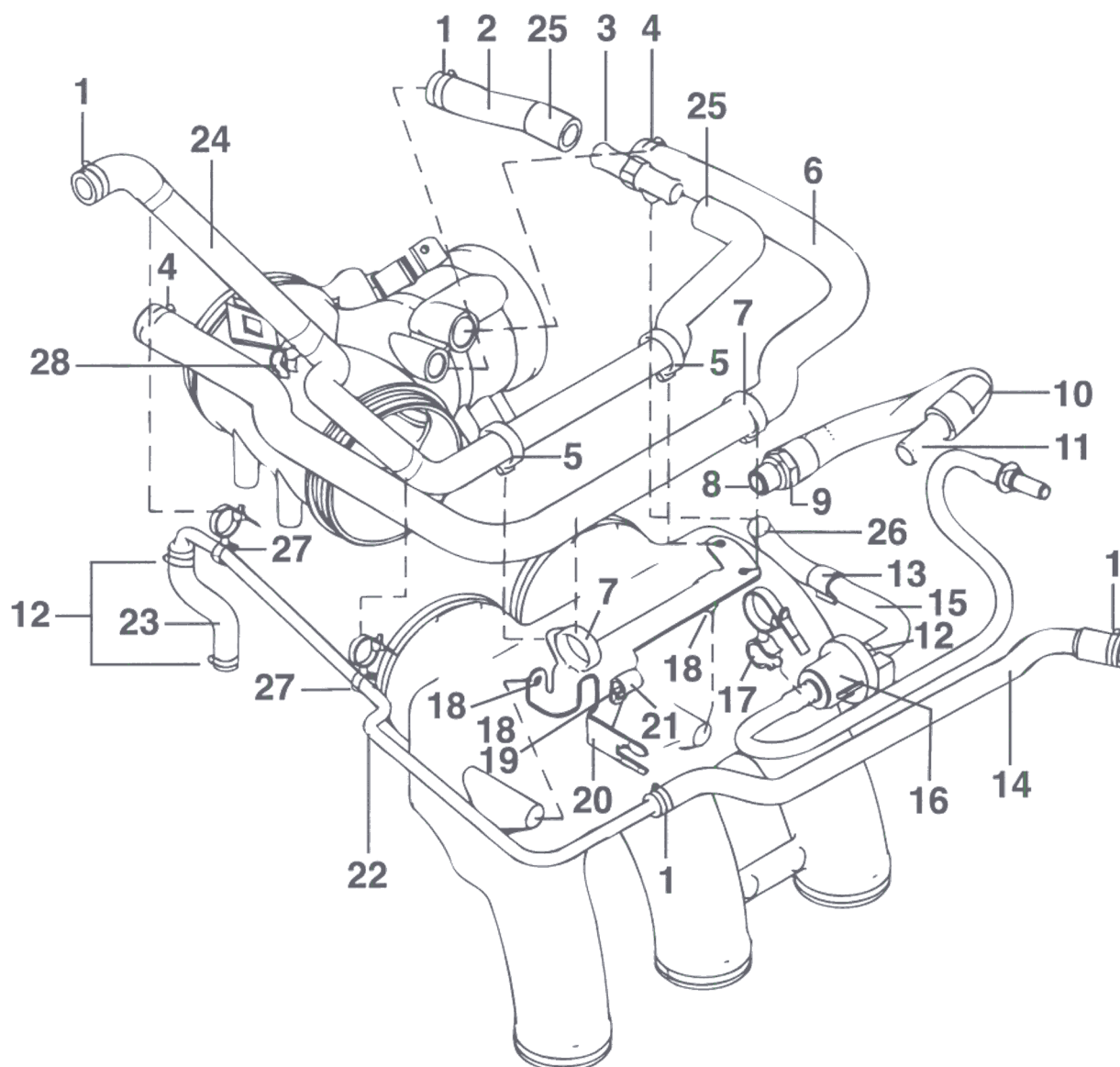
Removing and installing intake pipe – GT3

1. Undo the two holders for the coolant lines
2. Undo the nine fastening screws and take off the intake pipe. For reinstallation, the seal between the cylinder head and intake pipe must be replaced. The screws are tightened to 9.7 Nm (7.0 ftlb.).



214_99

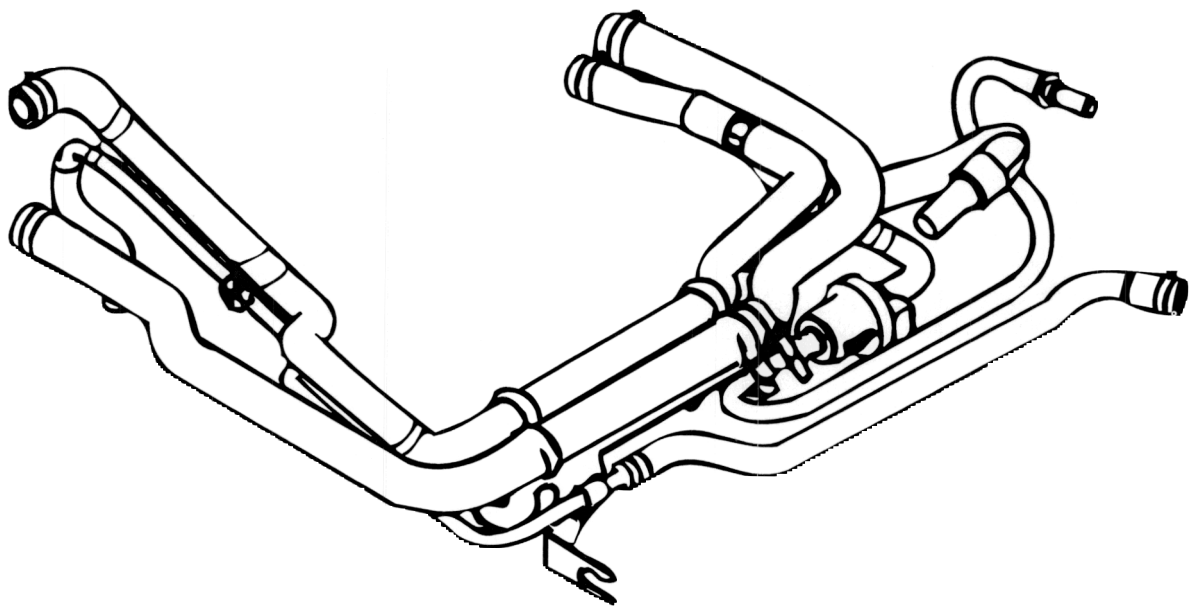
Hose routing plan – GT3



421_99

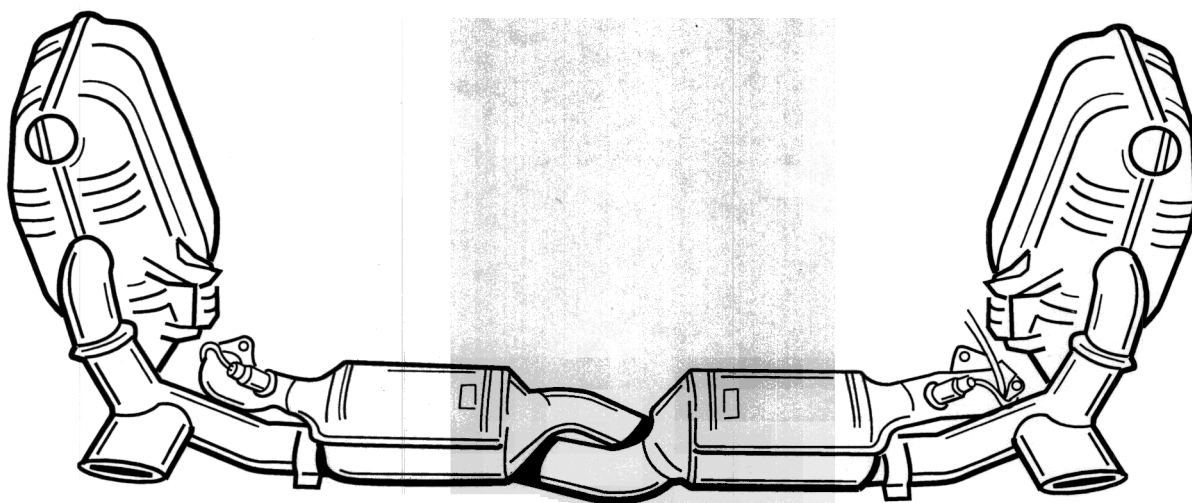
No.	Designation	Qty.	Removal	Note:	Installation
1	12-22/9 hose clamp	4			
2	Oil tank vent hose for partial load				
3	T-piece				
4	16-27/9 hose clamp	2			
5	22x18.5 fastening clip	2			
6	Oil tank vent hose for full load	1			
	24.8x22. retaining clip	2			
8	16x20 seal	1			Replace
9	Neck	1			
10	Vacuum hose	1			
11	Neck	1			
12	8-16/9 hose clamp	3			
13	B 13.5 clip	1			
14	Vent hose between oil cooler and expansion tank	1			
15	Tank vent line	1			
16	Tank vent line with valve	1			
17	8-3/13 combination clip	1			
18	M 6x12 hexagon-head bolt	3			
19	M 6 hexagon-head bolt	1			
20	Combination holder	1			
21	8x15 hose holder	1			
22	Vent pipe	1			

No.	Designation	Qty.	Removal	Note:	installation
23	Vent hose	1			
24	Oil tank vent hose for full partial load	1			
25	19.2-21.8 single-lug clip	2			
26	12-14 single-lug clip				
27	10-52/8-9 combination clip	2			
28	20.0/24.5 hose holder	1			



433_99

26 01 19 Removing and installing exhaust system – GT3



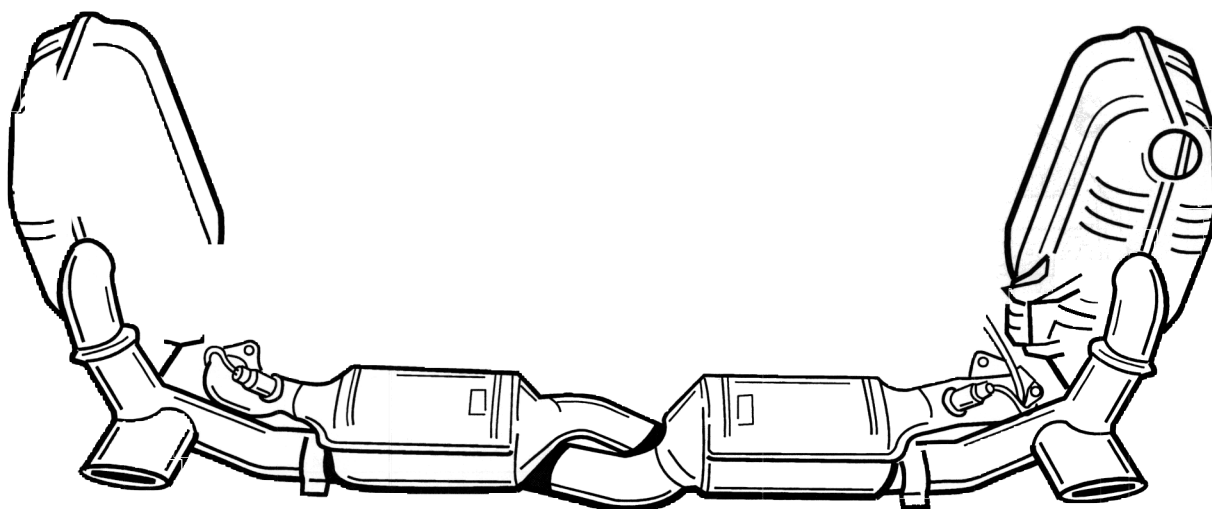
272_99

Includes:

26 01 21 Removing exhaust system – GT3

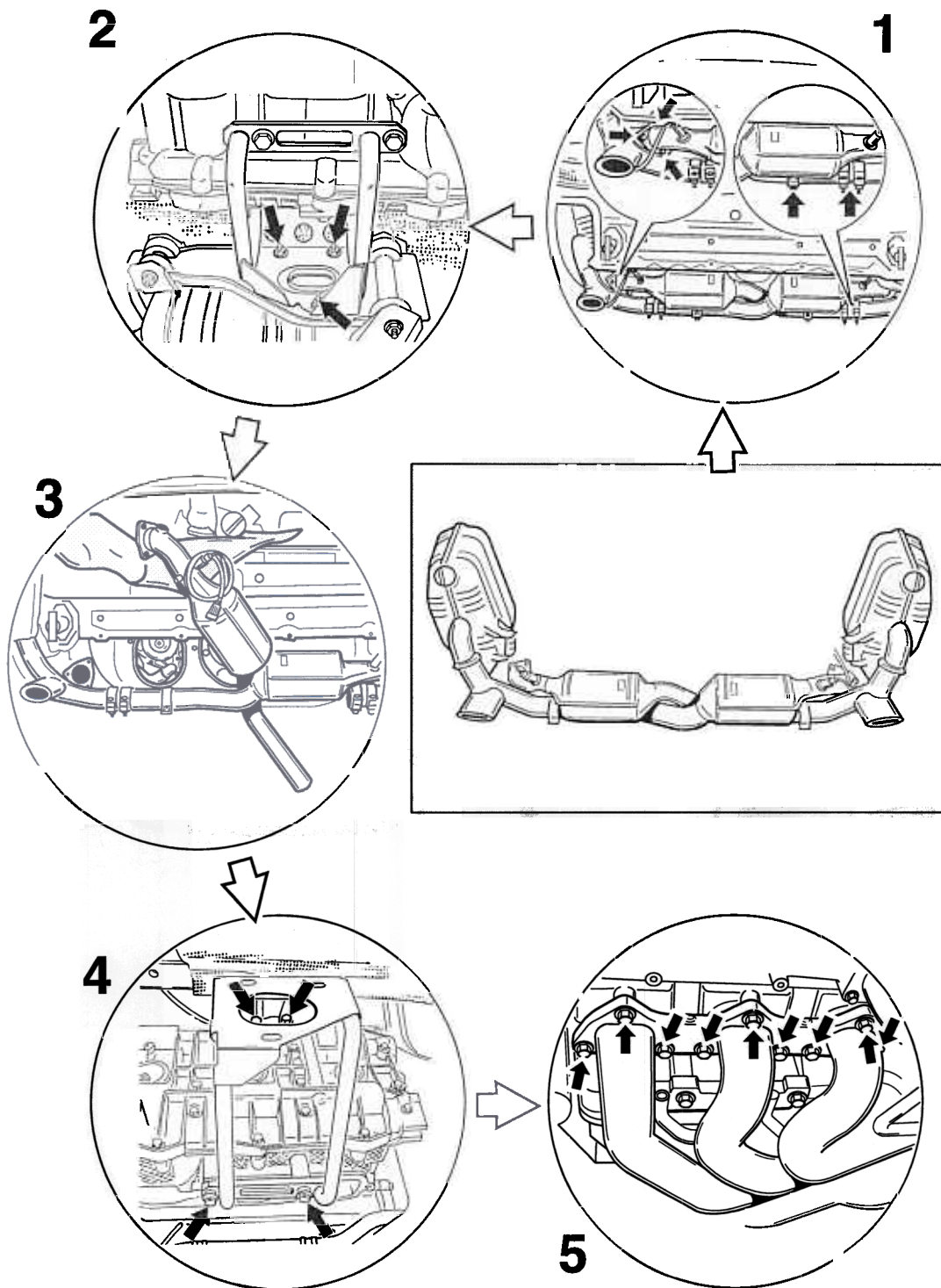
26 01 23 Installing exhaust system – GT3

26 01 21 Removing exhaust system – GT3



272_99

Removal overview of the exhaust system – GT3



350_99

Removal overview of the exhaust system – GT3

Preliminary work:

Disassemble the accessories of the rear spoiler Serv. No. 6355 (contains: rear end, bottom centre heat shield and bumpers).

- 1 Undo fastening clamps
- 2 Remove end mufflers
- 3 Remove catalytic converters
- 4 Remove rear muffler holders
- 5 Undo exhaust manifolds

Removing exhaust system – GT3

No. Procedure

Instructions

1

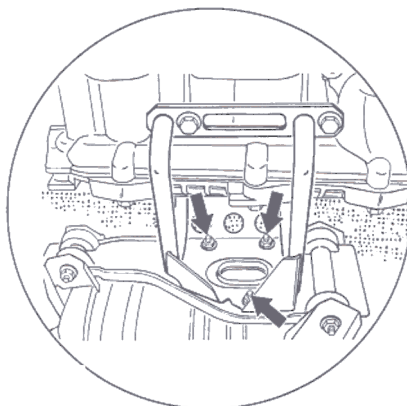


350_b_99

Undo fastening clamps

Undo the two exhaust clamps between the catalytic converter and the rear muffler. Undo the fastening clamp on the support sheet and remove.

