PORSCHE
MOTORSPORT



Technical manual

911 GT3 Cup (991 II) MY 2018

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Preface

This document should give you the opportunity to look up data, settings, und operating regulations, and to facilitate maintenance or repair of the vehicle.

We wish you many sporting successes with your 911 GT3 Cup (991 II).

Customer Sport

Dr. Ing. h.c. F. Porsche

Inc.

Motorsport Sales



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Competition Vehicle 911 GT3 Cup (991 II) Model 2018

The design of this vehicle is specially configured for use in one-make cup competitions.

For understandable reasons, it cannot therefore be assumed that the standards set by our production vehicles are relevant for the car body design.

Porsche assumes no responsibility for compliance with regulations.

The vehicle is not approved for use on public roads and does not comply with the German Road Traffic Licensing Regulations.

Pictures, descriptions, and schematic drawings are used solely for illustrating the text. We assume no responsibility for the completeness and conformity of the contents with the prevailing sporting codes.

Due to the constant improvement of our products and the related documentation at the time of your purchase, a new version of this technical manual could be available. The latest Version is always accessible at the "Porsche Motorsport race car service information" database (PMRSI), and can be downloaded on the following homepage.

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Warnings and safety instructions

The warning notes and safety instructions are classified by the respective signal word (Danger, Warning, Caution) beside the warning symbol.



Warns against death or very serious injury which will certainly occur if the instructions are ignored.



Warns against death or very serious injury which may occur if the instructions are ignored.



Warns against minor injury if the instructions are ignored.



Warns against damage to property if the instructions are ignored.



Information

Contains advisory information which makes the work procedure easier.

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To prevent injury and adversely affecting the operational and road safety of the vehicle, or damage to the vehicle as a result of improper work, read these warnings and safety instructions carefully and observe them fully.

It is not possible for Dr. Ing. h.c. F. Porsche AG to give a detailed evaluation of all danger situations for the persons carrying out the work. It is therefore imperative that all persons carrying out repair and maintenance work on Porsche vehicles use their specialist knowledge to ensure that their own safety is not put at risk and that the procedure chosen will not have any negative effects on the vehicle - especially with regard to safety.

It is therefore expressly specified that all work involved in the work procedures described should be carried out only in accordance with the valid guidelines and regulations of the local authorities responsible with respect to health, accident prevention and environmental protection, and in compliance with the respective legal provisions in force.

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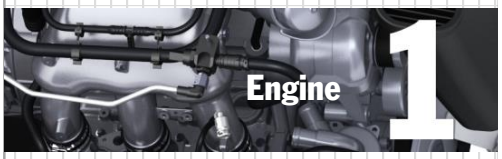


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Preface

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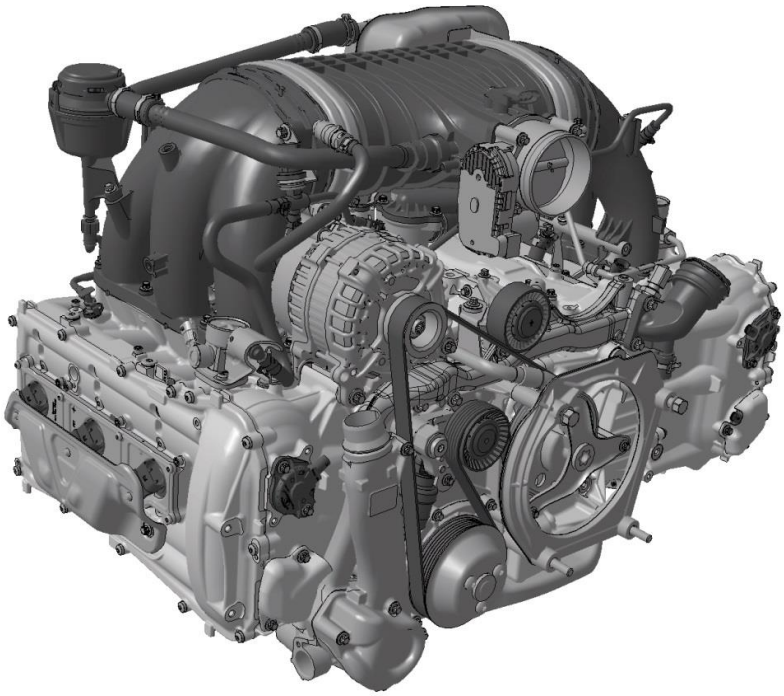


1 Engine

1.1 General information

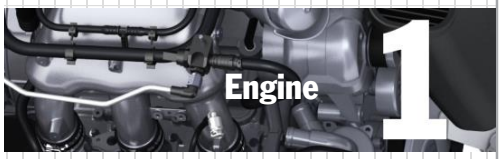
The engine of the new 911 GT3 Cup (991 II) is an enhancement of the unit in the road-approved 911 GT3 RS with displacement of 3,996 cc. New features compared with the previous Cup engine are the direct fuel injection, camshaft control for the intake and exhaust valves, and rigidly mounted valve levers for valve actuation. The oil supply for the connecting-rod bearings is ensured by the central oil supply to the crankshaft. Also new is the demand-controlled oil pump with integrated centrifuge for oil defoaming. The engine features dry-sump lubrication with an oil tank mounted on the engine side. The oil is cooled by an oil/water heat exchanger integrated into the cooling system.

The Bosch Motronic MS 4.6 NG control unit is used for engine control.



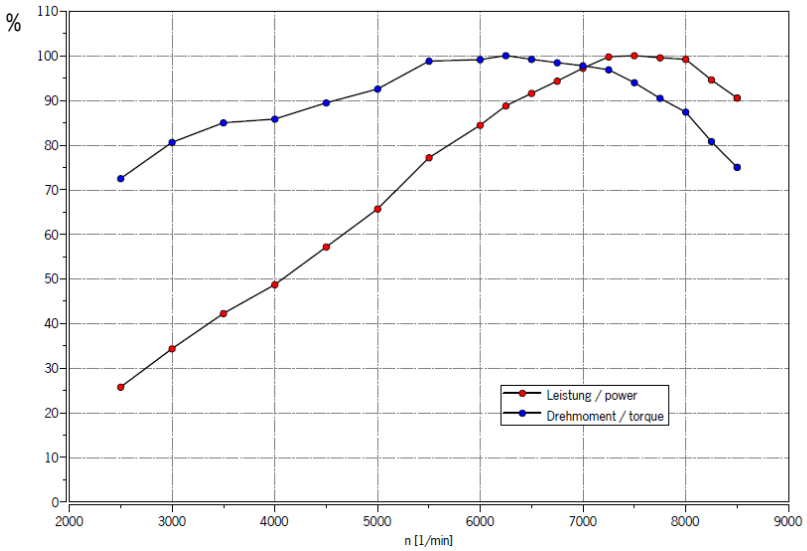
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1.2 Technical data

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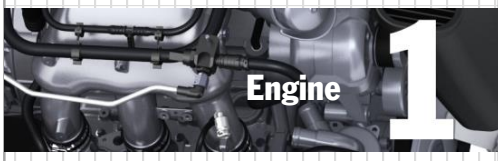


1.2.1

Technical engine specifications

Number of cylinders	6
Type	Flat-six engine
Valves per cylinder	4
Displacement	3,996 cc
Bore	102.0 mm (4 inches)
Stroke	81.5 mm (3.2 inches)
Compression	Approx. 13.3 : 1
Max. engine speed	8,500 rpm
Cooling	Water-cooled
Lubrication	Dry-sump lubrication (demand-controlled oil pump) Oil/water heat exchanger

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1.3 Engine lubrication

The 911 GT3 Cup (991 II) features dry-sump lubrication with a demand-controlled oil pump. This type of lubrication system design ensures a reliable pressure oil supply to the engine components that require lubrication in all driving situations. The oil tank mounted separately on the front of the engine always contains enough oil to supply the oil pump. The crankshaft has a central oil supply to provide the connecting-rod bearings with sufficient lubrication at high engine speeds.

An oil/water heat exchanger has been integrated into the engine's oil/water system for controlling the engine temperature.

1.3.1 Oil level measurement

On the 911 GT3 Cup (991), the oil level is measured electronically by means of a level sensor in the oil tank. There is no dipstick. To ensure a correct measurement, the engine must be at operating temperature (coolant temperature 80°C (176°F)).

See Section 7.1

1.3.2 Filling capacities

NOTE

Improper adding of engine oil

Risk of damage to the engine

- Engine oil must not be added when the engine is running.
- The engine must be stopped before adding engine oil.