2

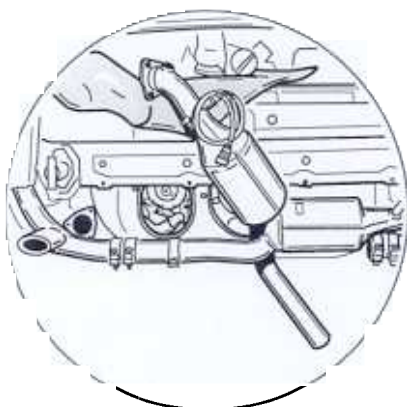


350_a_99

Remove end mufflers

Remove both end mufflers. Undo the three fastening screws on the left and right of each to do this.

3



350_c_99

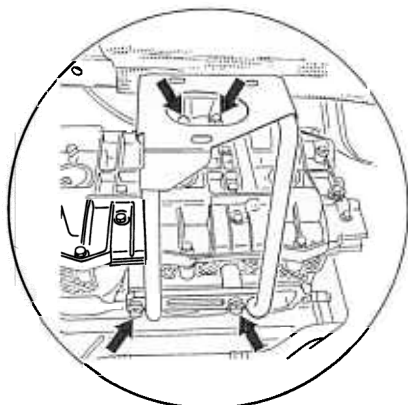
Remove catalytic converters

Unclip oxygen sensor cable and unplug. Undo the three fastening screws on the exhaust manifold. Carefully lift the catalytic converter up and off.

No. Procedure

Instructions

4

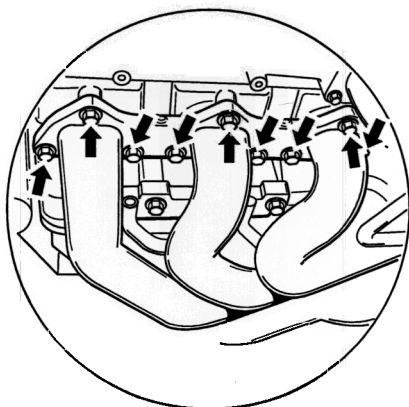


350_d_99

Remove rear muffler holder

To disassemble the holder on the rear muffler, undo the four fastening screws on the left and right of the cylinder head respectively.

5

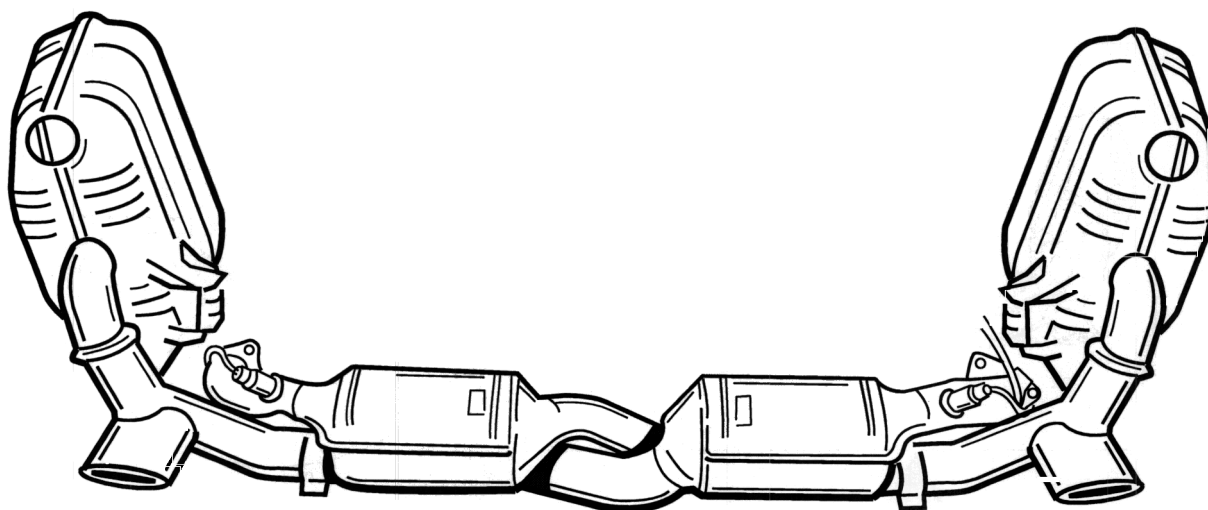


350_e_99

Remove exhaust manifolds

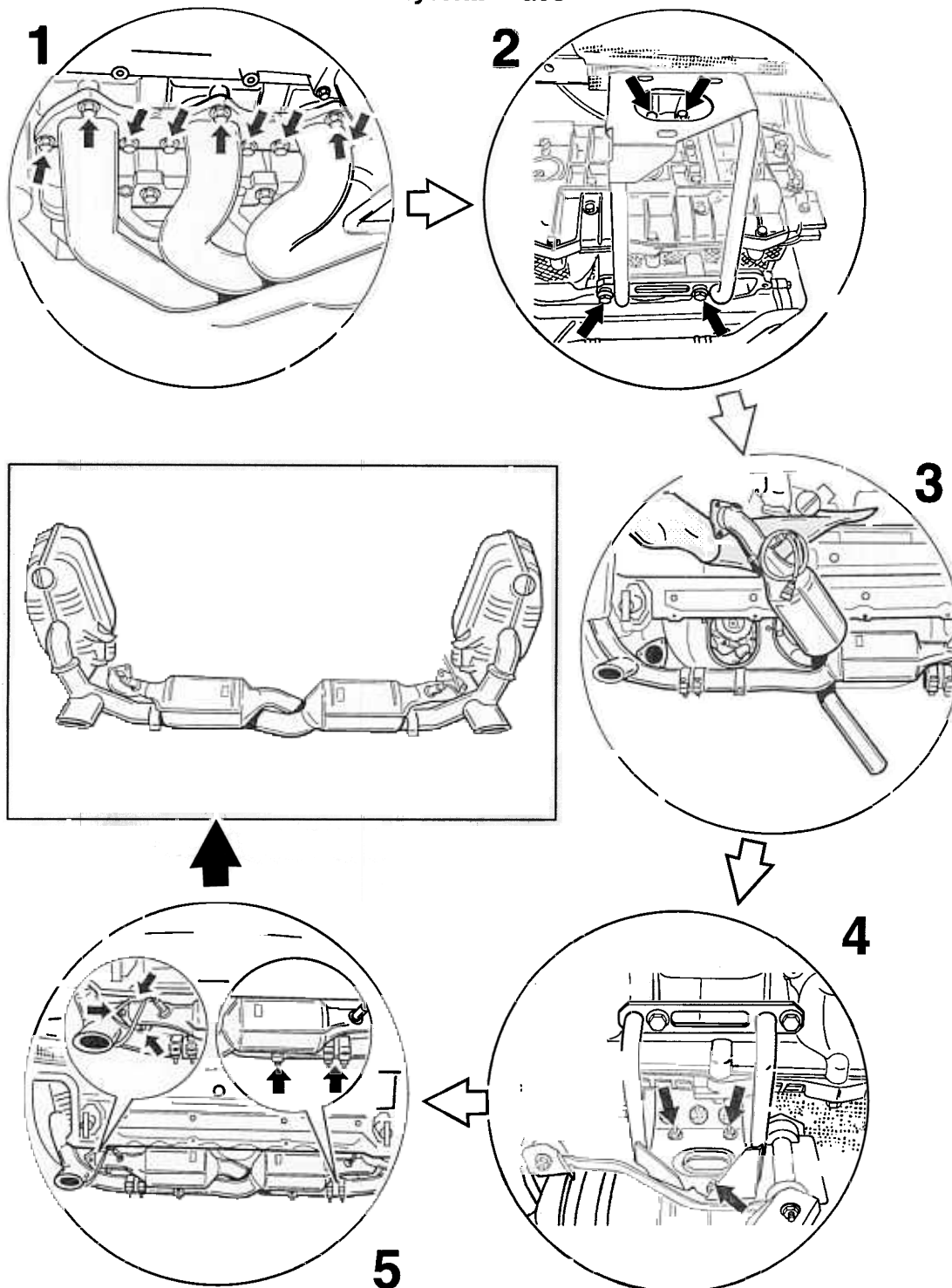
Undo the nine fastening screws of the exhaust manifolds on the left and right of the cylinder head respectively. Remove exhaust manifolds. Do not use the seal between the cylinder head and the exhaust manifolds again.

26 01 23 Installing exhaust system – GT3



272_99

Installation overview of the exhaust system – GT3



351_99

Installation overview of the exhaust system – GT3

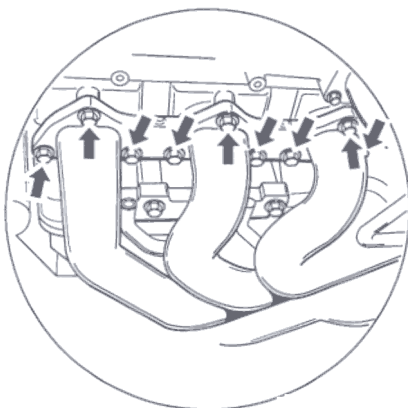
- 1 Tighten exhaust manifolds
- 2 Tighten rear muffler holder
- 3 Install catalytic converters
- 4 Install end mufflers
- 5 Tighten fastening clamps

Installing exhaust system – GT3

No. Procedure

Instructions

1

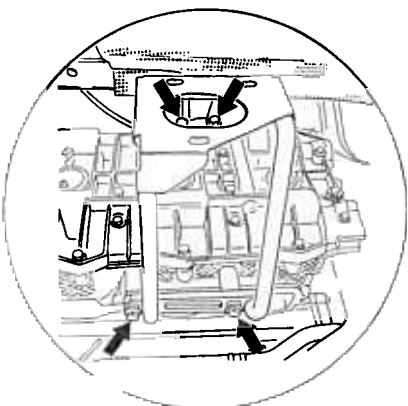


350_e_99

Tighten exhaust manifolds

Position exhaust manifold with new seal. Tighten the nine hexagon-head bolts on the cylinder head to 25 Nm (19 ftlb.).

2

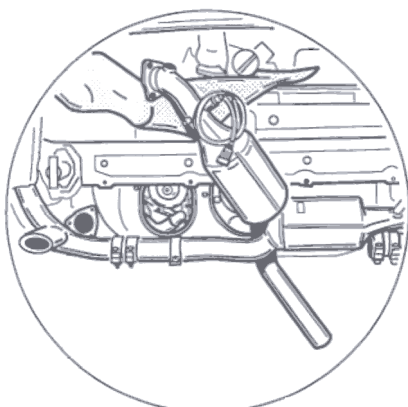


350_d_99

Install holder for rear muffler

Position holder for rear muffler. Tighten the four fastening screws to 23 Nm (17 ftlb.).

3



350_c_99

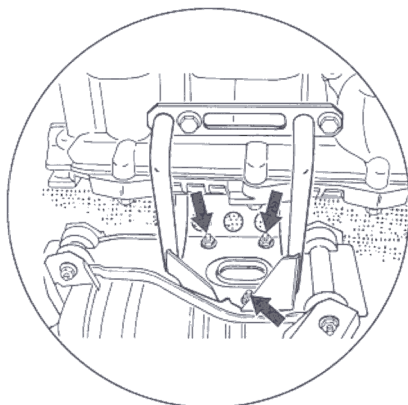
Install catalytic converters

Position catalytic converter on exhaust manifold with new seal. Tighten the three fastening screws on the exhaust manifold to 30 Nm (22 ftlb.) Fit fastening clamp between catalytic converter and engine holder in horizontal position if possible and tighten.

No. Procedure

Instructions

4

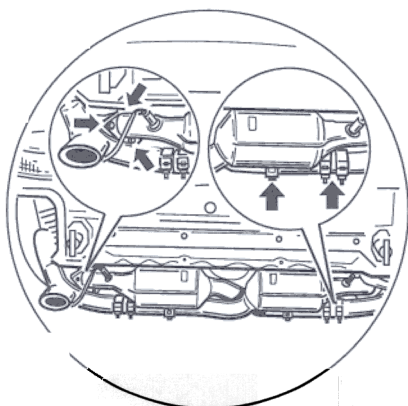


350_a_99

Install rear mufflers

Before assembling the rear mufflers, make sure that the two fastening clamps for each are fitted. Insert rear muffler into the catalytic converter. Screw rear muffler onto rear muffler holder. Tighten the hexagon-head bolts to max. 23 Nm (17 ftlb.).

5



350_b_99

Tighten exhaust clamps

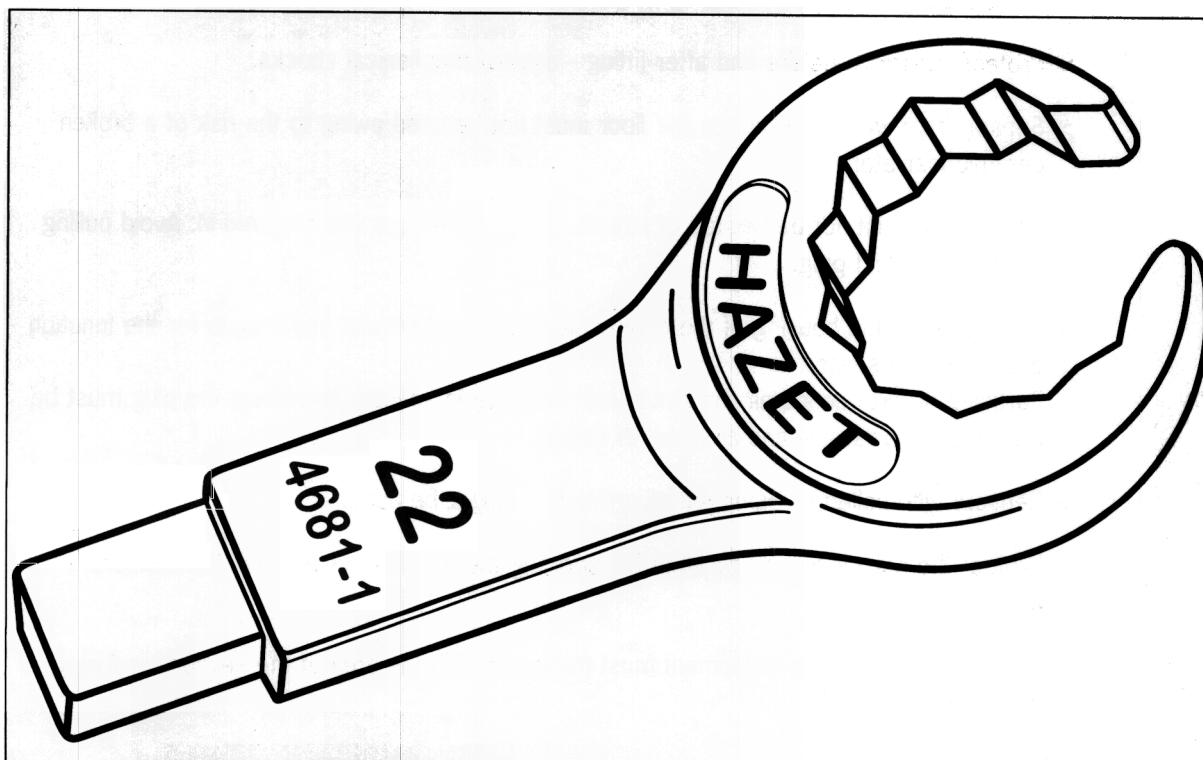
Move the two exhaust clamps between each catalytic converter and rear muffler to horizontal position if possible. Tighten exhaust clamps.

Fit rear spoiler

Fit the accessories of the rear spoiler Serv. No. 6355 (contains: rear end, centre heat shield and bumpers).

26 73 20 Removing and installing catalytic converters – engine installed

Tools



26730001

Item	Designation	Special tool	Explanation
	Open ring wrench (angled)	Commercially available	Refer to Workshop Equipment Manual, Chapter 2.4, No. 96-3



Caution!

Oxygen sensor can be damaged if handled improperly.

- > Do not remove the plastic cap on the thread until just prior to fitting the oxygen sensor. The thread grease must under no circumstances come into contact with the plug.
- > Protect sensors – before and after fitting – against mechanical shocks.
- > Sensors that were dropped on the floor must not be used owing to the risk of a broken ceramic insulator.
- > The cables must not be twisted or kinked when the sensors are screwed in. Avoid pulling on the cable and plug.
- > Cleanliness in the housing of the plug connections is of utmost importance for the function of the oxygen sensor.
Particles of dirt can impair the function of the oxygen sensor. Therefore, the plug must be protected against any and all types of soiling.

Sensors with soiled or damaged plug must no longer be used.

Protect the cables and plugs when transporting the exhaust system with the sensors already fitted.

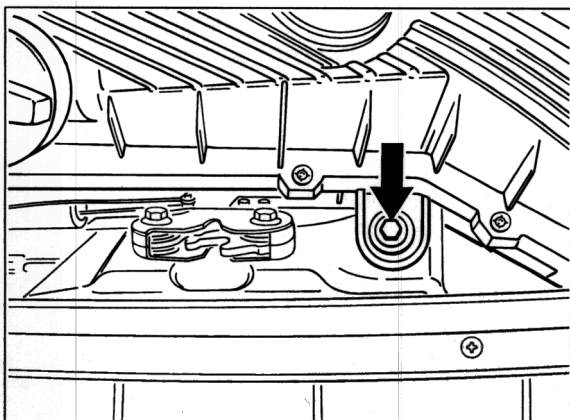
- > High-pressure cleaning equipment must not be used in the area of the sensors and plug connections.

Removing and installing catalytic converters

Removal

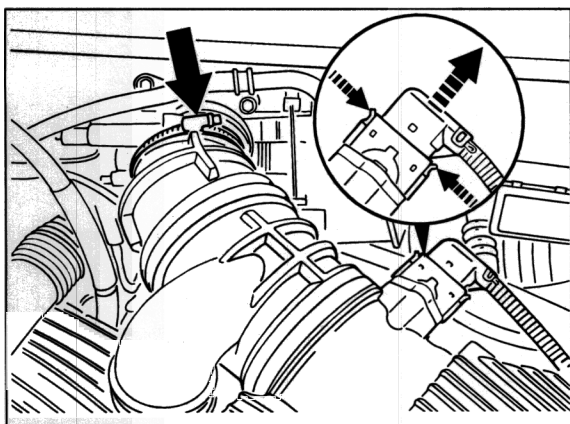
1. Remove air cleaner assembly:

- 1.1 Undo hexagon-head bolt M6 x 34 (wrench size 13).



261_97

- 1.2 Undo hose clamp on throttle body and pull plug off the mass air flow meter. Unclip wire on air cleaner housing and remove air cleaner assembly.



249_97

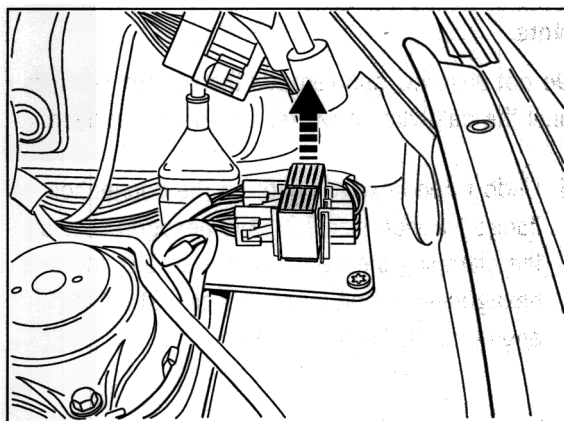
Sequence when removing the catalytic converters:

Remove catalytic converter of cylinder bank 4 - 6

1. In the engine compartment, pull the oxygen sensor plug connection from its holder, unlock and disconnect.

Black connector – oxygen sensor in front of the catalytic converter

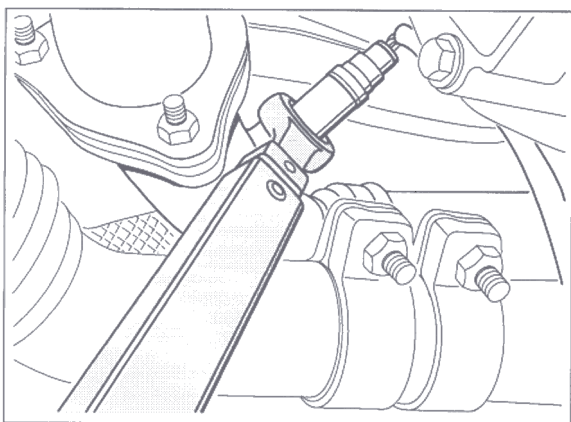
Grey connector – oxygen sensor behind the catalytic converter



26730004

2. Unclip cable on engine carrier.

3. Undo oxygen sensors, e.g. using a commercially available open-end ring wrench (wrench size 22).



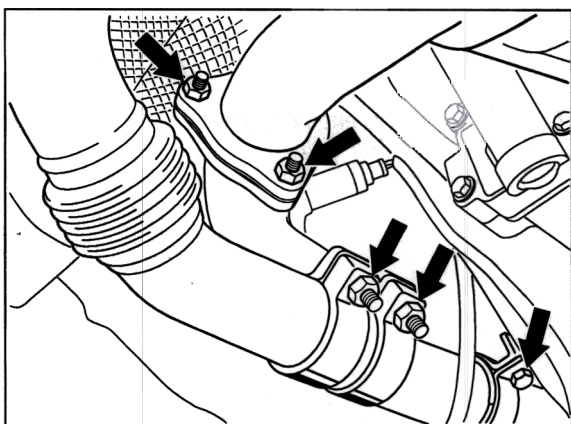
26730002

5. Remove catalytic converter for cylinder bank 4 – 6, taking care not to damage the loosened oxygen sensors.
6. Unscrew the oxygen sensors whilst simultaneously turning the cable with them.

Note

Do not unscrew and remove the oxygen sensors until the catalytic converter has been removed.

4. Undo three hexagon nuts on the connection flange (wrench size 13), two hexagon nuts on the clamping sleeve (wrench size 17) and one hexagon-head bolt (wrench size 13) on the engine carrier holding clamp.



26730005

Installation

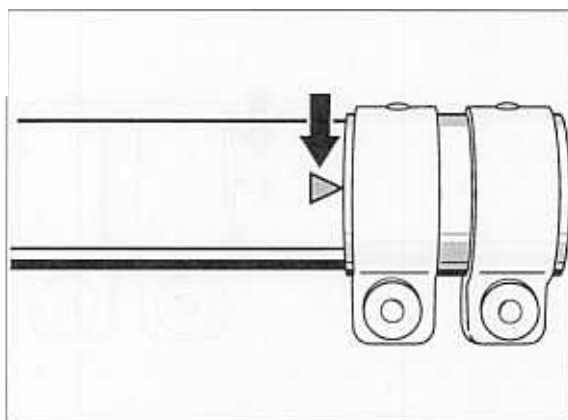
1. Fasten oxygen sensors with open-end ring wrench.
Tightening torque 50 - 60 Nm (37 - 44 ftlb).

Note

Different values if the suggested tool is used:
Tightening torque 50 Nm (37 ftlb.)

2. Slide a **new** clamping sleeve onto the catalytic converter tube.
3. Fit catalytic converter with new seal. Fasten "three-point flange".
4. Align clamping sleeve. The position is designated by embossed arrowheads. The clamping sleeve is position in the centre between the arrowheads. Tighten clamping sleeve. Tightening torque 46 Nm (34 ftlb.)

6. Route the oxygen sensor cable to the plug connection in the engine compartment.
"Black" plug connection to "black" plug of the oxygen sensor.
"Grey" plug connection to "grey" plug of the oxygen sensor.
(black – in front of catalytic converter)
(grey – behind catalytic converter)



26730003

5. Fasten the fastening clamp between catalytic converter and engine carrier.

Remove catalytic converter of cylinder bank 1 - 3

1. In the engine compartment, pull the oxygen sensor plug from its holder, unlock and disconnect.
2. Unclip cable on engine carrier.
3. Undo oxygen sensors using a commercially available open-end ring wrench (wrench size 22).

Note:

The oxygen sensor **behind the catalytic converter** must be removed for reasons of space.

4. Loosen the connection flange, clamping sleeve and holding clamp on the engine carrier.
5. Remove catalytic converters.
6. Unscrew oxygen sensor **in front of catalytic converter**.

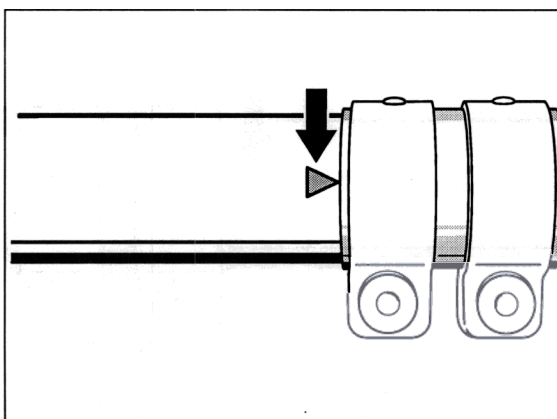
Installation

1. Fasten oxygen sensors with open-end ring wrench.
Tightening torque 50 - 60 Nm (37 - 44 ftlb).

Note

Different values if the suggested tool is used:
Tightening torque 50 Nm (37 ftlb.)

2. Slide a **new** clamping sleeve onto the catalytic converter tube.
3. Fit catalytic converter with new seal. Fasten "three-point flange".
4. Align clamping sleeve. The position is designated by embossed arrowheads. The clamping sleeve is positioned in the centre between the arrowheads. Tighten clamping sleeve. Tightening torque 46 Nm (34 ftlb.)



26730003

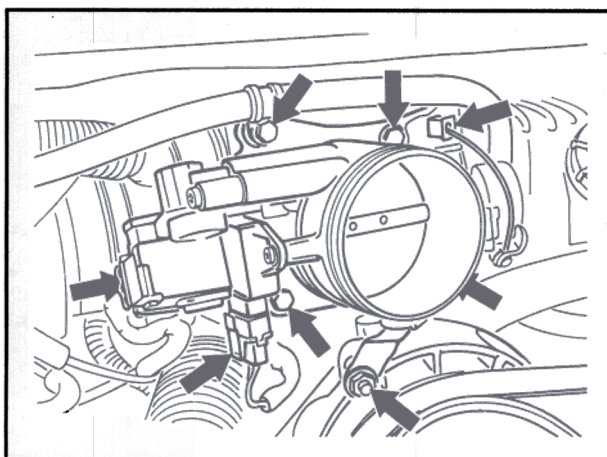
5. Fasten the fastening clamp between catalytic converter and engine carrier.

6. Fasten oxygen sensor **behind catalytic converter**.
7. Route the oxygen sensor cable to the plug connection in the engine compartment.
"Black" plug connection to "black" plug of the oxygen sensor.
"Grey" plug connection to "grey" plug of the oxygen sensor.
(black – in front of catalytic converter)
(grey – behind catalytic converter)

27 60 19 Removing and installing starter

Removal

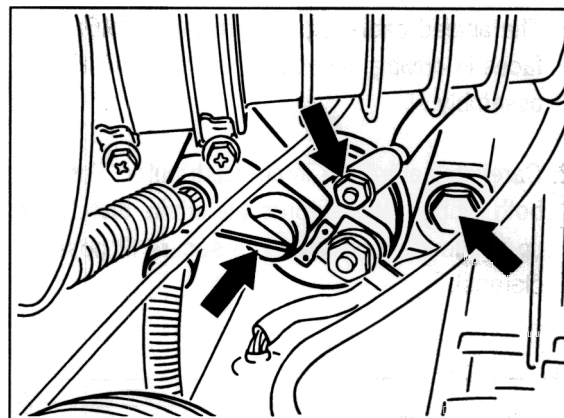
1. Disconnect the battery and cover the terminal or battery. Remove the complete air cleaner assembly.
2. Disconnect the line from the tank venting valve and the electrical plug connection. Disconnect the electrical plug connections at the idle speed positioner and throttle potentiometer.
3. Disengage accelerator cable and remove throttle body. Pull off vacuum check valve.



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4. Disconnect the vent line for the oil separator at the intake distributor. Undo all hose clamps (4 ea.) at the intake distributor and push the rubber sleeves to the side. Pull out intake distributor to the rear.

5. Pull back protective cap on the starter cable and undo cable terminal 30 (M8) and terminal 50 (M6) at the starter.



103 - 97

6. Undo the upper fastening screw. To do this, use the following 3/8 inch tool: 3 long extensions, cross handle, universal joint and hexagon socket wrench insert a/f 15. The joints can be secured using adhesive tape.
7. Undo the lower fastening screw from the right generator mounting side.
8. Carefully remove the starter from the engine compartment to the rear.

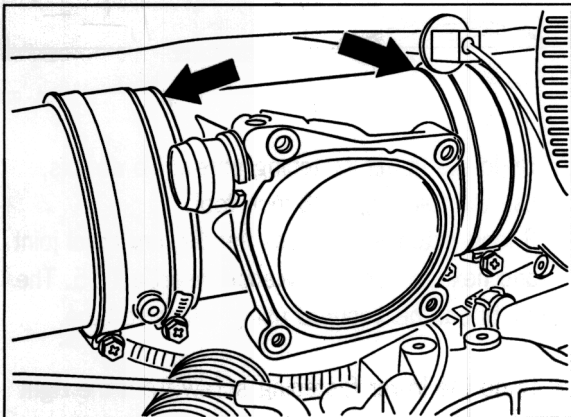
Installation

Tightening torques:

Terminal 30	Nut M8	15 Nm (11 ftlb.)
Terminal 50	Nut M6	6.5 Nm (5 ftlb.)
Hexagon-head bolt	M10	45 Nm (33 ftlb.)

1. The angled cable lug of terminal 50 (M6) faces in driving direction (transmission) after assembly.
2. Carefully centre the intake distributor. Push both rubber sleeves onto the intake distributor up to the marking (line) and secure (2 hose clamps).

4. Engage accelerator cable and install throttle body. Fit fastening screw M6 x 20 at the bottom right.
5. Tighten the outer hose clamps of the rubber sleeve after securing the throttle body on the hydraulic pump housing. The throttle body must not contact the hydraulic pump housing.
6. The intake system must be checked for leaks after assembly (visual inspection).



104 - 97

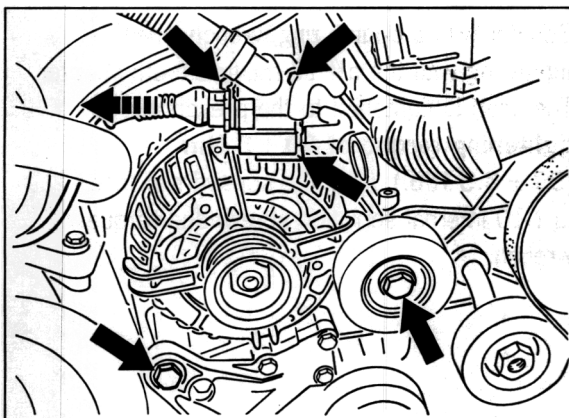
Arrow shows marking (line) on the intake distributor

3. Check bore in the rubber sleeves for check valve and vacuum to the fuel pressure regulator for clear passage.

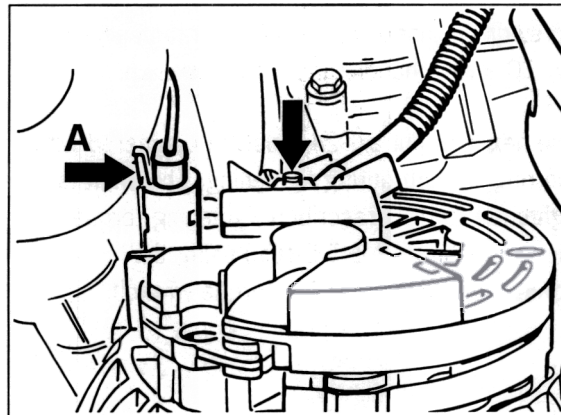
27 22 19 Removing and installing generator

Removal

1. Disconnect the battery and cover terminal or battery. Undo the fastening screw for the air cleaner housing and the hose clamp on the throttle body.
2. Disconnect the electrical plug connection on the air flow sensor and remove the complete air cleaner assembly.
3. Relieve the drive belt at the tensioning pulley and remove the belt.
4. Disconnect the electrical plug connection on the vacuum switchover valve and unclip the switchover valve from the holder.
5. Undo the holder at the intake distributor (2 screws) and remove. Pay attention to the sealing ring (vacuum line for brake booster) when removing.
6. Undo left fastening screw (in direction of travel) and unscrew.
7. Undo right fastening screw (with deflection roller) by three turns. A gentle tap on the fastening screw loosens the threaded bushing in the generator arm (use aluminium mandrel). Unscrew fastening screw and remove with deflection roller.
8. The generator must be turned clockwise so that the swivel arm is near the crankcase and the holding arm projects beyond the fastening eye.
9. Carefully pull the generator back a little and undo the electrical connections, or press the plug connection to the generator housing, release (arrow A) and pull off. Pull out generator to the rear.