- Engine rebuild: 9.5 liters (10 qts)
- Oil change with change of oil filter: 6.6 liters (7 qts)
- Oil change without change of oil filter: 6.0 liters (6.3 qts)

1.3.3 Engine oil

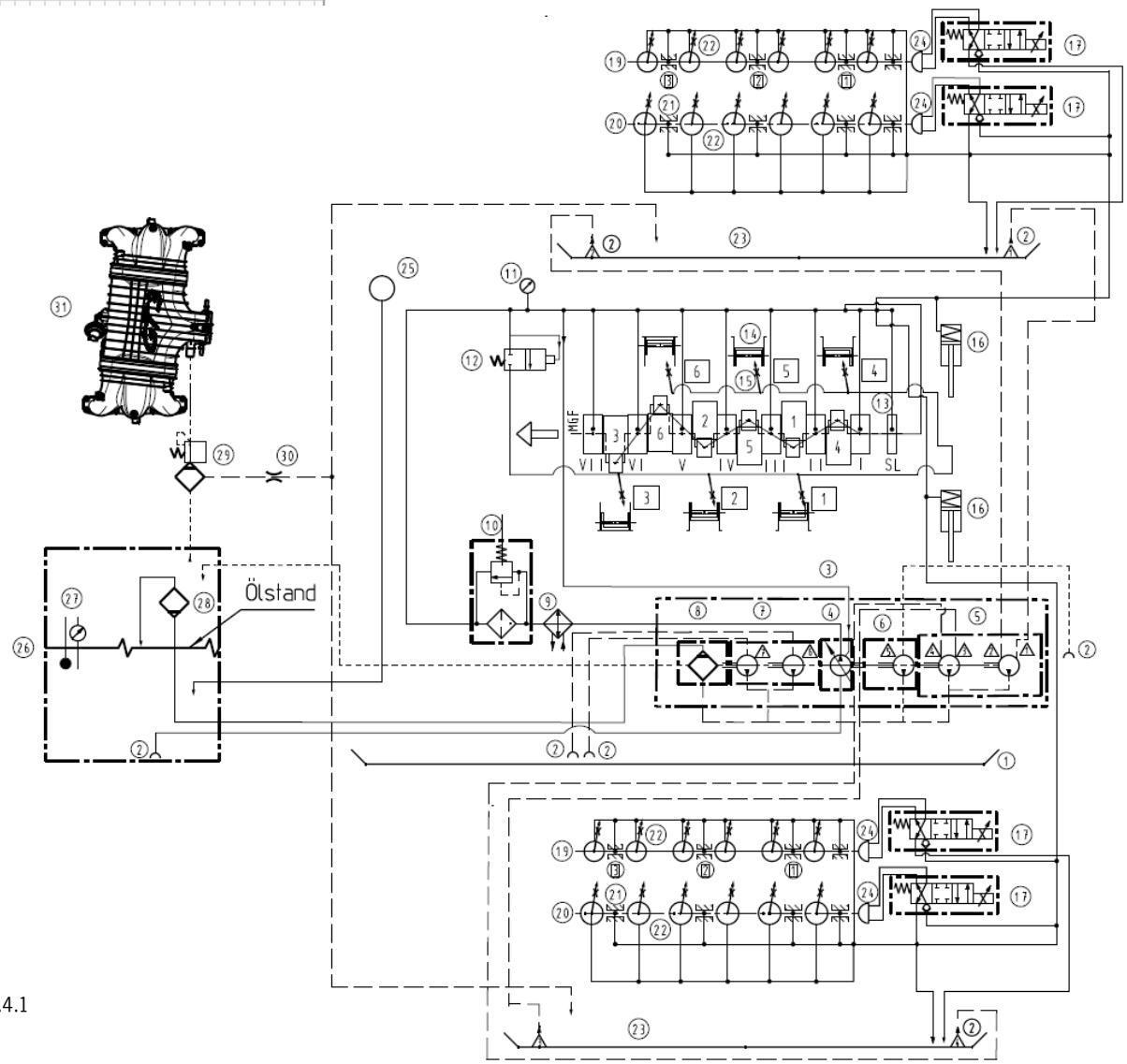
The engine oil is always changed when the engine is overhauled at Porsche AG. The following oil specification is used for this:

- Mobil 1 FS 0W-40
- Mobil 1 New Life 0W-40

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1.3.4 Engine oil circuit



1.3.4.1

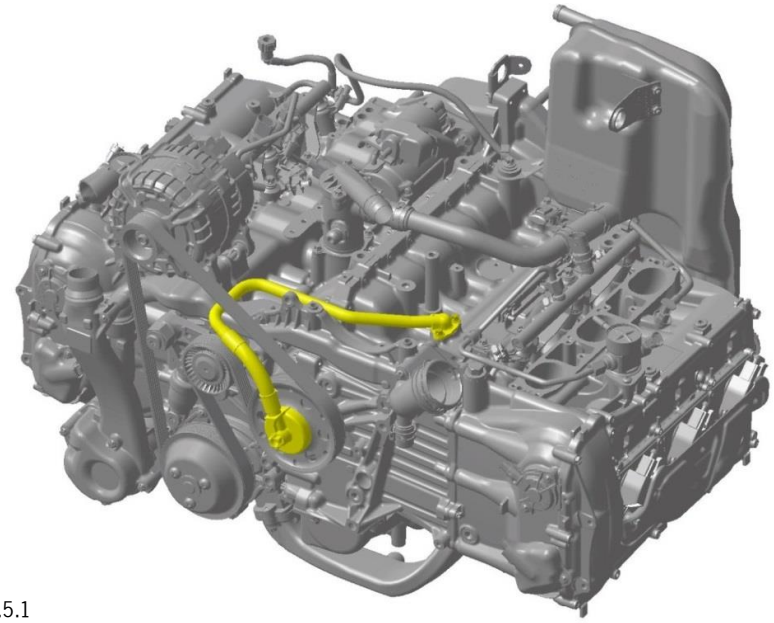
1 – Dry-sump oil pan
2 – Extraction point
3 – Oil pump
4 – Oil pump pressure stage
5 – Head suction stage
6 – Chain box extraction point
7 – Crankcase suction stages
8 – Centrifuge
9 – Heat exchanger
10 – Oil filter
11 – Pressure/temperature sensor
12 – Piston oil spray jet switching valve
13 – Crankshaft
14 – Piston
15 – Piston oil spray jets
16 – Chain tensioner
17 – Camshaft control valve
19 – Camshaft, intake
20 – Camshaft, exhaust
21 – Camshaft bearing
22 – Valve lever with oil spray jets
23 – Oil collection duct
24 – Camshaft controller
25 – Oil filler neck
26 – Oil tank
27 – Oil-level sensor
28 – Air/oil separator
29 – Vacuum limiting valve
30 – Vent line
31 – Intake system

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1.3.5 Central oil supply

The engine of the 911 GT3 Cup features a central engine oil supply to the crankshaft to ensure lubrication of the connecting-rod bearings all the way up to the highest engine speeds.

The oil for the connecting-rod bearings is not routed to the connecting rod via the main bearings here in the conventional way, but rather supplied centrally from the main oil gallery to the crankshaft via a line. This achieves a more stable oil supply to the connecting-rod bearings with less loss.



1.3.5.1

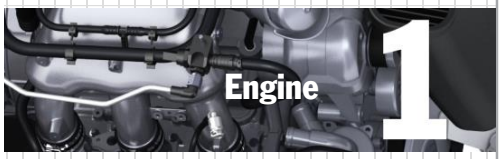
1.3.6 Oil mist separator

The oil tank vent is routed into the intake system through an oil mist separator; the separated oil is returned to the crankcase.