094_97



095_97

6. Undo left fastening screw (in direction of travel) and unscrew.

Installation**Tightening torques:**

Hexagon nut a/f24	M16x1.5	65 ± 5 Nm (48 ± 3.5 ftlb.)
Hexagon-head bolts	M10	45 Nm (33 ftlb.)
Hexagon nut a/f 13	M8	15 Nm (11.0 ftlb.)

Note

When carrying out installation, make sure that the sealing ring for the vacuum brake booster is replaced and carefully fitted.

Undoing and tightening the belt pulley**Note**

The belt pulley can be undone and tightened using a standard commercially available tool.
Tools: double offset ring wrench a/f 24, screwdriver insert for internal serration screw a/f 10, cross handle and torque wrench.

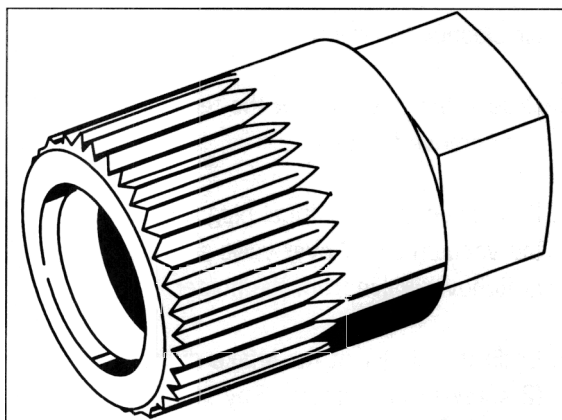
The hexagon nut a/f 24 must be countered with the ring wrench during tightening. The shaft is tightened to the prescribed tightening torque of 65 ± 5 Nm (48 ± 3.5 ftlb.) using the screwdriver insert and the torque wrench.

Tool for holding the free-wheel pulley

For Carrera 996 (manual transmission only) from engine No. 66 Y 03208

Use an a/f 17 multiple-tooth adapter to hold the free-wheel pulley.

A/f 17 multiple-tooth adapter: see Workshop Equipment Manual, chapter on commercially available tools, No. 32-1.



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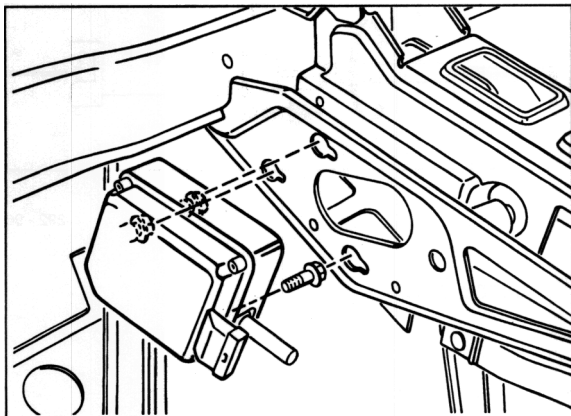
Note

Counter with a double ring wrench when tightening with the a/f 17 multiple-tooth adapter. The shaft is tightened to the prescribed **tightening torque of 80 ± 5 Nm (59 ± 3.5 ftlb.)** using the screwdriver insert (a/f 10 internal serration screw) and torque wrench.

27 84 19 Removing and installing cruise-control actuator

Note

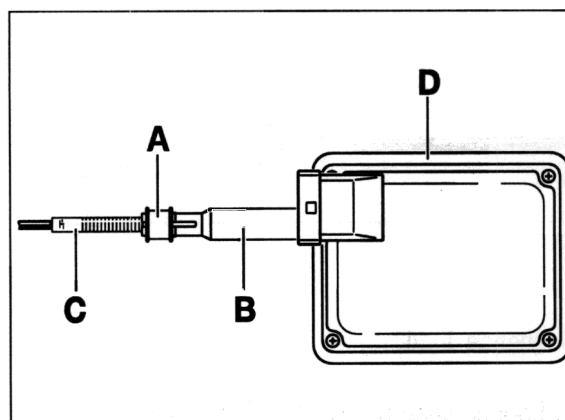
The cruise-control actuator is fastened with three screws to the pedal bearing block above the accelerator.



212 - 96

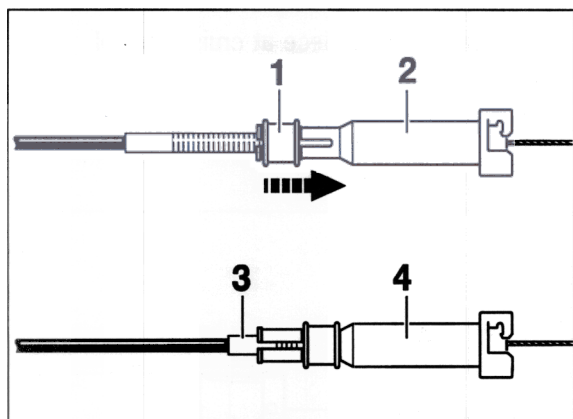
1. Remove air guide and footwell air vent of the heating and air conditioning system. Remove brake-light switch from pedal bearing block.
2. **Only** loosen fastening screws on the cruise-control actuator.
3. Draw cruise-control actuator to the rear and extract to the side. Disconnect the electrical plug connection.
4. Loosen snap ring at adjusting piece (displace it) and push threaded part through along with cruise-control cable.

5. Loosen adjusting piece at cruise-control actuator (bayonet lock) and disengage cruise-control cable.

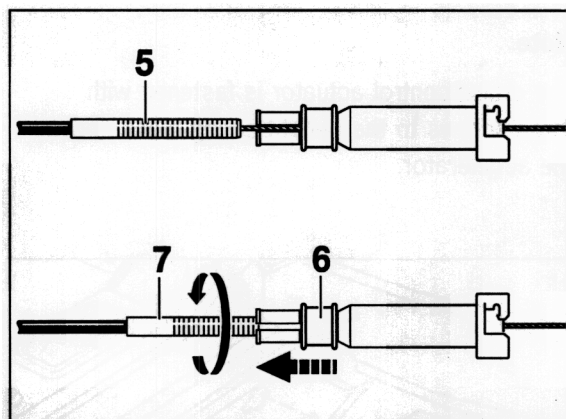


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- A – New snap ring
- B – Adjusting piece
- C – Threaded part
- D – Cruise-control actuator

Adjusting cruise-control cable

291 - 96



292 - 96

Sequence 1...4

1. Loosen snap ring 1 at adjusting piece 2 (displace it) and push threaded part 3 through along with cruise-control cable.
2. Engage cruise-control cable on cruise-control actuator and clip on adjusting piece 4 (bayonet lock).
3. Unscrew threaded part 5 until the accelerator plate is noticeably pulled.
4. Draw accelerator plate firmly back against its idle stop.

Sequence 5...7

5. Push snap ring 6 back (fixing it).
6. Make fine adjustment by turning the threaded part 7.
Permissible play: 0 + 1 mm.

27 60 19 Removing and installing starter – GT3**Removal**

1. Disconnect the battery and cover terminal or battery.
2. Pull back protective cap on the solenoid switch and undo terminal 30 (M8 nut) and terminal 50 (M6 nut) at the starter.
3. Undo the upper fastening screw. To do this, use the 3/8 inch tool:
two short extensions, universal joint, hexagon socket wrench insert a/f 15, cross handle or ratchet.
4. Undo the lower fastening screw.
5. Remove the starter from the holder and turn so that the solenoid switch is facing in the direction of the halfshaft. Remove starter in a downward direction.

Installation

1. Install and fasten starter. Fasten B+ lead from the battery and B+ lead from the engine to the B+ disconnection point to Terminal 30 (M8 nut) on the solenoid switch. Fasten Terminal 50 lead (M6 nut) to the solenoid switch.

Tightening torques:

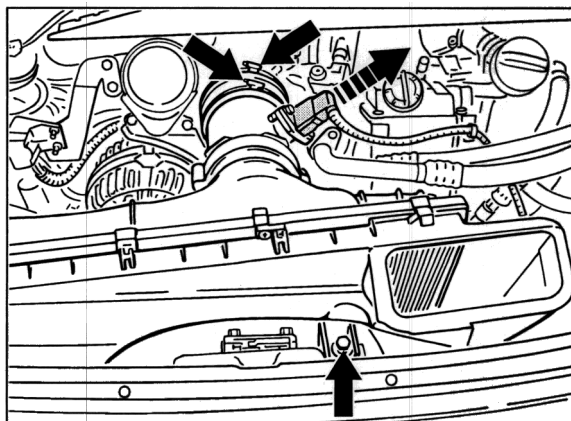
Terminal 30	Nut M8	15 Nm (11 ftlb.)
Terminal 50	Nut M6	6.5 Nm (5 ftlb.)
Hexagon-head bolt	M10	46 Nm (34 ftlb.)

2. Push protective cap over the solenoid switch and engage in the B+ lead.
3. Connect the battery and perform a function test.

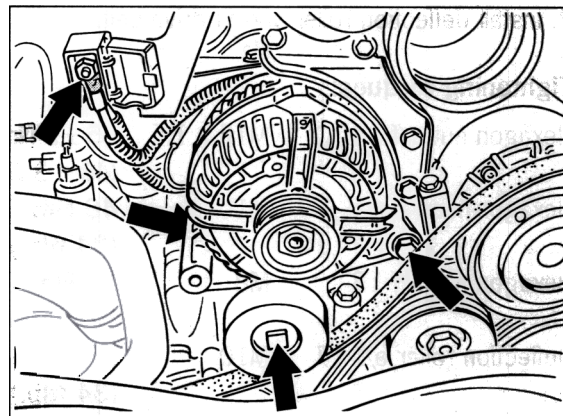
27 22 19 Removing and installing three-phase generator – GT3

Removal

1. Disconnect the battery and cover terminal or battery. Undo the fastening screw for the air cleaner housing and the hose clamp on the air flow sensor.
2. Disconnect the electrical plug connection on the air flow sensor and remove the complete air cleaner assembly.



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057_99

3. Relieve the drive belt on the tensioning pulley and remove the belt.
4. Remove the deflection roller under the three-phase generator.
5. Disconnect the cable lug of the B+ lead to the three-phase generator at the B+ disconnection point.
6. Undo left fastening screw (in direction of travel) and unscrew.

7. Undo right fastening screw by three turns. A gentle tap on the fastening screw loosens the threaded bushing in the three-phase generator arm (use aluminium mandrel). Unscrew fastening screw.
8. Remove three-phase generator and carefully pull a little to the rear. Press the plug connection towards the three-phase generator housing, release and pull off. Pull out three-phase generator to the rear.
9. Undo B+ lead on the three-phase generator.

Installation

1. Fasten B+ lead and install three-phase generator.
2. Install deflection roller and fit drive belt.

Tightening torques:

Hexagon nut a/f 24	M16 x 1.5	65 ± 5 Nm (48 ± 3.5 ftlb.)
Hexagon-head bolts	M10	46 Nm (34 ftlb.)
Hexagon nut a/f 13	M8	15 Nm (11 ftlb.)
Deflection roller a/f 17	M10	46 Nm (34 ftlb.)

3. Install air flow sensor with air cleaner assembly and connect battery. Perform a function test.

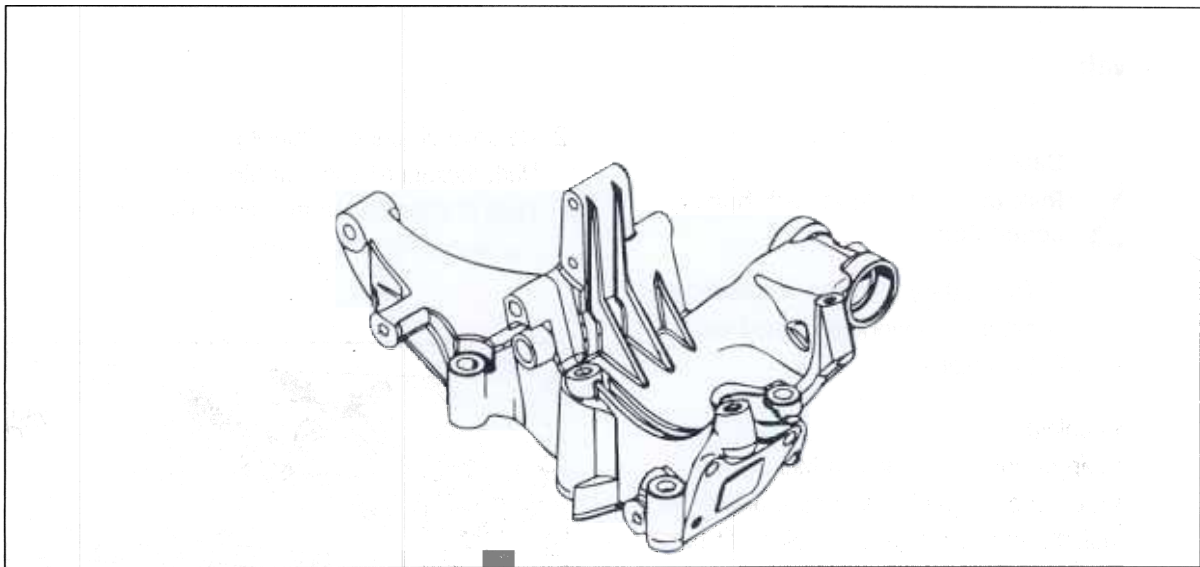
Undoing and tightening the belt pulley**Note**

The belt pulley can be undone and tightened using a standard commercially available tool.

Tools: double offset ring wrench a/f 24, screwdriver insert for screw with internal serrations a/f 10, cross handle and torque wrench.

The hexagon nut a/f 24 must be countered with the ring wrench during tightening. The shaft is tightened to the prescribed tightening torque of 65 ± 5 Nm (48 ± 3.5 ftlb.) using the screwdriver insert and the torque wrench.

27 27 19 Removing and installing bracket for generator – GT3



415_99

Removing and installing bracket for generator – GT3

Removal:



Caution!
Risk of short circuit with battery connected

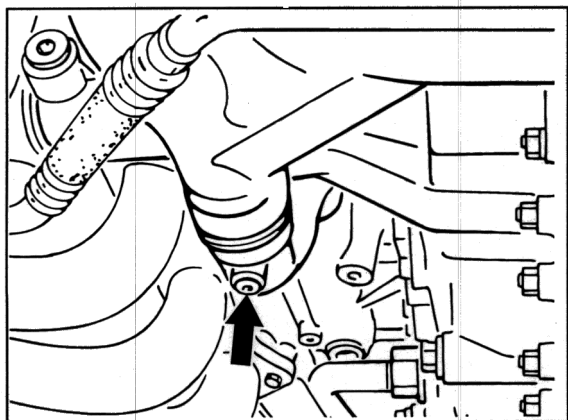
> The battery must be disconnected before any work is carried out on the engine.

Drain coolant.

Open cap of coolant expansion tank. Open coolant drain plugs on left and right and drain the coolant. After draining the coolant, fit new sealing rings on the drain plugs.

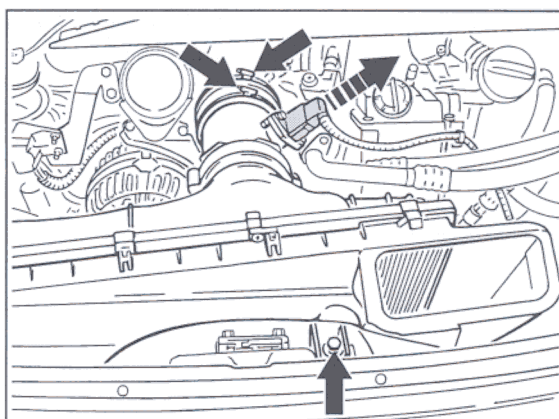
Tightening torque: 10 to 15 Nm (7.5 to 11 Nm)

(the illustration shows only one drain plug)



186_99

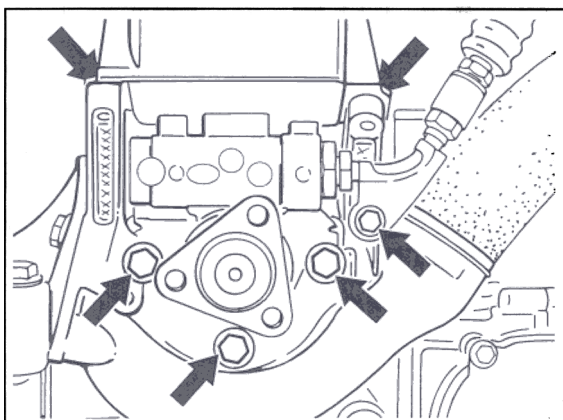
2. Remove air cleaner housing.
Undo hexagon-head bolt M6 x 34. Undo the hose clamps on the throttle body. Remove connector from mass air flow meter.