1.3.6.1

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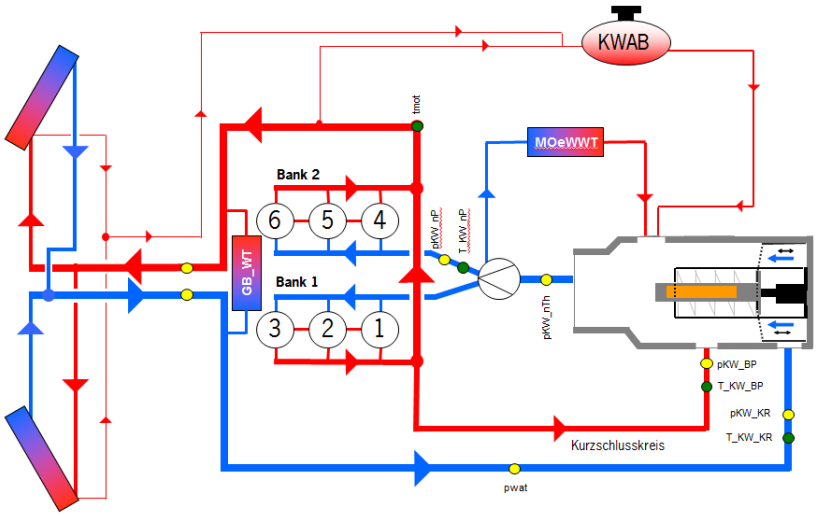


1.4 Engine cooling system

The cooling system is used to control the engine temperature. The heat generated during combustion is dissipated to the environment in a controlled manner via three radiators arranged in the front end, thereby protecting the combustion engine against overheating. The cooling system also has two oil/water heat exchangers. Both the heat exchanger for the engine and the heat exchanger for the transmission bring the oil temperatures of the respective units to operating temperature and maintain them there. There is a pressure relief valve fitted in the cap of the expansion tank that opens above an overpressure of 1.4 bar (203 psi) (max. volume flow 3L/min.) The system must be checked if it is losing coolant or a leak is suspected. Hazet provides a tester for this that pressurizes the cooling system in order to locate any possible leakage. The adapter required for the test, which must be screwed onto the expansion tank, can also be purchased from Hazet.

Adapter: Hazet 4800-12A

1.4.1 Schematic diagram

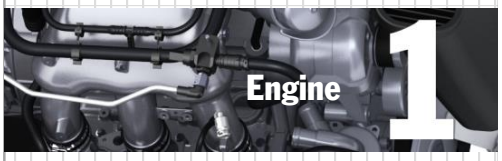


1.4.1.1

1.4.2 Thermostat

The thermostat installed in the engine opens above a water temperature of 81°C (178°F). The thermostat is fully open above approx. 95°C (203°F).

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1.4.3 Coolant

The cooling system is filled with 11 liters (11.6 qts) of water and 11 liters (11.6 qts) of antifreeze on delivery. This provides protection against cold/freezing down to -30°C (-22°F).

Porsche Motorsport recommends replacing the factory-filled coolant with 20 liters (21.1 qts) of water and 2 liters (2.1 qts) of anti-corrosion agent (Porsche spare part no.: 997.106.907.90) for all racing events. The anti-corrosion agent protects the water-carrying parts against corrosion, reduces cavitation, lubricates the water pump, and increases the boiling point of the cooling water.

Information

For races as part of a Formula 1 event, the coolant must be replaced as described below:

Approx. 20 liters (21.1 qts) of water plus at least 2 liters (2.1 qts) of anti-corrosion agent Porsche spare part no.: 997.106.907.90

Filling capacity: 22 liters (23.2 qts)

1.4.4 Filling the cooling system

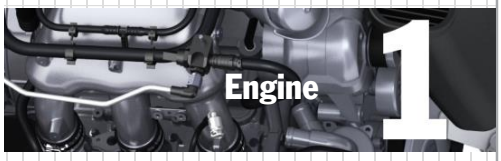
See maintenance instructions in Section 7.1.6 Engine cooling system

1.4.5 Racing at low temperatures

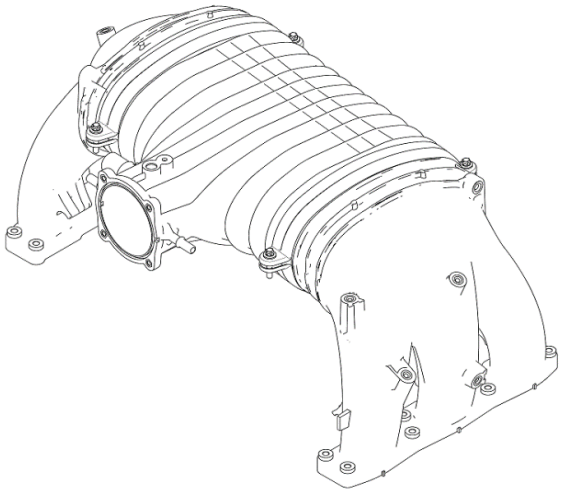
Information

The engine is fully thermostat-controlled, therefore the radiators do not need to be masked.

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1.5 Intake system



1.5.1

The new intake bridge has been made from plastic to save weight and lower the center of gravity.

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1.5.1 Throttle valve

The electronic throttle valve controls the air supply to the engine using an integrated electric motor.



1.5.1.1

- Electronic throttle valve
- Redundant design through the use of two potentiometers

Adjusting the throttle valve

There is no mechanical connection between the throttle valve and gas pedal. The electrical signal from the gas pedal is converted into an opening angle by an electrical servo motor in the throttle valve.

Information The Start button is blocked for 3 seconds after the ignition is switched on to prevent interference with the throttle valve calibration.

The throttle valve does not need to be adjusted. After the ignition is switched on, the throttle valve opens and closes automatically and in this way determines its end points.

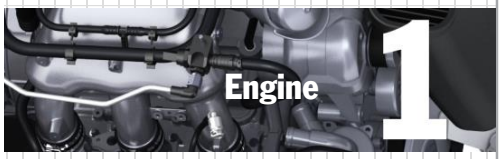
NOTE

Use of restrictors

The throttle valve projects beyond the housing when fully open.

- Make sure that the throttle valve has clearance to move

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1.6 Working on the engine

1.6.1 Tightening specification for the flywheel

The following procedure must be observed when installing the flywheel.

1. Use new screws
2. Tighten the screws in diagonally opposite sequence to **60 Nm** (44.3 ft-lb)
3. Tighten the screws in diagonally opposite sequence with a 90° angle of rotation.

1.6.2 Valve timing

The valve timing does not need to be adjusted; the position of the camshafts is detected by the engine control and automatically readjusted to the optimum setting.

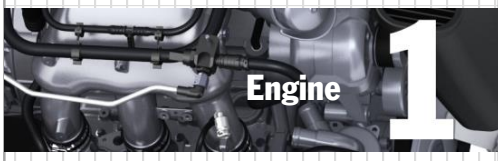
NOTE

Bad engine start properties

Adjustment of valve timing by car spinning
The engine can turn anticlockwise in case of car spinning's. The cam shaft positions must be synchronized by its own.

- To avoid bad engine start properties by car spinning's push clutch immediately

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1.6.3 Removing and installing the crankshaft sealing ring (flywheel side)

Special tools

Porsche Motorsport recommends using the following special tools to install and remove the crankshaft sealing ring on the flywheel side:

Press-in tools for crankshaft sealing ring: Porsche spare part no.: 9699/3

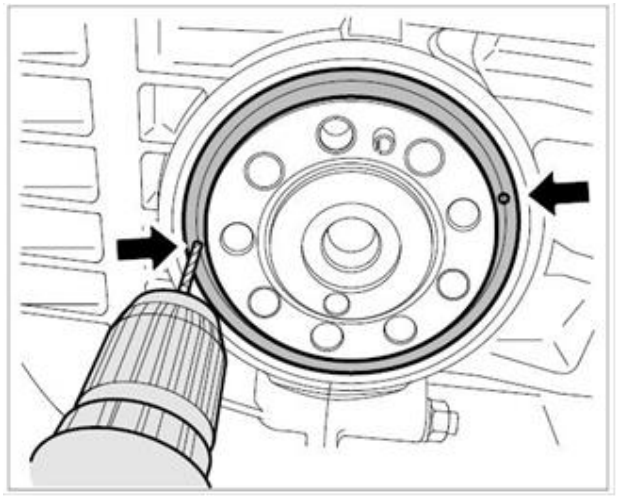
This tool can be ordered in the Porsche Dealership.

Removal

1. Drain the engine oil

NOTE	Removal of the sealing ring Damage to the crankshaft/engine block Leakage in the engine • Do not lever out the sealing ring. • The sealing ring must only be removed using an impact pull-off device.

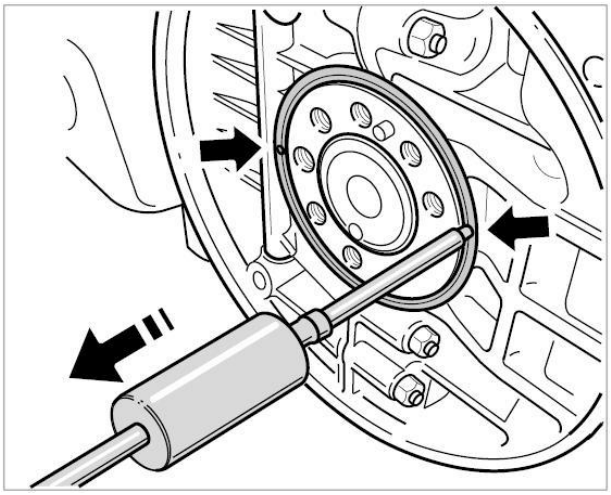
2. Prick-punch the sealing ring centrally at two positions offset by 180°.
3. Drill holes at the prick-punched positions using a drill bit (Ø 2 mm (0.08 inches)).



1.6.3.1

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4. Screw the threaded tip of a commercially available impact pull-off device alternately into the bore holes and pull the metal ring off evenly



1.6.3.2

5. Part of the sealing ring remains in the crankcase after the metal ring is pulled off.

NOTE

Removal of the remaining sealing ring

Damage to the crankshaft/engine block
Leakage in the engine

- Do not lever out the remaining sealing ring.
- The remaining sealing ring must only be removed using an impact pull-off device or tapping screws.

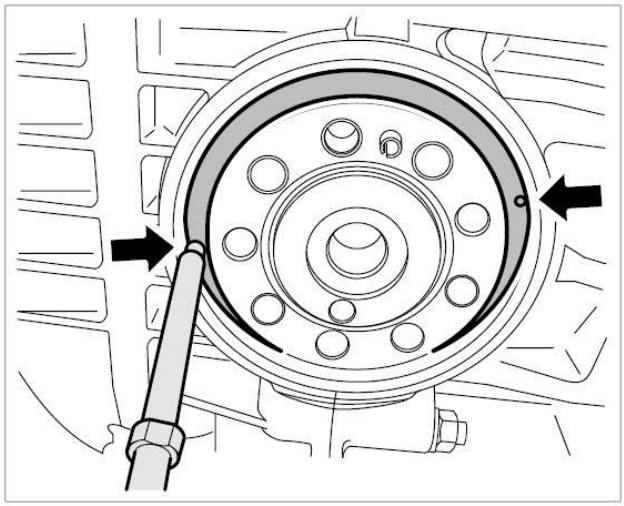
6. Carefully remove drilling chips

7. Using a (Ø 2 mm (0.08 inches)) bit, carefully drill another two holes (arrows) as far into the corners (metal body) of the sealing ring as possible.

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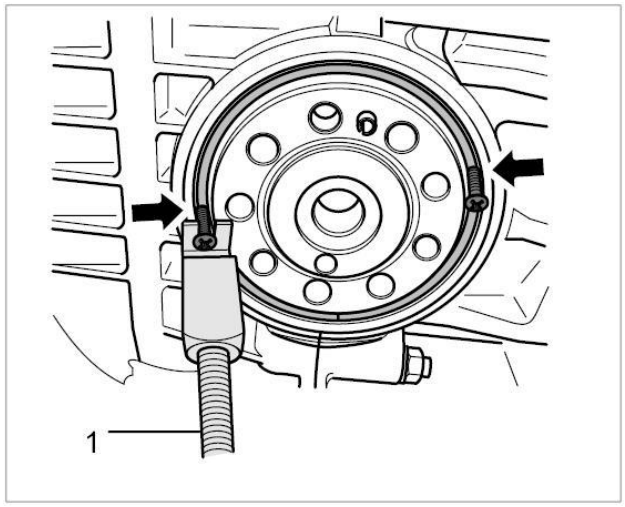
8. Remove the sealing ring; there are two ways of doing this:

   a.) Screw the threaded tip of the impact pull-off device alternately into the bore holes and pull the sealing ring off evenly.



1.6.3.3

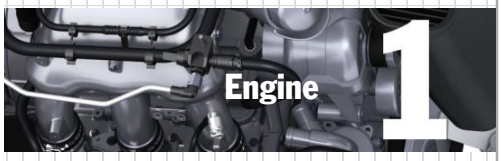
   b.) Screw in two tapping screws and pull the sealing ring off evenly using the claw sleeve from a slide hammer kit.



1.6.3.4

9. Carefully remove chips and oil residue at the crankshaft bore hole

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Installing the crankshaft sealing ring

If any small edges or burrs are found on the chamfer of the crankshaft flange, carefully remove them with an oilstone. Then, carefully clean the crankshaft journal and crankcase bore using solvent naphtha or acetone and a clean lint-free cloth.

Never use an abrasive or polishing cloth or brushes with metal bristles on the sealing surface of the crankshaft flange. Only use a special metal-polishing pad to remove corrosion on the crankshaft flange. Then clean the crankshaft flange carefully using acetone or solvent naphtha.



1.6.3.5

- Unscrew the press-in tool (Porsche spare part no.: 9699/3) (Figure 1.6.3.5).
- Slide the sealing ring with red assembly protection onto the base plate. Grease the outside of the sealing ring (Figure 1.6.3.6 and Figure 1.6.3.7).
- Secure the base plate to the crankshaft using two hexagon socket head bolts a/f 8 (arrows in Figure 1.6.3.7).
- Screw the mounting bell onto the base plate



1.6.3.6

NOTE

Damage to the sealing ring

Leakage in the engine

- Do not unscrew the a/f 19 hexagon-head bolt of the press-in tool past the point of resistance.

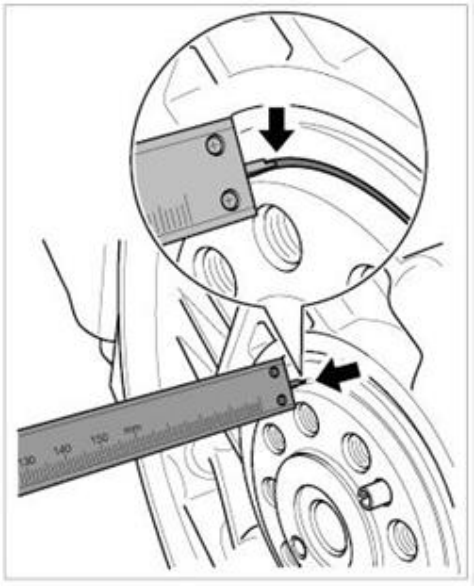


1.6.3.7

- Tighten the a/f 19 hexagon-head bolt until strong resistance is felt.
- Leave the assembly tool in the end position for one to two minutes to allow the sealing ring and sealing lip to settle into their positions
- Undo the a/f 19 hexagon-head bolt and remove the press-in tool.

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- Check the installation position of the sealing ring by using a caliper gauge to take measurements at four points from the crankcase flange to the flat part of the steel ring (arrows)



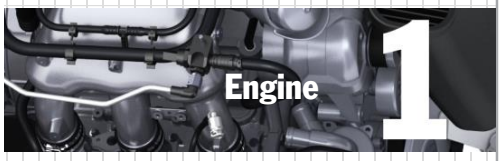
1.6.3.8

Information

- Measured depth is approx. 4.5 mm (0.18 inches)
- Maximum permissible inclined position is 0.5 mm (0.02 inches)

- If the comparative values exceed the maximum difference, press the sealing ring on again using the insertion tool

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1.6.4 Changing the poly-V-belt

Preliminary work:

- Remove the rear apron
- Remove the heat shield

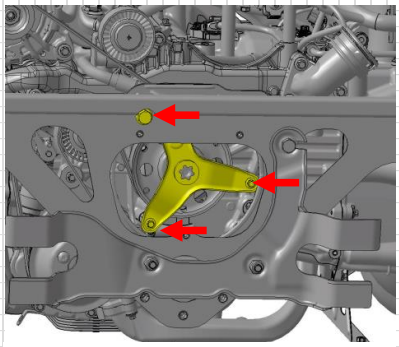
NOTE

Damage to the central oil supply

Major engine damage

- The oil line of the central oil supply must not be dismantled to change the belt.

- Unscrew the retaining bracket (2x M6x16 hexagon round-head bolts, 1x M10x135 hexagon-head bolt) (Figure 1.6.4.1)
- Remove the spacer (Figure 1.6.4.2)

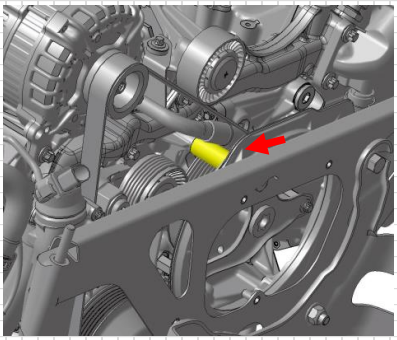


1.6.4.1

Changing the belt:

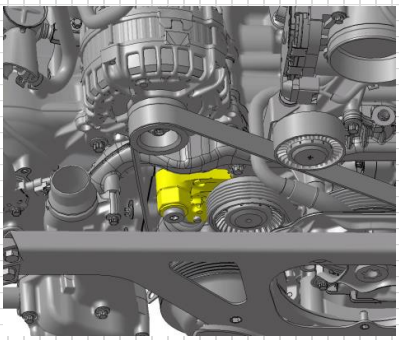
- Relieve the tension on the belt. To do this, turn the a/f 30 belt tensioner clockwise (arrow in Figure 1.6.4.3).