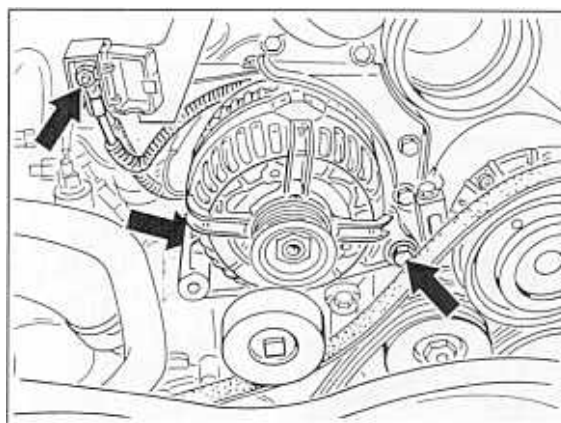
058_99

3. Remove drive belt (refer to service No. 13 78 19).
4. Unclip the cable from the air flow sensor on the reservoir of the hydraulic pump and lay it aside. Detach oil filler neck from the holder.

5. Undo fastening screws on the reservoir (two M8 screws) and four screws (three M8 screws and one M6 screw) on the hydraulic pump. Pull the expansion tank with hydraulic pump and connected lines up out of the fastening bracket and lay aside to the right-hand side.



059_99

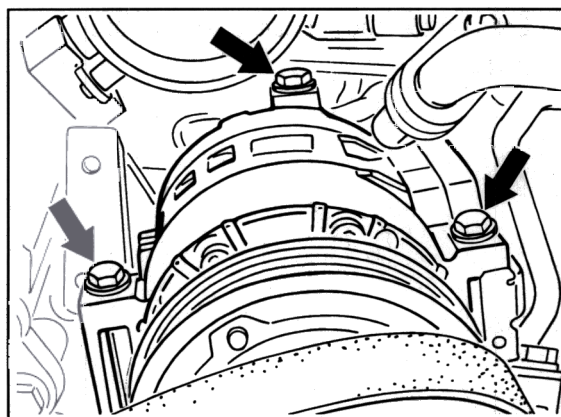


427_99

8. Remove compressor from the bracket for the generator. Unscrew the three screws for this purpose. The throttle body can be swung upward for better accessibility to the front screw. To do this, the two inner hose clamps must be removed.

6. Remove holder for oil filter bracket. Unscrew the M6 screw and undo the M8 screw for this purpose. Lift the holder out.

7. Remove generator.
Separate the B+ disconnection point under the cover for this purpose.
Unscrew the left fastening screw. Undo right fastening screw by approx. three turns.
Loosen the threaded bushing in the alternator swivel arm with a light tap on the screw head.
Then unscrew the fastening screw. Lift the generator out.

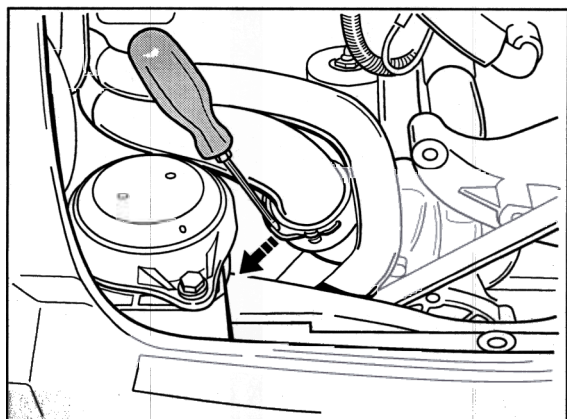


061_99

9. Remove the compressor. Disconnect the electrical connection on the compressor. Lift the compressor out of the engine compartment and lay it aside **with the leads still connected**. Protect the body from damage with a cover.

10. Unclip coolant hose.

Unclip the safety bracket on the coolant neck with a screwdriver and pull the coolant hose up and out.

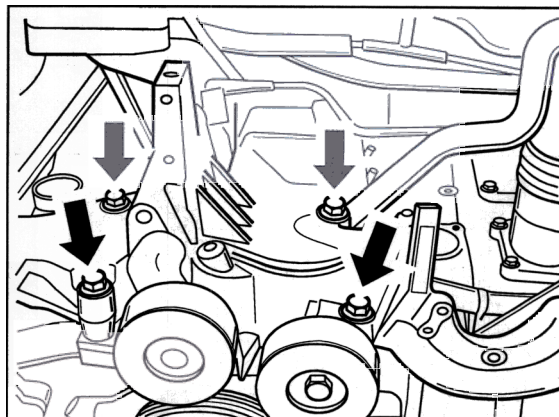


54_99

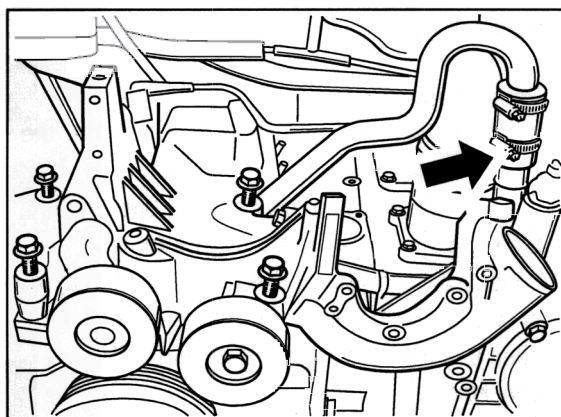
11. Detach the coolant outlet neck of cylinder bank 4 – 6. Undo the two hexagon-head bolts on the coolant outlet neck for this purpose.

12. Detach bracket for generator.

Unscrew the four bracket fastening screws.

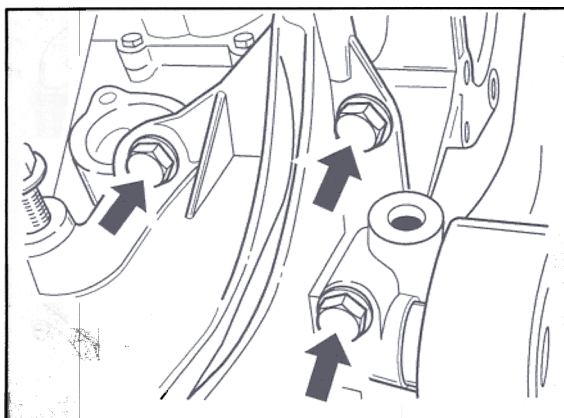


13. Loosen the hose clamp on the coolant connecting hose and pull the hose off. Take bracket for the generator out of the engine compartment upward and to the right.



14. Separate bracket for the generator.

The bracket can be disassembled in the event of leakage. Unscrew the three screws for this purpose. Pull the two parts apart. Make sure that the two dowel sleeves are not lost. Use a new O-ring when assembling the bracket for the generator. Tightening torque of the three screws:
23 Nm (17 ftlb.)



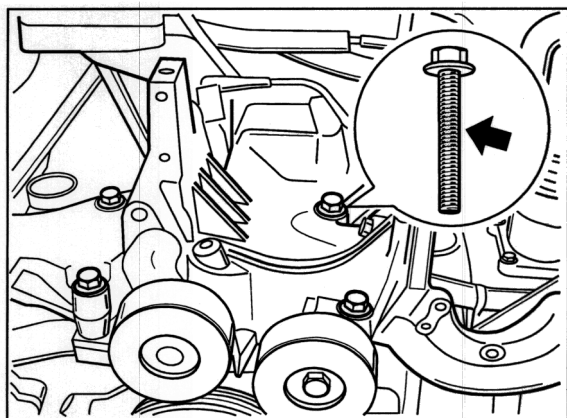
417_99

Removing and installing bracket for generator – GT3

Installation:

Install bracket for the generator.

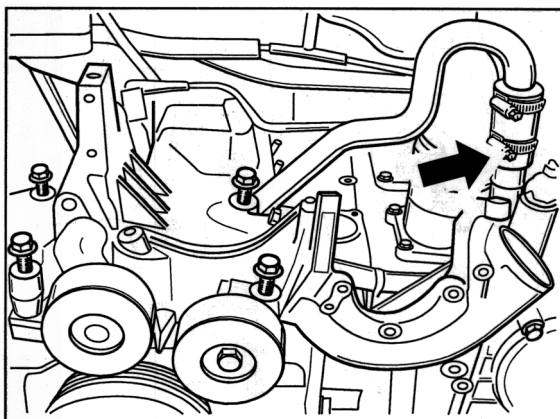
Replace the four O-rings on the two connecting sleeves between the two coolant outlet necks and the bracket for the generator. Insert the bracket into the coolant outlet neck of cylinder bank 1– 3 from the right-hand side. Then screw in the four fastening screws. Important: The front right screw must be inserted with Loctite 574 (as shown in the illustration).



420_99

2. Tighten the four fastening screws to 65 Nm (48 ftlb.).

3. Push on the coolant connecting hose between the oil/coolant heat exchanger and the bracket again and tighten the hose clamp.

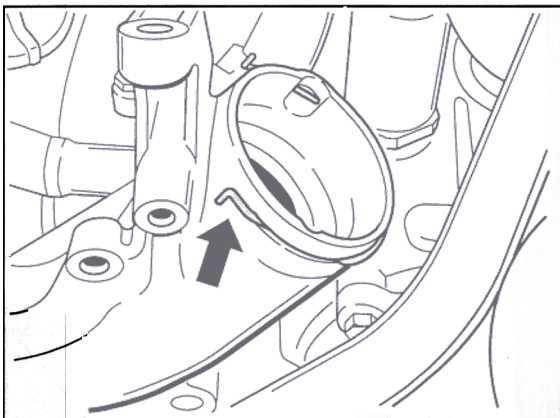


418_99

4. Fit coolant outlet neck of cylinder bank 4 - 6
Insert the neck with the connecting sleeve into the bracket for the generator for this purpose. Tighten the two fastening screws on the coolant outlet neck 9.7 Nm (7.0 ftlb.)

5. Insert retaining clip.

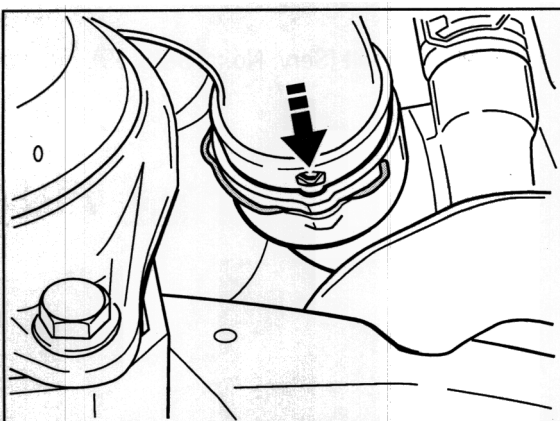
Insert the retaining clip into the groove provided as shown. Replace the O-ring on the coolant hose.



87_99

6. Push on coolant hose.

Align the connection neck of the coolant hose as shown in the illustration (lug/groove). Press the coolant hose firmly against the connection neck. The clip must audibly engage.

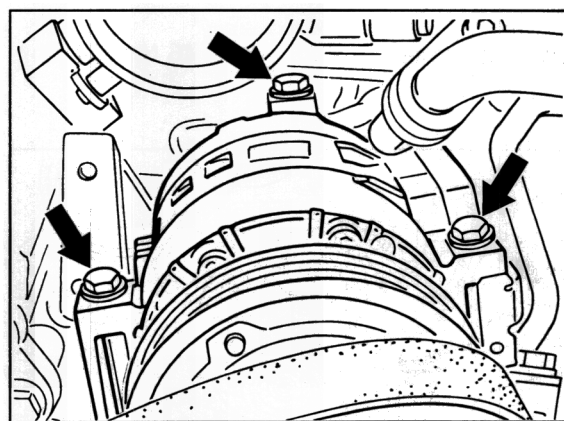


88_99

7. Fit compressor.

Coat the spacer sleeve of the rear fastening screw with grease to keep it from falling out. Lift the compressor back into its installation position and push on the electrical connection.

8. Fasten the compressor. Tighten the three compressor fastening screws to 23 Nm (17 ftlb.). If the throttle body has been turned, it must be returned to installation position.



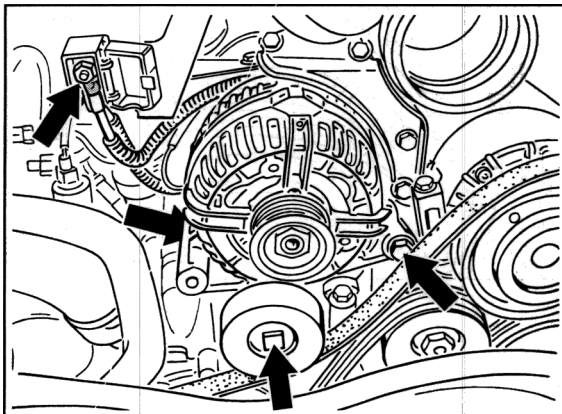
061_99

9. Install generator.

Return the generator to its mounting position.
Reconnect the plug connections and screw on the B+ lead.

Tightening torques:

Hexagon nut	M16 x 1.5	65 Nm (48 ftlb.)
Hexagon-head bolt	M10	46 Nm (34 ftlb.)
Hexagon nut	M8	15 Nm (11.0 ftlb.)
Deflection roller	M10	46 Nm (34 ftlb.)



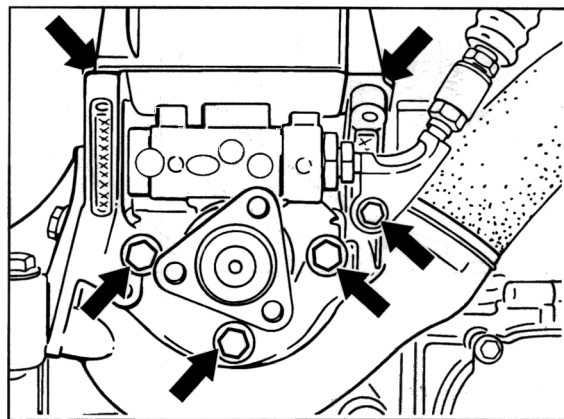
057_99

10. Install holder for oil filter bracket.

To do this, push in the holder in downward direction. Tighten the M6 screw to 10 Nm (7.5 ftlb.) and the M8 screw to 23 Nm (17 ftlb.).

11. Install hydraulic pump.

Return the hydraulic pump with connected lines to its installation position. Tighten the four fastening screws. Tighten the three M8 screws to 23 Nm (17 ftlb.) and the M6 screw to 10 Nm (7.5 ftlb.). Tighten the two fastening screws on the reservoir to 23 Nm (17 ftlb.).



059_99

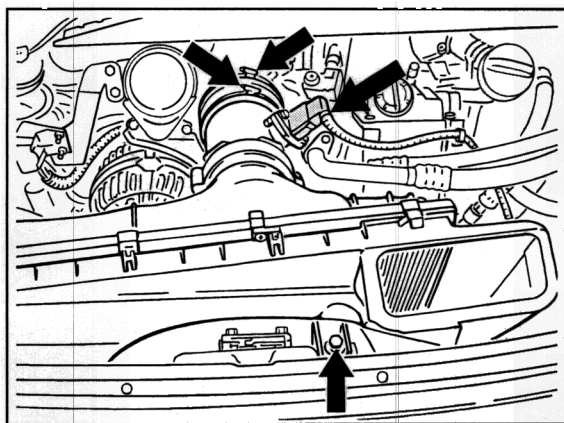
13. Insert oil filler neck in its holder again. Clip the cable from the air flow sensor into the holder on the hydraulic expansion tank again.

14. Install drive belt (Serv. No.: 13 78 19).

15. Install air cleaner housing.

Insert air cleaner housing in its holder again.

Tighten the M6 x 34 hexagon-head bolt to 9.7 Nm (7.0 ftlb.) Tighten the hose clamp on the throttle body and push the plug onto the hot film mass air flow sensor.



429_99

16. Connect battery.

Reconnect the battery ground cable.

17. Fill in coolant.

Fill in coolant through the coolant expansion tank. Carefully bleed the vehicle (Serv. No.: 19 38 17).