Remove the belt

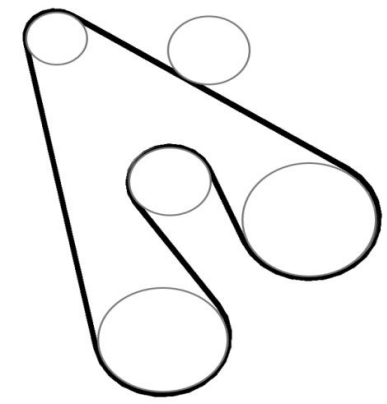


1.6.4.2

- Fit the new belt. Figure 1.6.4.4 shows the routing of the belt. Loosen the tensioner to allow the belt to assume the correct tension.
- Install the parts in reverse order.



1.6.4.3



1.6.4.4

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1.6.5 Fuel high-pressure line

⚠ WARNING

Installation of the fuel line

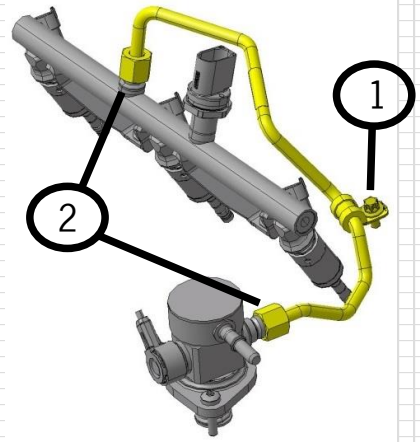
Danger of fire due to leakage

- The high-pressure line must always be replaced following disassembly.

Mounting specification for the high-pressure line:

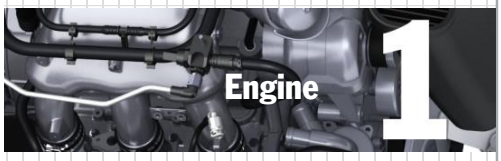
The assembly specification is the same for both cylinder banks.

- Fit the line **(always use a new line)**
- Screw on the union nut by 2-3 turns (the line must still be freely movable)
- Tighten the M6 bolt (item 1) to **7 Nm** (5.2 ft-lb)
- Tighten the union nut (item 2) to **25 Nm** (18.4 ft-lb)



1.6.5.1

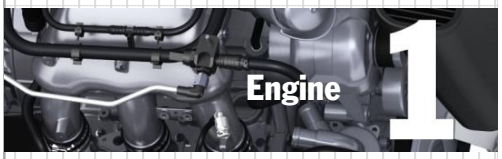
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1.7 Tightening torques for engine

Component	Screw dimension	Tightening torque [Nm (ft-lb)]
Engine		
Retaining bracket at central oil supply line	M6x16	13 Nm (9.6 ft-lb)
Pulley on crankshaft	M8x1.25	20 Nm (14.8 ft-lb) +90° crossed
Pulley on alternator	A/F	55 Nm (40.6 ft-lb)
Oil filter	1"-12 UNF	20 Nm (14.8 ft-lb)
Oil drain plug on oil modul	M16x1.5	30 Nm (22.1 ft-lb)
Water drain plug on water pipe	M14x1.5	35 Nm (26 ft-lb)
Flywheel	M10x1	See 1.5.2
Service cover on valve cover	M5x20	6.5 Nm (4.8 ft-lb)
Intake distributor on cylinder head	M6x35	13 Nm (9.6 ft-lb)
Holder tank drain on intake distributor	M6x12	10 Nm (7.4 ft-lb)
Holder fuel pipe low prs. on intake distributor	M8x12	20 Nm (14.8 ft-lb)
Knock sensor	M8x35	23 Nm (17 ft-lb) ± 2 Nm (1.5 ft lb)
Spark plugs (install max. five times)	M12x1.25	25 Nm (18.4 ft-lb)
Ignition coil fastening	M6x16	10 Nm (7.4 ft-lb)
Starter	M10x35	45 Nm (33.2 ft-lb)
Generator	M8x90	15 Nm (11.1 ft-lb)
Fuel		
High-pressure lines		See 1.6.5
High-pressure pumps	M6x25	Initial tightening: 6 Nm (4.4 ft-lb) Final tightening: 13 Nm (9.6 ft-lb)
Fuel rail	M6x16	13 Nm (9.6 ft-lb)
Pressure sensor on fuel rail	M10x1	33 Nm (24 ft-lb) ± 2 Nm (1,8 ft-lb)

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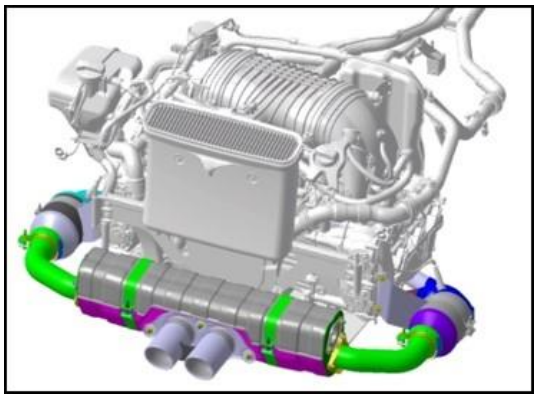
Exhaust system		
Restraining strap on muffler	M8x50	18 Nm (13.3 ft-lb)
Oxygen sensor	M18x1.5	50 Nm (36.9 ft-lb) ± 8 Nm (6 ft-lb)
Muffler ball clamp on manifold	M8x50	18 Nm (13.3 ft-lb)
Engine mount		
Engine strut on body	M10x130	60 Nm (44.3 ft-lb)
Engine strut on crankcase	M10	60 Nm (44.3 ft-lb)
Heat protection on engine carrier	M5x12	5 Nm (3.3 ft-lb)
Underbody fastening	M6x12	12 Nm (8.8 ft-lb)
Underbody fastening	M8x20	23 Nm (17 ft-lb)
Oil tank		
Oil tank on crankcase	M8x35	23 Nm (17 ft-lb)
Oil tank on intake distributor	M8x30	23 Nm (17 ft-lb)
V-band clamps on oil tank	M6x25	4 Nm (2.6 ft-lb)
Oil drain plug on oil tank	M18x1.5	30 Nm (22.1 ft-lb)
Clutch		
Flywheel		See 1.6.1
Clutch to flywheel		Pre 8 Nm (6 ft-lb) Final 33 Nm (24.4 ft-lb)

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1.8 Exhaust system

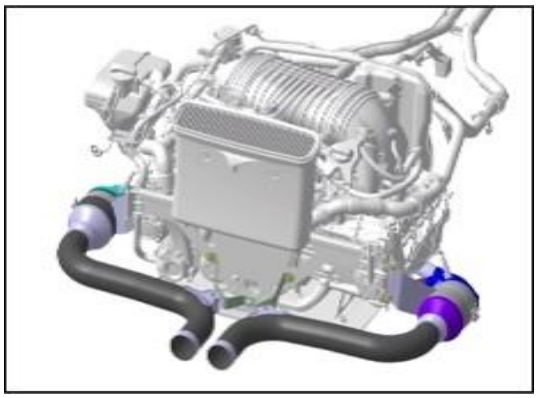
The exhaust system was also enhanced as part of the engine redevelopment. Variants with a muffler, with additional front mufflers as well as without any muffler are available. All variants have exhaust manifolds with catalytic converters (each 100 cells). The exhaust system is always mounted on the engine.

System with rear muffler:



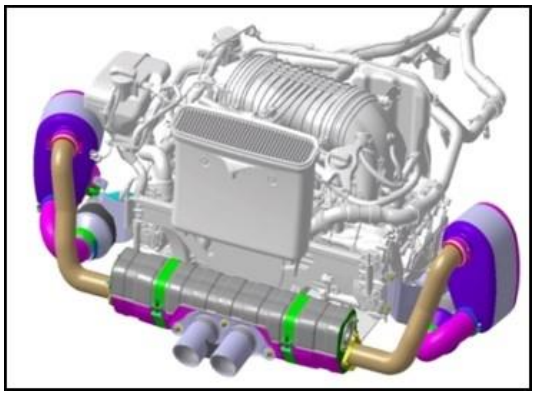
1.8.1

System without muffler (Supercup system):



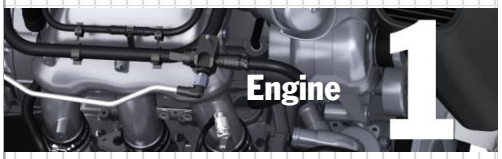
1.8.2

System with front muffler and rear muffler:



1.8.3

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Noise Emission

The following noise emission values for the Porsche 911 GT3 Cup MY 2018 (type 991 II) are measured by Porsche AG as guide values and are to inform about the different available exhaust configurations. The guide values can differ from the actual values measured by any race track through technical tolerances (wear and tear, deterioration of filling material, etc.) and environmental influences (weather, ambient pressure, structural conditions, etc.). The measurements by any race tracks and their allowance to operate are to be followed and no claim for the compliance with the numbers indicated will be recognized

Overview drive-by measurements:

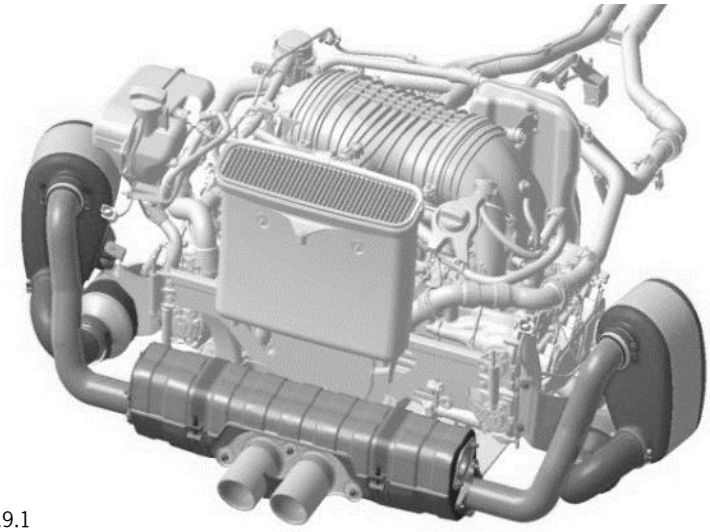
Measurment parameters				*Exhaust system configuration*		
Measuring height	*Distance to exhaust pipe*	*Angle to exhaust pipe*	*Engine speed (rpm)*	*Supercup exhaust*	*Center silencer*	*Center silencer + side silencers*
				Accoustic power [dB(A)]	Accoustic power [dB(A)]	Accoustic power [dB(A)]
1,2 m	15 m	90°	8500 *(full load)*	114,2	106,1	99,3
1,2 m	10 – 40 m	90°	8500 *(full load)*	116,6	107,6	101,9

Overview stationary measurements:

Measurment parameters				*Exhaust system configuration*		
Measuring height	*Distance to exhaust pipe*	*Angle to exhaust pipe*	*Engine speed (rpm)*	*Supercup exhaust*	*Center silencer*	*Center silencer + side silencers*
				Accoustic power [dB(A)]	Accoustic power [dB(A)]	Accoustic power [dB(A)]
0,53 m (7 ft)	2,13 m (7 ft)	45°	65% nmax (5500)	123,9	102,5	98
0,2 m	0,5 m	45°	4500	-	110,6	100,6
0,5 m	0,5 m	45°	3800	117,2	101,5	96
0,5 m	0,5 m	45°	4500	-	-	98,5
0,5 m	0,5 m	45°	75% nmax (6375)	129,3	110,6	104,7
0,5 m	1 m	45°	75% nmax (6375)	127,3	109,3	100,5
0,5 m	2 m	45°	75% nmax (6375)	123,8	104,2	94,5
0,5 m	3 m	45°	75% nmax (6375)	121,3	103,5	91

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1.9 Mounting front muffler



1.9.1

Prelimnary work:

- Remove rear cover
- Let the exhaust system cool down

Caution

Hot components

Risk of burns

- Allow hot components to cool down
- Wear protective clothing

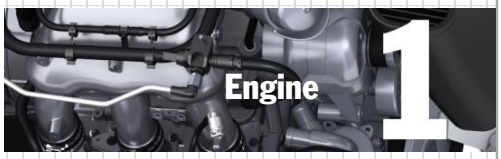
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- Pre-mount the holder of the front muffler.
- Tighten the screw 1 (Figure 1.9.2). Torque: **20 Nm**



1.9.2

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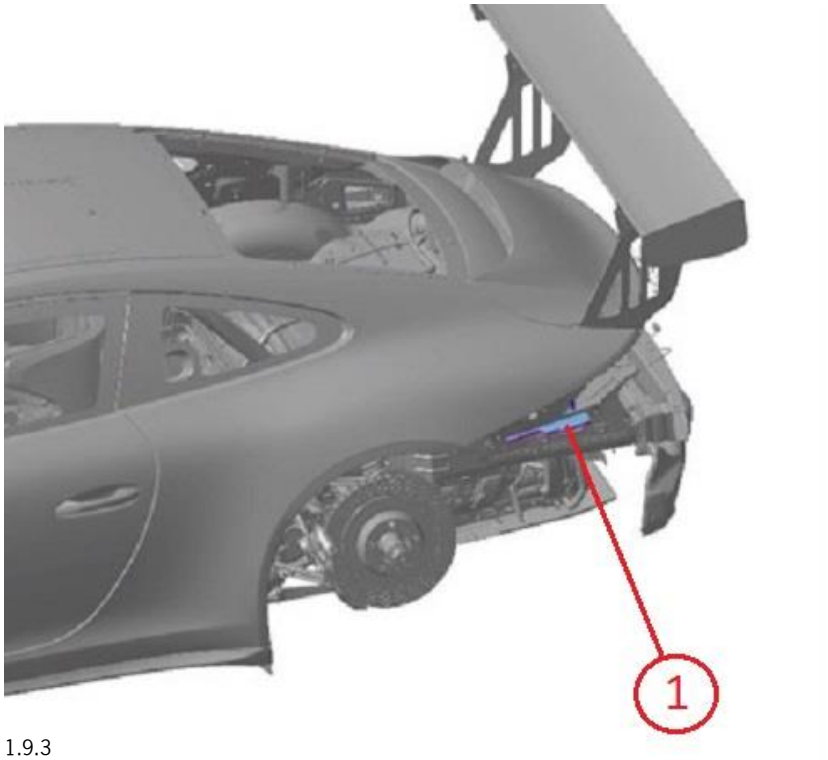


Installation:

NOTE

Before fitting the front muffler, an adaption oft he heat shiled below the rearlight is required..

For this purpose, an additional heat shield 1 (Figure 1.9.3) must be attached to the body.

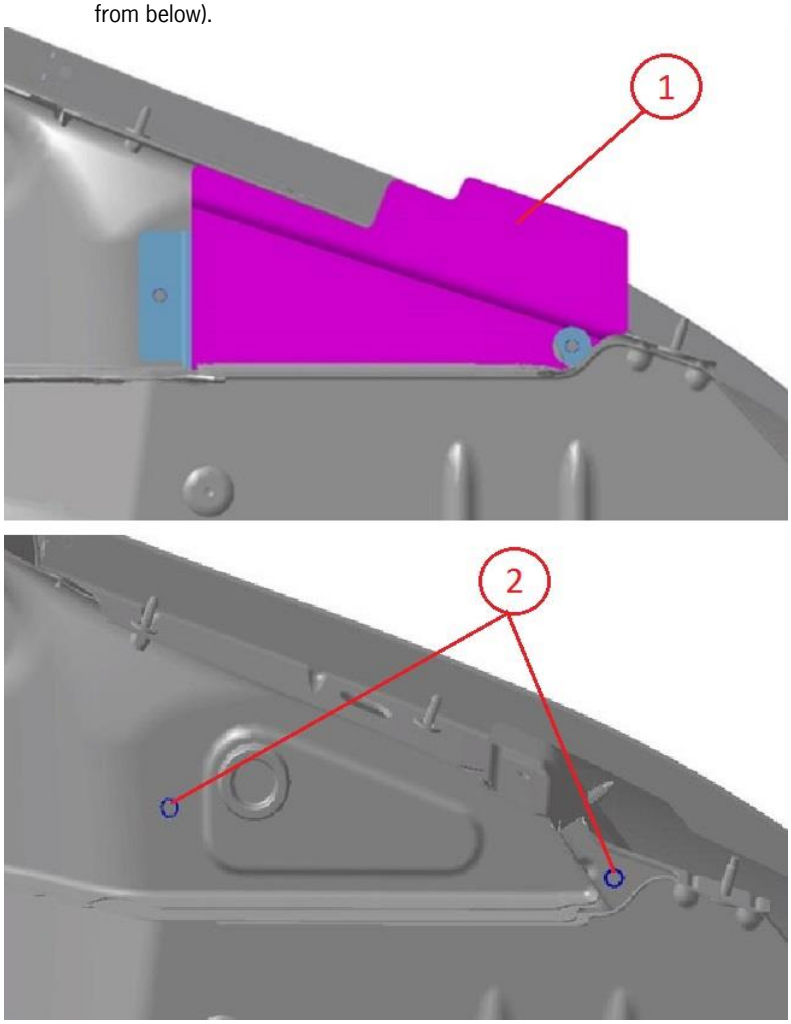


1.9.3

- Drill the marked points (Figure 1.9.4) with a drill (Ø 9 mm/0,358 inch).
- Insert the blind rivet nuts with the rivet tool..