27 06 Work instructions after disconnecting the battery**Effect of disconnection or total discharge of the battery on electrical systems in the vehicle, subsequent measures:**

1. Never disconnect battery with engine running.
2. Never start engine without securely connected battery.
3. Do not use a boost charger to start the engine.
4. Whenever possible, use jump leads with overvoltage protection.
5. Always disconnect the battery terminals before carrying out welding work on the vehicle.
6. Wiring harness plugs of control modules or other electronic components must be connected or disconnected with the ignition off. Exception: vehicles with the additional equipment M 536 (alarm siren with tilt sensor).

Note concerning M 536:

In order to avoid triggering the alarm siren (installed on right next to the battery) of vehicles with M 536, the battery must be disconnected with the ignition on (all loads must be switched off beforehand).

Control module memories:

Values and faults stored in the control modules can be deleted if the battery is disconnected or completely discharged.

Remedy:

If possible, all fault memories should be checked and, if necessary, printed out before the battery is disconnected.

Supply voltage fault entry:

The entry "supply voltage" could be stored in various control modules if the battery has been completely discharged.

Remedy:

Delete the "supply voltage" entry from the control modules in question.

Test drive after connecting the battery:

The fault memories of all vehicle control modules should be read out again after the test drive.

**24 70 DME control module:**

After disconnection of the power supply, the idle speed might change or fluctuate briefly until the idle speed positioner (M 5.2) or the throttle adjusting unit (ME 7.2) is readapted. The mixture adaptation is also lost.

Remedy:

After the battery is connected:

With the DME ME 7.2, it is necessary to carry out a learning and adaptation routine as described below:

Switch the ignition on for 1 minute without starting the engine. Do not actuate accelerator pedal.

Switch off ignition for at least 10 seconds.

This completes the adaptation of the throttle adjusting unit.

With all DME systems, the engine must run for several minutes before the engine control module can relearn the idle speed and mixture adaptation values.

37 30 Tiptronic:

The stored pressure adaptation valves are lost if the power supply to terminal 30 is interrupted. This can result in poor shifting quality (rough shift operations) during the adaptation phase.

Remedy:

Perform a test drive. During the test drive, drive the vehicle with varying load conditions and speeds so that all shift functions (manual and automatic programs) are executed at least once. This readapts the shifting pressures of the system and thereby re-establishes smooth shifting.

64 52 Power windows:

The limit positions of the power windows are deleted from the control module when the battery is disconnected and connected.

Remedy:

Manually close each power window as far as it will go, then press the rocker switch for closing the window again.

The limit position of the respective power window is now stored in the control module again.

90 25 Instrument cluster:

The trip counter is set to 0 when the power supply is disconnected.

90 30 Clock:

Depending on the software version, the clock is set to 12:00 a.m. or 1:00 a.m. when the power supply is disconnected.

Remedy:

Enter the current time again.

Note:

On vehicles with PCM, 91 10 PCM position 3.



90 80 On-board computer:

Disconnection of the vehicle battery deletes the memories for average speed and average consumption.

As a result, the displayed range on remaining fuel can be markedly different or even 0.

The outside temperature indicator loses its memory effect. In other words, the indicated outside temperature can be too high due to the heat radiated when the vehicle is hot.

90 23 Fuel level display:

Only 911 Carrera 4 (996) and GT3 are affected:

If the power supply is interrupted by a discharged or disconnected battery with the tank containing less than 19 l, the calculated value for the range on remaining fuel in the instrument cluster will be incorrect or deleted.

If the tank contains less than 10 l, it is possible that the fuel level warning light is no longer activated.

If the power supply is restored with the fuel level at less than 19 l, it is possible that the fuel level display may subsequently display too much in some 996 Carrera 4 and GT3 vehicles.

This may lead to the vehicle breaking down.

Remedy in these vehicles:

Refill at least 19 l of fuel; then the fuel level sensor is in operating range and its display precision is guaranteed.

Note: 911 Carrera (996) Technical Manual, Group 2, TI. No. 9/99.

91 20 Radio:

The radio reverts to the Code function when the battery is disconnected and is thus no longer ready for operation.

Remedy:

Input the radio code. If the code card is unavailable, the radio code can be read from the DME control module (under "Vehicle data"). The code is also available from the Porsche IPAS.

91 10 PCM:

1. The PCM reverts to the *Code input* function when the battery is disconnected and is thus no longer ready for operation.
2. When the power supply is disconnected, the built-in GPS receiver loses the so-called "almanac" containing the satellite orbital paths.
3. The date and time are deleted when the battery is disconnected.
4. Radio stations stored by the customer are no longer displayed.
5. If the telephone card was inserted and the telephone was ready for operation, the telephone is subsequently disabled.

Remedy:

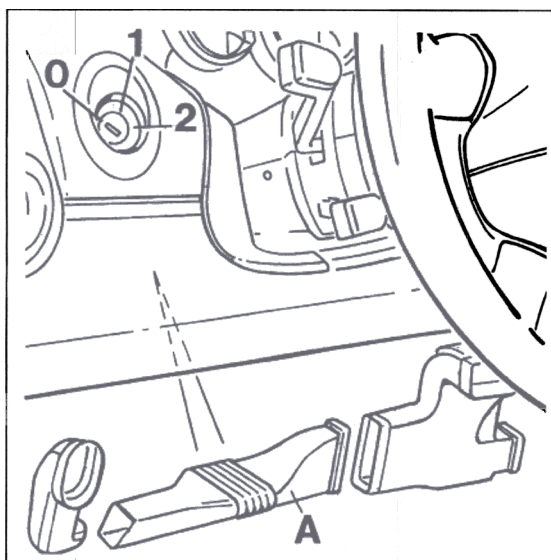
1. Input the PCM code. If the code card is unavailable, the PCM code can also be read from the DME control module (under "Vehicle data"). This code is also available from the Porsche IPAS.

2. Switch on the PCM with a free panoramic view for approx. 20 minutes (to load GPS almanac).
3. The date and time are also adopted once the GPS almanac has been loaded (see step 2); it may be necessary to change over to summer time (daylight-saving time). This time is transferred to the instrument cluster. If the time is then manually changed by means of the instrument cluster, this time is adopted by the PCM and synchronised with GPS time.
4. The stored stations are displayed again when station buttons 1 to 6 are pressed.
5. The telephone is enabled again when the telephone PIN code is entered with the SIM telephone card inserted.

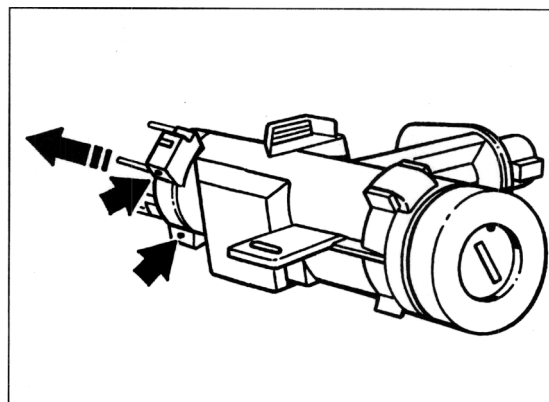
28 04 19 Removing and installing ignition switch

Removal

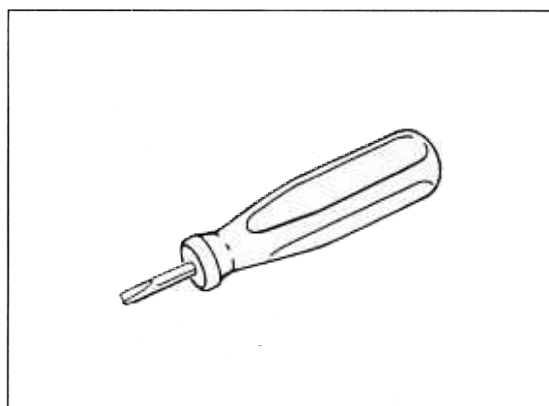
1. Disconnect battery ground cable.
2. Turn ignition key to position 0 and remove.
3. Remove air duct (A).
The air duct is plugged in.



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291.97



483.97

4. Pull connecting plug off ignition switch.
5. Remove screw locking paint in the threaded bores of the two fastening screws (short arrows).
Slightly loosen both fastening screws (short arrows) **using special tool 9631** (Figure 483-97) and pull the ignition switch out of the housing (direction arrow).

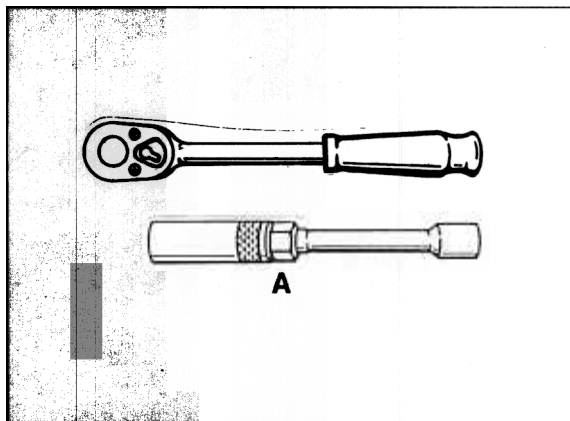
Installation

1. Move ignition switch to position 0 (same position as lock barrel).
2. Insert ignition switch into the housing.
Tighten fastening screws using **special tool 9263** (Figure 483-97) and subsequently secure with screw locking paint.

3. Push plug onto ignition switch and fit air duct.
4. Connect battery ground cable.
Perform function test.

28 70 21 Removing the spark plugs – GT3

Tools



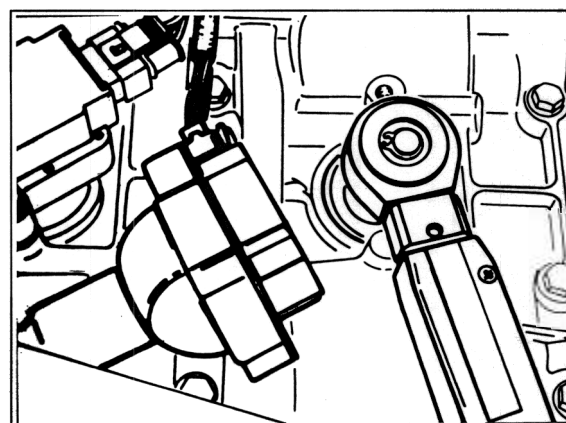
A – Commercially available tool, Chapter 2.4 No. 1 and extension No. 15

637_96

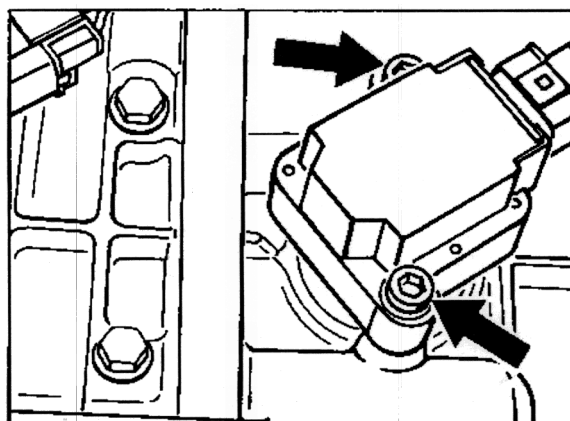
1. Lift the vehicle.
2. Remove shields.
3. Undo hexagon socket head bolts.

4. Pull off the plug coils and detach them to the side with connected cable.

5. Screw out spark plugs with commercially available tool.



399_97



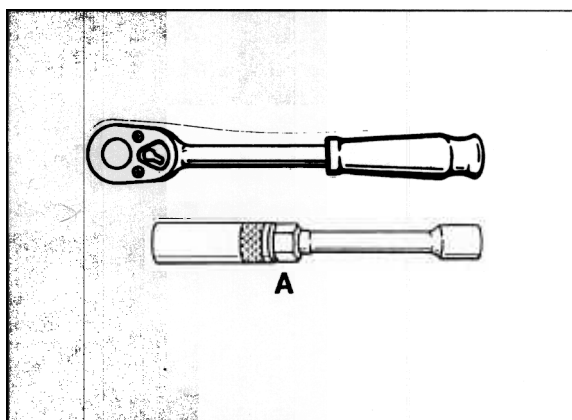
272_96

Note:

Only this spark plug wrench was tested and approved.

28 70 21 Installing spark plugs – GT3

Tools



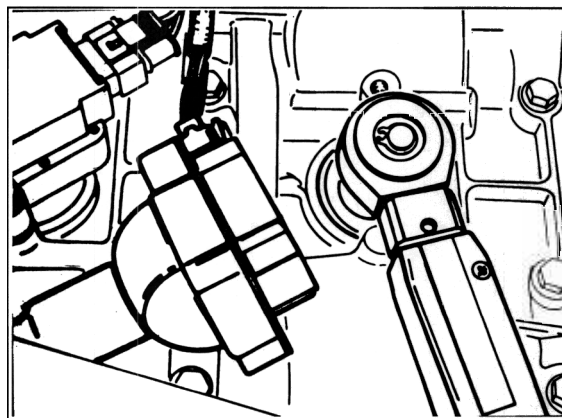
A – Commercially available tool, Chapter 2.4 No. 14 and extension No. 15

637_96

1. Put on spark plug by hand.
2. Tighten spark plug with commercially available tool S 9706.
Tightening torque:
New spark plug: 30 Nm (22 ftlb.)
Re-fitting: 25 Nm (19 ftlb.)

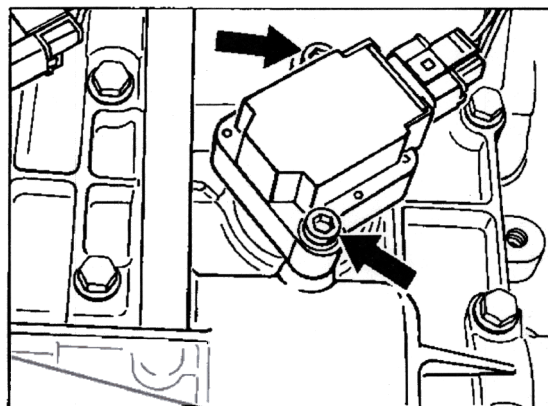
Note:

Only this spark plug wrench was tested and approved.



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3. Push on the plug coils again.
4. Tighten hexagon socket head bolts to the plug coils to 10 Nm (7.5 ftlb.).



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5. Fit shields and tighten to 10 Nm (7.5 ftlb.).
6. Lower vehicle.

Technical Manual

911 Carrera 4 (996)

Repair

Group 2

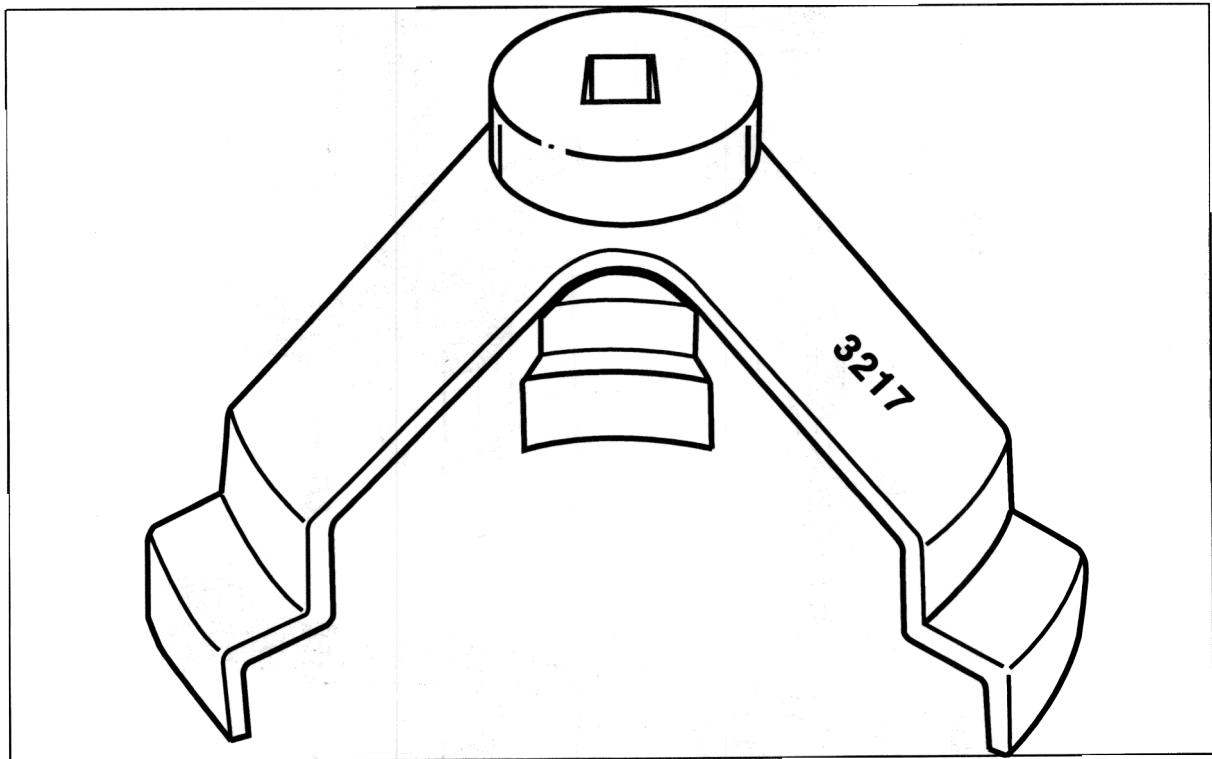
Fuel, exhaust, engine electronics

2 Fuel, exhaust, engine electronics – four-wheel drive**2 Fuel, exhaust, engine electronics**

20	Fuel supply, control	
20 66 19	Removing and installing fuel pump . . .	20 - 101
20 78 19	Removing and installing pedal encoder .	20 - 111
20 80 19	Removing and installing accelerator pedal	20 - 113
20 15 01	Calibrating fuel level sensor system . .	20 - 115

24 Fuel system – Electronic injection

24 42 19	Removing and installing throttle body	24 - 101
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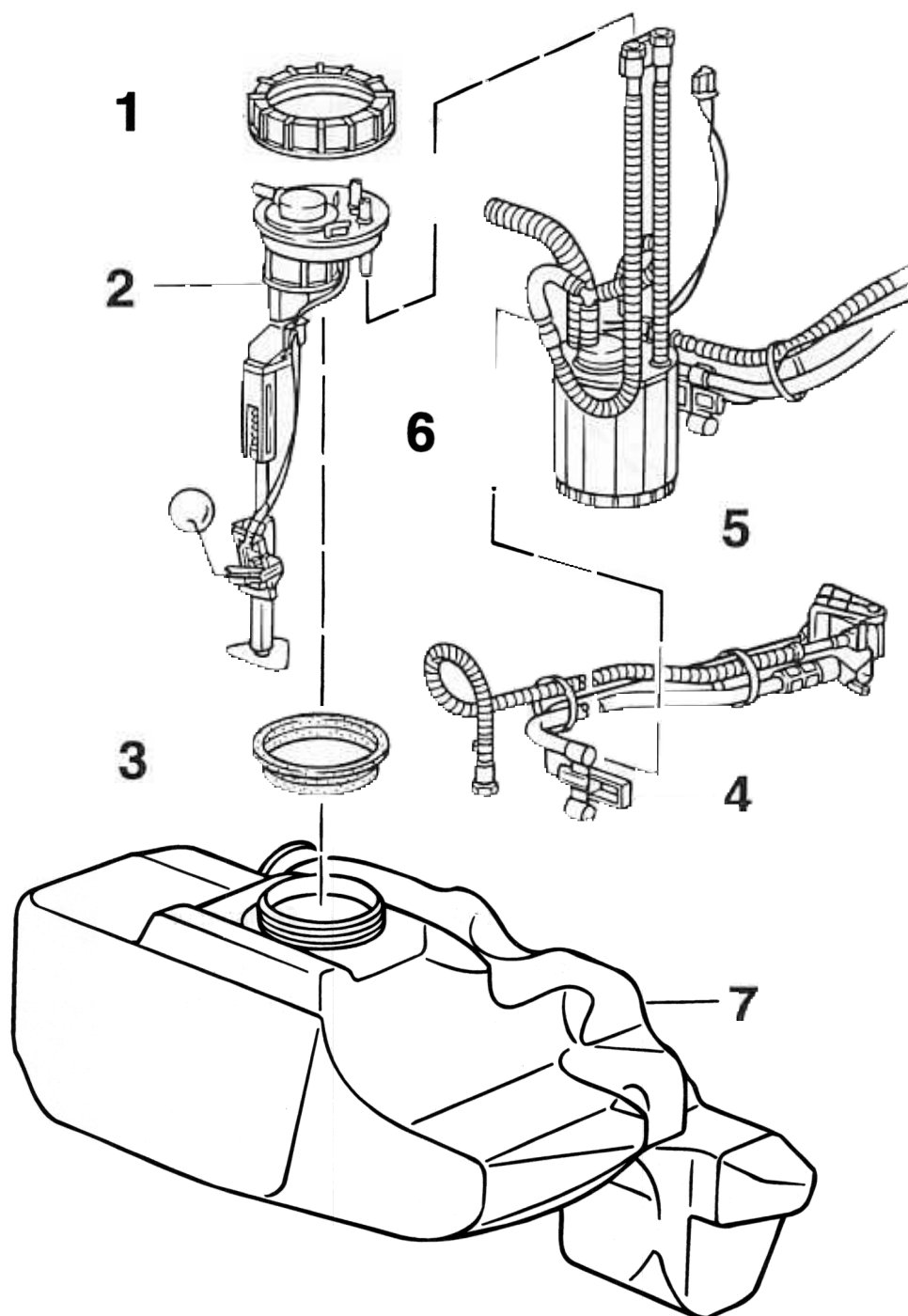
20 66 19 Removing and installing fuel pump**Special tool**

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Item	Designation	Special tool	Explanation
	Socket wrench for union nut	3217	VW/Audi special tool

Removing and installing fuel pump

Overview of the fuel tank components



386_

Overview of the fuel tank components

1 Union nut

2 Fuel tank sender unit

3 Sealing ring

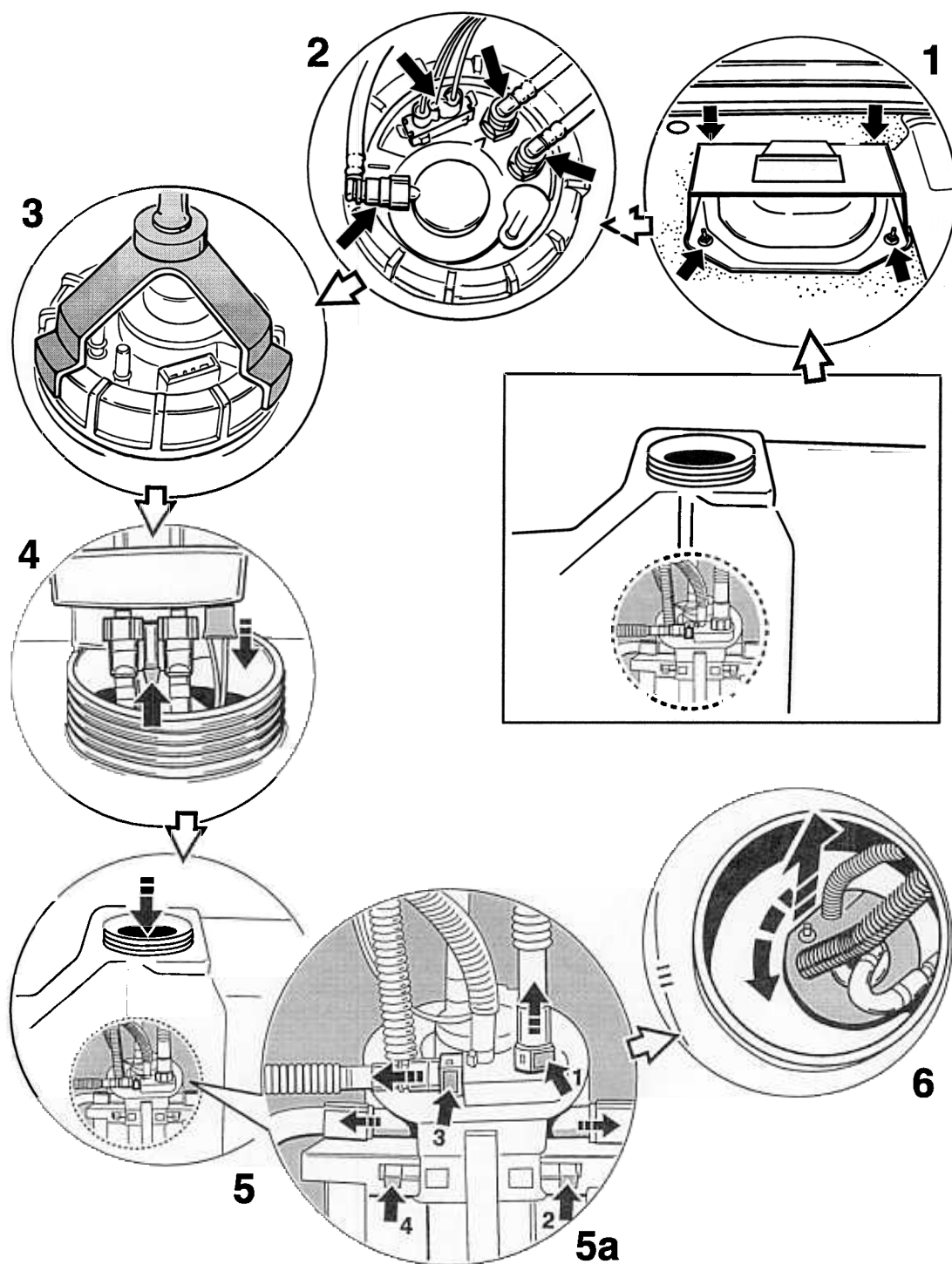
4 Left sucking jet pump

5 Right sucking jet pump

6 Fuel pump

7 Fuel tank

Removing fuel pump



373_98

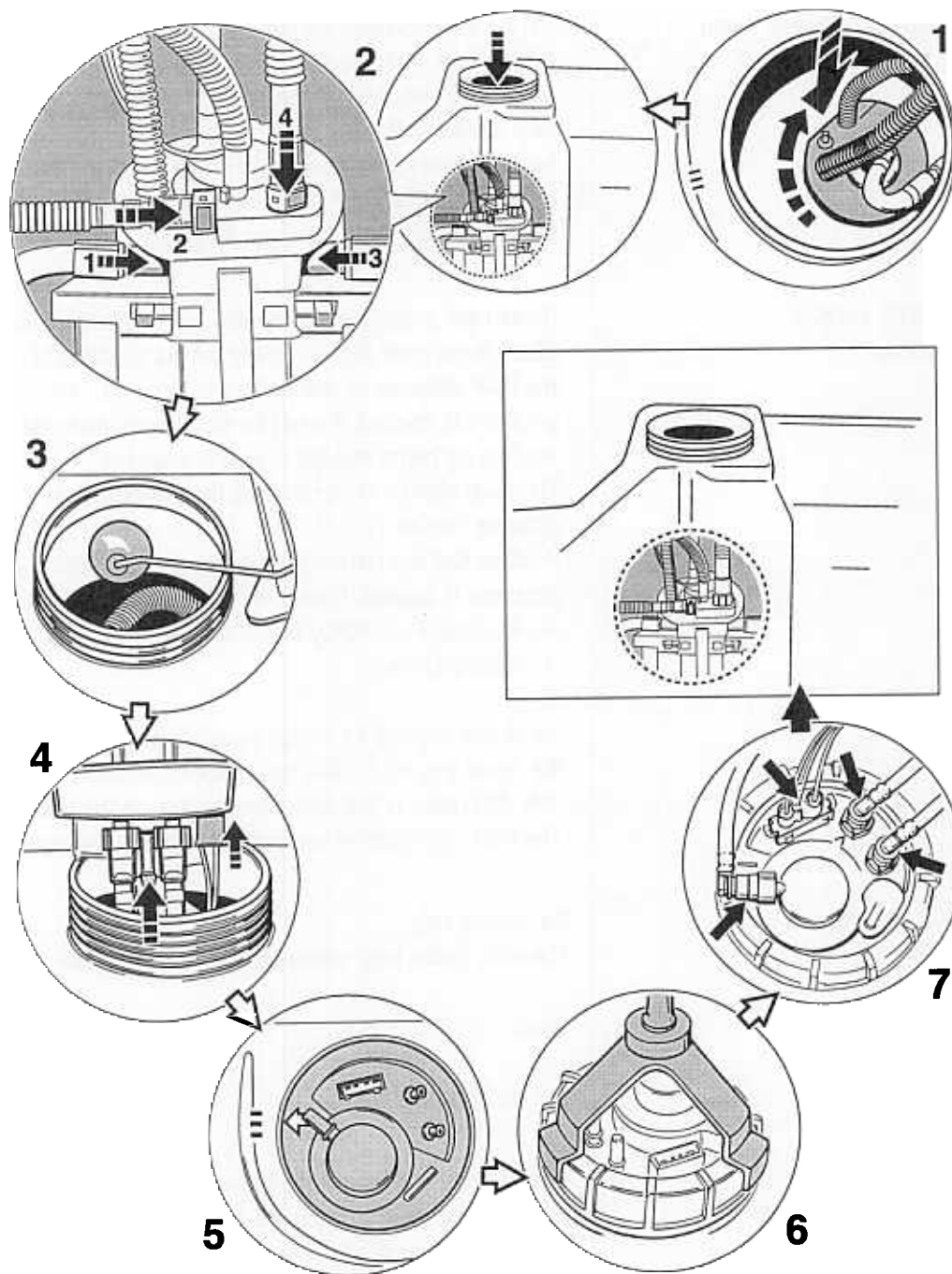
Removing fuel pump**Caution:****Danger of fire and injury!**

- > Observe general safety regulations at the fuel system.
- > Wear protective gloves.

No.	Procedure	Instructions
	Disconnecting battery	Detach negative terminal of battery (a/f 10 mm) and cover the terminal or battery.
1	Removing cap	Remove cap in the front luggage compartment (access to the fuel level sensor or to the fuel pump). Undo four hexagon nuts (a/f 10 mm).
2	Disconnecting fuel lines and electrical plug connection	Actuate (press) release buttons and simultaneously pull off the fuel lines. Press the clip and simultaneously pull off the electrical plug connection.
3	Undoing union nut	Undo union nut with socket wrench (special tool 3217) (VW/Audi).
		Note If the sealing ring and union nut are to be re-used, mark the position of the union nut with respect to the fuel tank in colour before undoing the union nut. Tightening method: refer to "Fitting union nut", Page 20-109.
4	Removing fuel tank	Lift fuel tank sender unit and disconnect electrical plug connection. Press the pushbutton (arrow) and simultaneously pull off the fuel lines. Carefully lever out the fuel tank sender unit. Extract residual fuel.

No.	Procedure	Instructions
5	Removing sucking jet pumps	Put on a petrol-resistant glove. Remove left sucking jet pump. To do this, disengage and pull off the fuel line (arrow 1) as show in the enlargement of sectional view 5a. Press button (arrow 2) and pull sucking jet pump off the fuel pump. Guide sucking jet pump out of the recess at the side of the fuel tank. Remove right sucking jet pump. Disengage and pull off fuel line (arrow 3). Press button (arrow 4) and pull off the sucking jet pump.
6	Removing fuel pump	Put on a petrol-resistant glove, grasp the fuel pump fastened on the bottom of the fuel tank, turn it counter-clockwise (approx. 15° in the bayonet lock) and take out the fuel pump.

Installing fuel pump



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Installing fuel pump

No.	Procedure	Instructions
1	Positioning the fuel pump	Put on a petrol-resistant glove. Position the fuel pump. The edge of the fuel pump housing should be approximately aligned with the installation position markings of the fuel tank sender unit. Place fuel pump on the tank bottom/bayonet lock in this position and turn the fuel pump clockwise as far as it will go. Then check proper seating of the fuel pump by pulling it up.
2	Installing sucking jet pumps	<p>Guide right sucking jet pump into the fuel tank recess. Insert upper part of the sucking jet pump straight into the take-up bores of the fuel pump (arrow 1). When slight pressure is applied, it must be possible to hear the sucking jet pump engage in plug-in coupling. Then pull slightly to ensure that the connection is properly locked.</p> <p>Position fuel line (arrow 2) in a straight line. When slight pressure is applied, it must be possible to hear the fuel line engage. Pull slightly to ensure that the connection is properly locked.</p> <p>Install left sucking jet pump. Installation is performed the same way as for the right sucking jet pump. The only difference is the insertion direction of the fuel line. The lines are inserted vertically in this case (arrow 4).</p>
3	Installing tank sender unit	<p>Fit sealing ring.</p> <p>Carefully guide tank sender unit into the fuel tank.</p>
		Note
		Do not bend the linkage.
4	Fitting fuel lines and electrical plug connection	Position fuel lines in a straight line. When slight pressure is applied, it must be possible to hear the fuel lines engage. Pull slightly to ensure that the connection is properly locked. Push on the electrical plug connection.