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- Insert the new heat shield 1 and mark the drill points 2 (Figure 1.9.4/View from below).

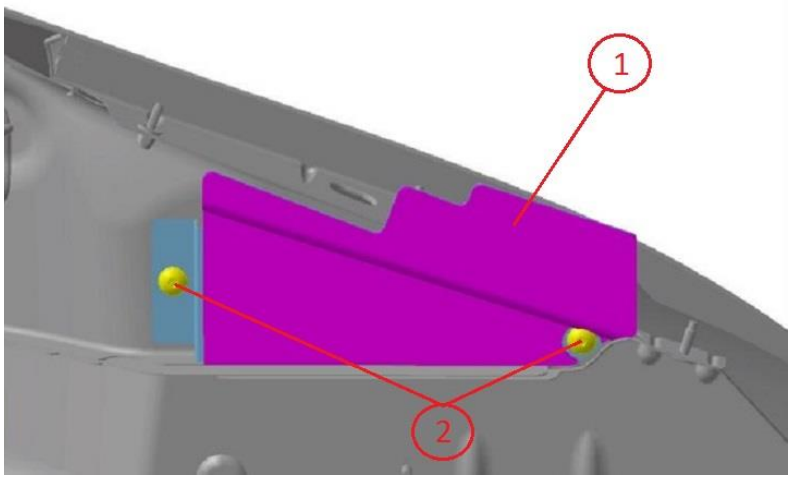


1.9.4

- Drill the marked points (Figure 1.9.4) with a drill (Ø 9 mm/0,35 inch).
- Insert the blind rivet nuts with the rivet tool.

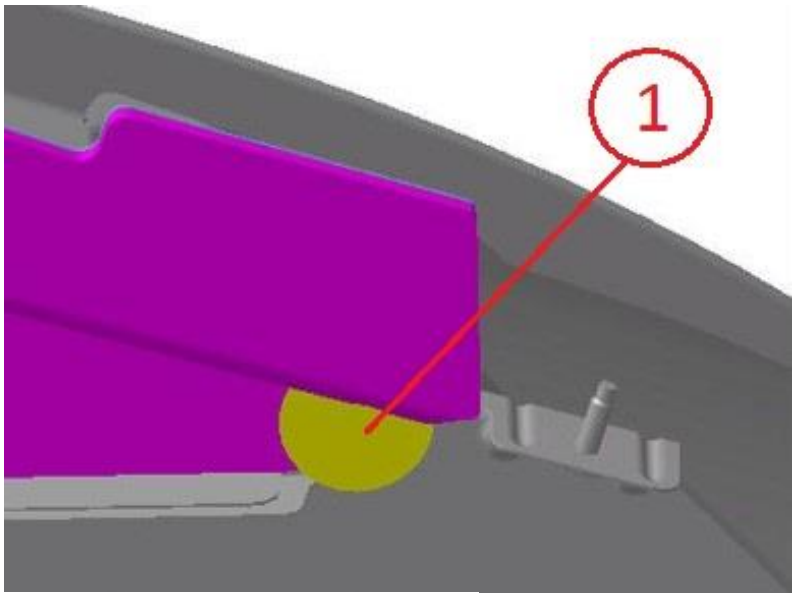
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Position the heat shiled 1 to secure with two torx screws 2 (Figure 1.9.5). Torque: **10 Nm**



1.9.5

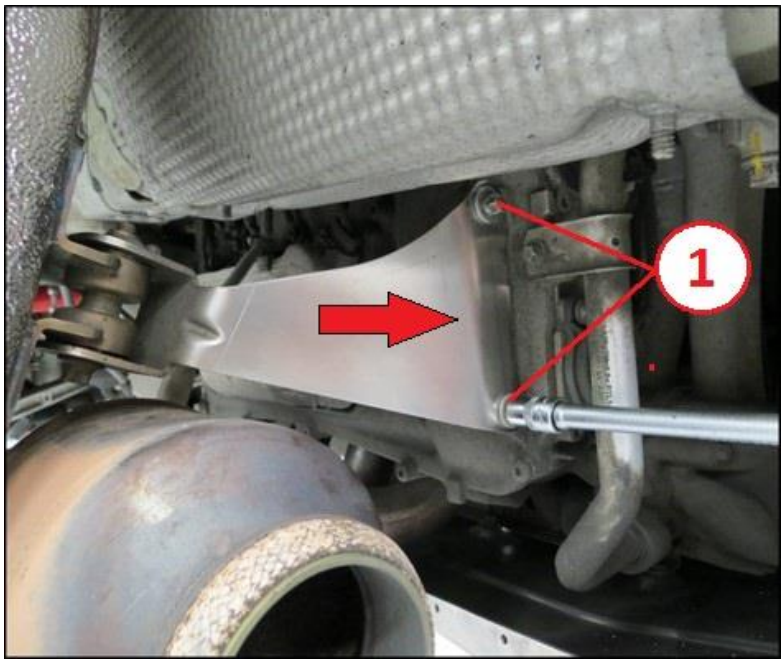
After the screws are tightened, an additional heat protection (yellow marking) must be glued over the screw 1 (Figure 1.9.6)



1.9.6

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- Position the holder on the cylinder head. Tighten the screws 1 by hand. The holder must remain displaceable.
- Pess the holder with slight force in thre direction of the motor (Figure 1.9.7/arrow), so that it rests evenly on both screw shafts.
- Tighten the two screws 1. Torque: **23 Nm**.

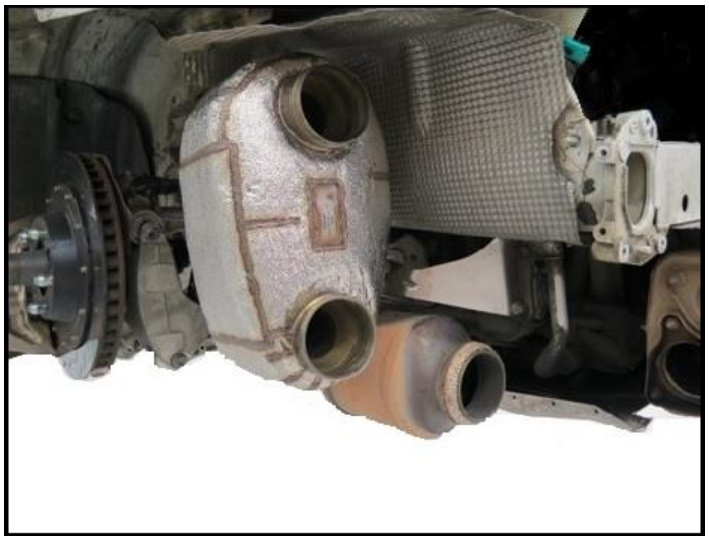


1.9.7

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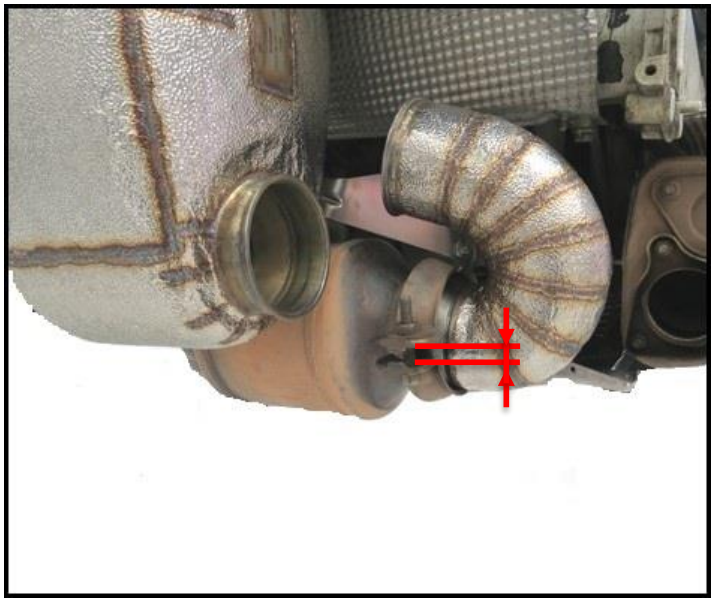
Information

The front silencer is attached to the vehicle and has little freedom of movement due to the decoupling elements.