No.	Procedure	Instructions
5	Aligning fuel level sensor	Insert fuel level sensor and align or turn until the arrow marking on the fuel level sensor is aligned with the line marking on the fuel tank.
6	Fitting union nut	<p>Tighten union nut with socket wrench (special tool 3217) (VW/Audi).</p> <p>Tightening torque with new union nut and new sealing ring 70 Nm (52 ftlb.).</p> <p>The following tightening method must be used if the sealing ring and union nut are re-used: Before removal, mark the position of the union nut with respect to the fuel tank in colour. Perform assembly work, fit sealing ring and union nut.</p> <p>Use socket wrench to tighten union nut up to the marking. From this position, turn the union nut approx. one rib further.</p>
	Fitting fuel lines and electrical plug connection	<p>Attach fuel lines and electrical plug connection. The fuel lines must audibly engage.</p> <p>Correct engagement must be checked with a gentle pull. The colour-coded plug (green) must be fitted to the connection identified with "V".</p>

Note on procedure No. 2:

Installing sucking jet pumps
- Page 20 - 110

Installing fuel pump

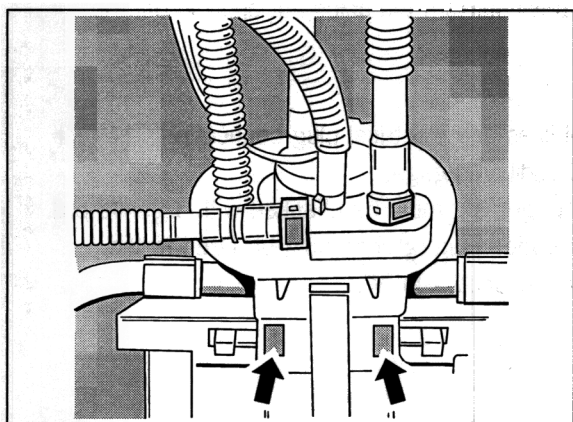
Assembly note:



Warning

Observe fuel pump and sucking jet pump allocation.

- > Before installing a new fuel pump, check the previous and the new fuel pumps to see the shape of the cut-outs for fastening the sucking jet pumps. Depending on the cut-out, the previous sucking jet pumps can either continue to be used or must be replaced.



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- > Fuel pump/sucking jet pumps allocation:

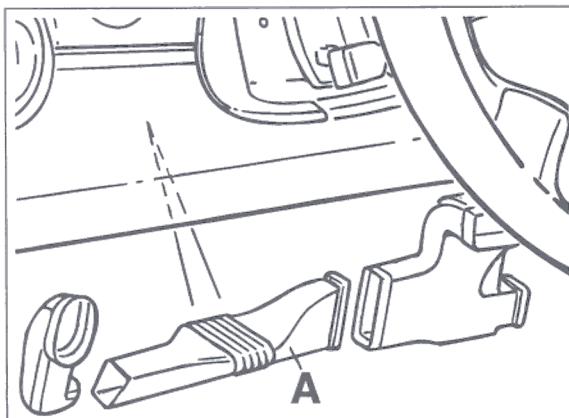
Previous fuel pump (cut-out **not rounded**): Old or new sucking jet pumps can be installed.

New fuel pump (cut-out **rounded**): Only install new sucking jet pumps.

20 78 19 Removing and installing pedal encoder

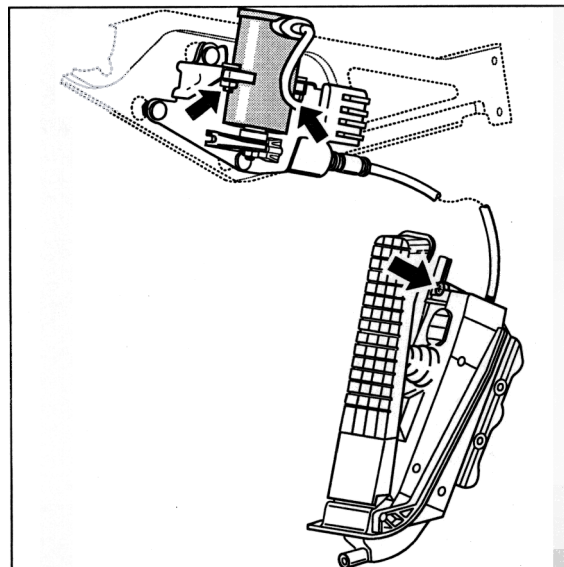
Removal

1. Pull off the centre air duct (A) in the driver's footwell.



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2. Undo two hexagon nuts (a/f 10 mm) on the pedal encoder.



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3. Disengage electrical plug connection on the bracket. To do this, turn the plug connection counter-clockwise in the bracket and take it off. Disconnect plug connection.
4. Pull pedal encoder out of the stud, disengage the cable from the cable disc and remove the pedal encoder in downward direction.

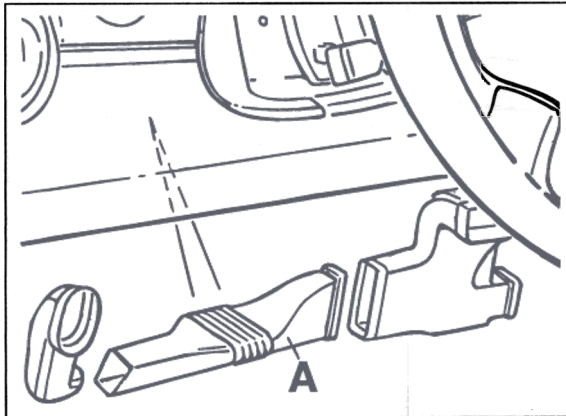
Installation

1. Engage cable in the cable disc, insert the pedal encoder in the stud and fasten the pedal encoder with two hexagon nuts. Tightening torque 8 - 9 Nm (6.0 - 6.5 ftlb).
2. Position electrical plug connection in the bracket and turn it clockwise until the plug connection engages.

20 80 19 Removing and installing accelerator pedal

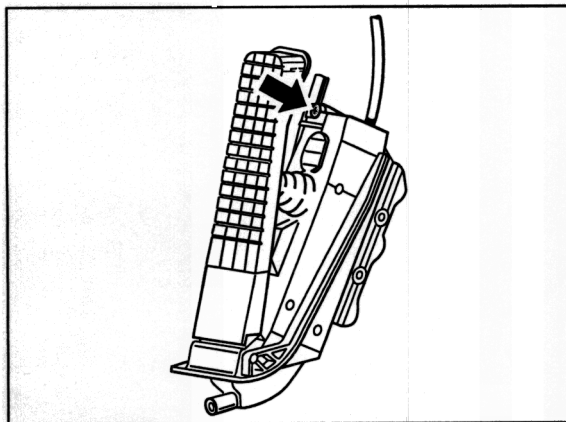
Removal

1. Pull off the centre air duct (A) in the driver's footwell.



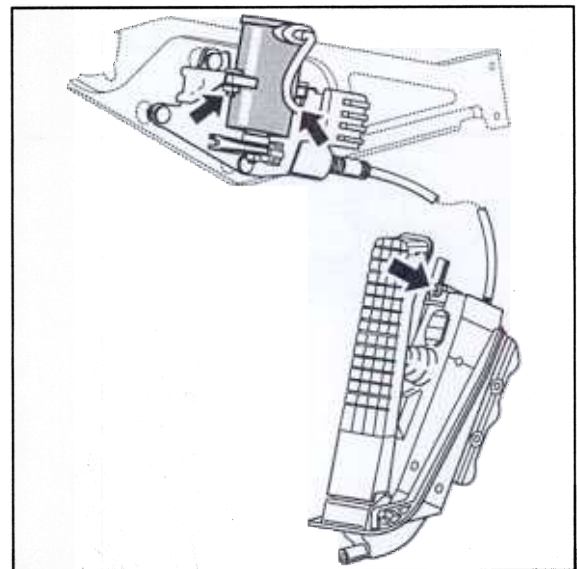
383_98

2. Undo upper countersunk screw (M5 x 55) on the accelerator pedal and remove the accelerator pedal.



380_98

3. Disengage electrical plug connection on the bracket. To do this, turn the plug connection counter-clockwise in the bracket and take it off. Disconnect plug connection.
4. Undo two hexagon nuts (a/f 10 mm) on the pedal encoder.



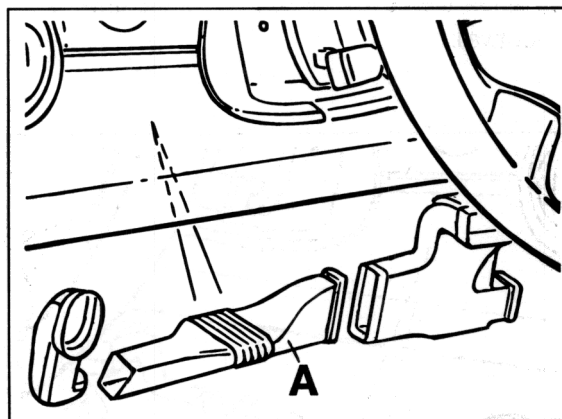
382_98

5. Pull pedal encoder out of the stud, disengage cable from the cable disc and remove the pedal encoder in downward direction.
6. Press both locking tabs of the cable guide together by hand and simultaneously pull the cable out of the bracket.

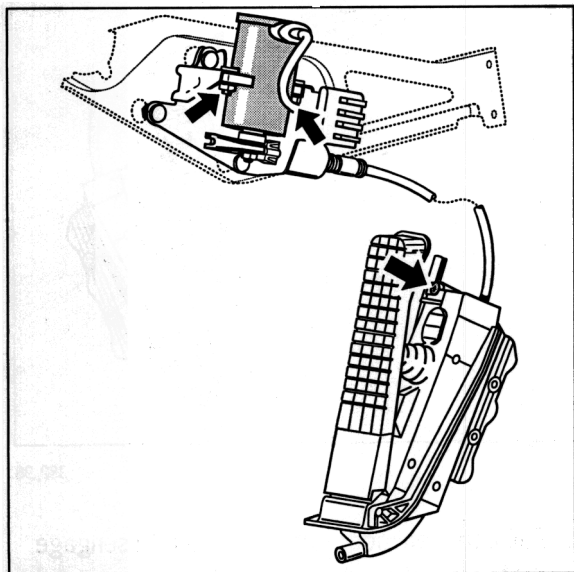
Installation

1. Engage cable guide into the bracket.
Then pull slightly to ensure that the connection is properly locked.
2. Fasten the accelerator pedal.
Tightening torque of the countersunk screw (M5 x 55) 2.8 Nm \pm 10 %
(2.0 ftlb. \pm 10 %)
3. Engage cable in the cable disc, insert the pedal encoder in the stud and fasten with two hexagon nuts.
Tightening torque 8 - 9 Nm (6.0 - 6.5 ftlb).

4. Fit air duct.



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20 15 01 Calibrating fuel level sensor system

Warning!
Danger of fire and injury!

- > Observe general safety regulations on the fuel system.
- > Wear protective gloves.

Note

Calibration is necessary after replacement of the fuel tank, fuel level sensor or instrument cluster.

1. Disconnect the battery and cover terminal or battery. Remove cap over the fuel level sensor system.
2. Remove fuel level sensor; refer to Serv. No. 20 66 19 (Removing fuel pump).
3. Using a fuel extractor, completely drain the fuel tank through the fuel level sensor opening. Fuel extractor: Refer to the Workshop Equipment Manual, Chapter 3 "Workshop Equipment".
4. **Make sure that the two recesses on the left and right-hand sides of the tank are emptied completely.**
5. Reinstall the fuel level sensor and, with "ignition off", fill the tank with **28 litres** of fuel. **The indication in the Porsche System Tester 2 (old or new characteristic) is the decisive indication.**

6. Perform tank calibration with the Porsche System Tester 2.

- Select vehicle type (911 Carrera)
- Select control modules
- Select instrument cluster
- Select menu item *Tank calibration*
- Confirm calibration

The fuel level sensor system has now been calibrated.

Note

The fuel level sensor system need not be calibrated if the battery was disconnected or a plug connection on the instrument cluster or fuel level sensor was removed. The values remain stored in the instrument cluster.

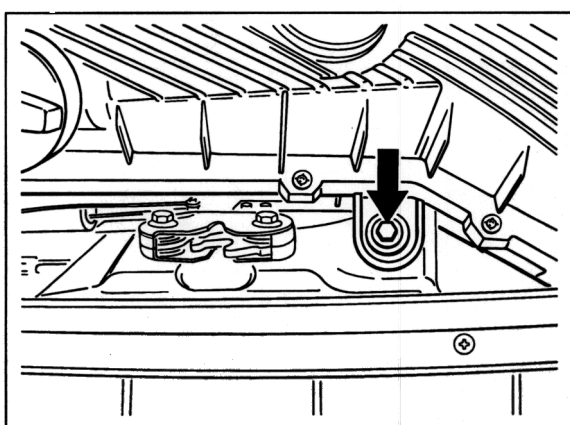
A range on remaining fuel of less than 15 km is not displayed in the instrument cluster.

24 42 19 Removing and installing throttle body

Removal

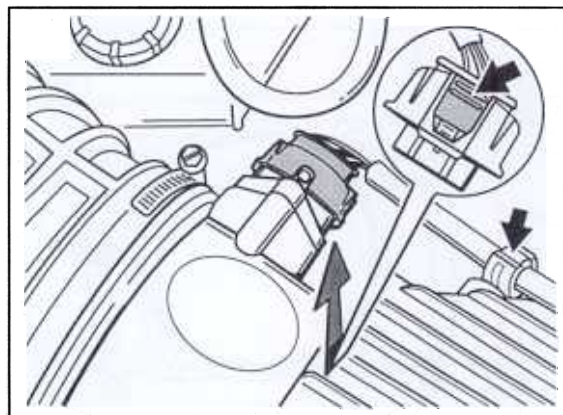
Remove the complete air cleaner assembly:

- 1.1 Unclip oil filler neck from upper part of the air cleaner.
- 1.2 Undo hexagon-head bolt M8 x 15.



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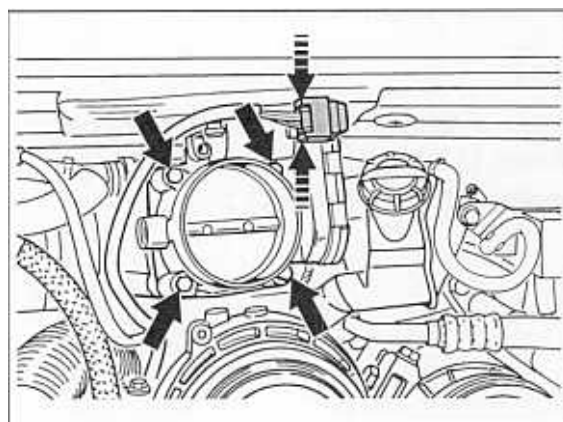
- 1.3 Pull plug off the hot film mass air flow meter. To do this, push the button and simultaneously pull the plug off. Loosen hose clamp on the throttle body, unclip cable on the air cleaner housing and remove the air cleaner system.



The plug is shown turned to show the button more clearly.

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2. Pull plug off the throttle body. Undo 4 hexagon-head bolts (M6 x 25) and remove the throttle body.

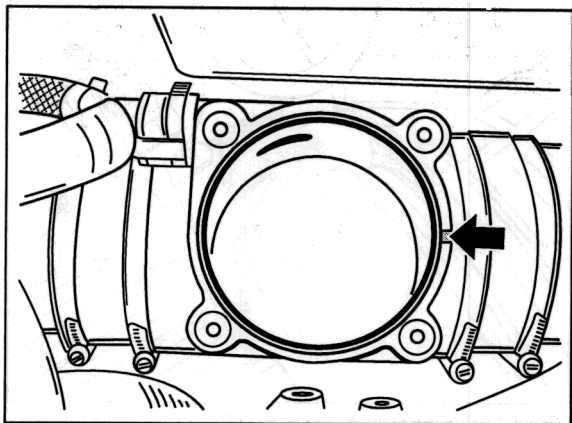


359_98

3. Remove sealing ring.

Installation

1. Insert new sealing ring in the correct position.



378_98

2. Fit throttle body.
Tightening torque for hexagon-head bolts 10 Nm (7.5 ftlb.)
3. Install air cleaner assembly.

Note

Before installation, make sure that the rubber sleeves (2 ea.) are present and properly seated in the transverse lock panel.