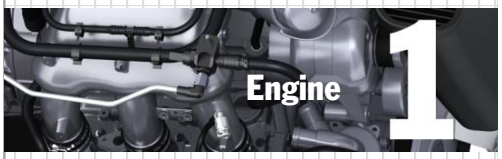
1.9.8

- Install the lower connecting pipe with the ball clamp on the exhaust manifold.
- Attach the ball clamp only hand-tight. The connecting pipe must still move freely (Figure 1.9.9).



1.9.9

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- Attach the connecting pipe cleanly tot he front muffler.
- Place the v-band clamp on the front and rear.
- Tigthen both halves evenly (Figure 1.9.10).

NOTE Observe the orientation oft he v-band clamp.



1.9.10

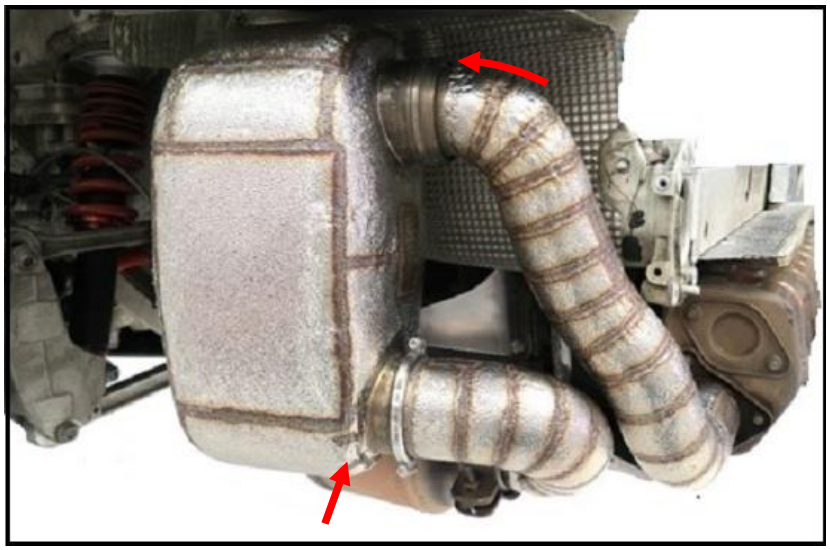
- Tigthen the screws oft he v-band clamp. Torque: **5Nm**



1.9.11

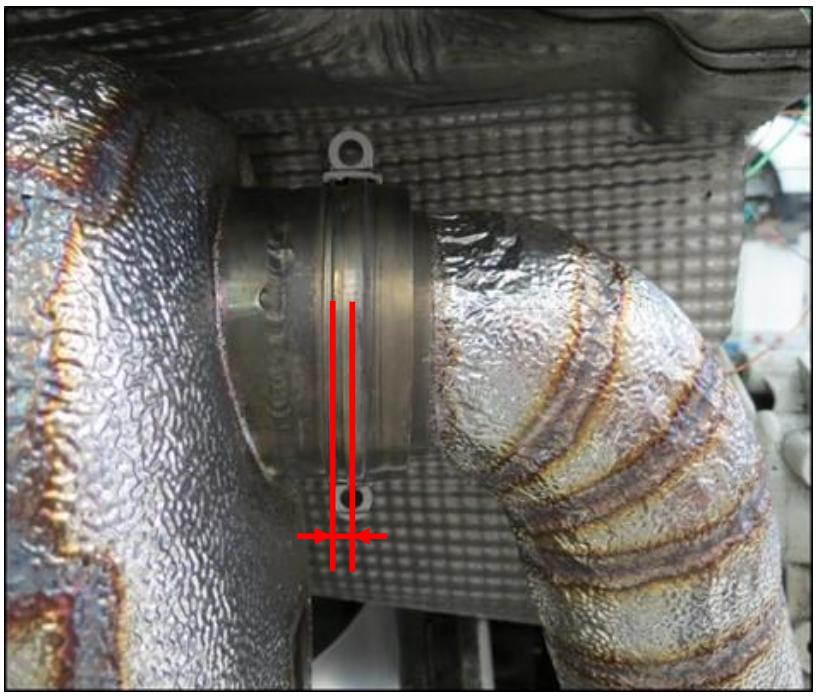
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- Insert the upper connecting pipe into the rear muffler.
- Fit the connecting pipe upper on the front muffler (Figure 1.9.12/arrows).



1.9.12

- Align the connecting pipe parallel tot he connection oft he front muffler and install the clamp (Figure 1.9.13)

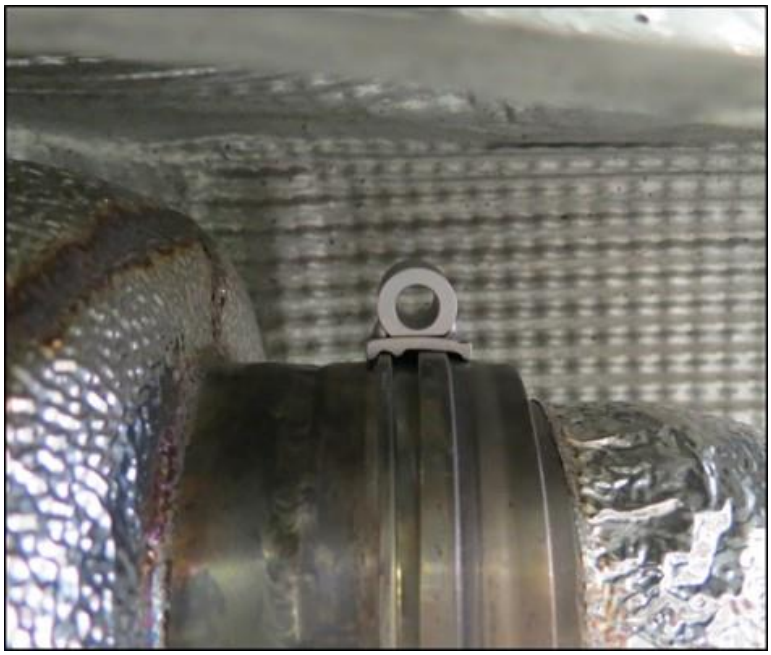


1.9.13

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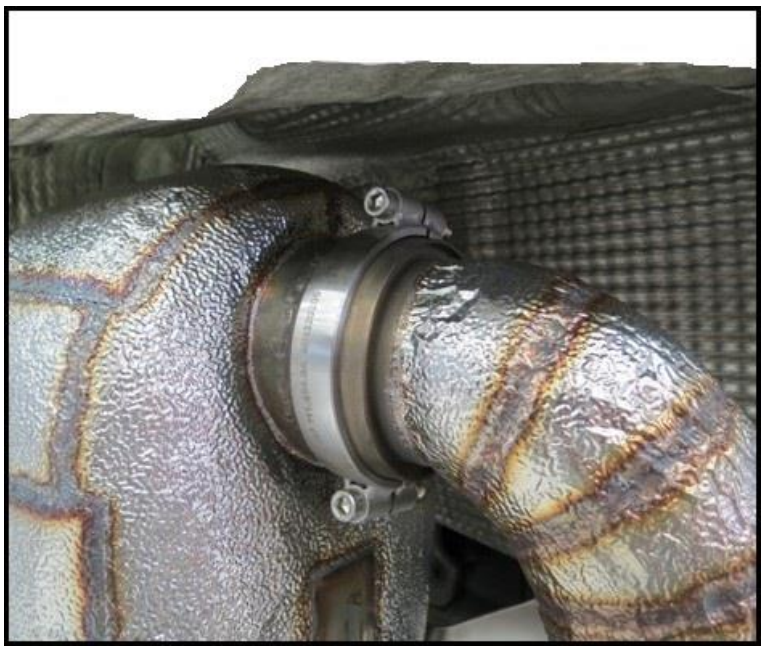
NOTE

Observe the orientation of the ball clamp.



1.9.14

- Tighten the two screws oft the ball clamp by hand. The front muffler must be movable (Figure 1.9.15)



1.9.15

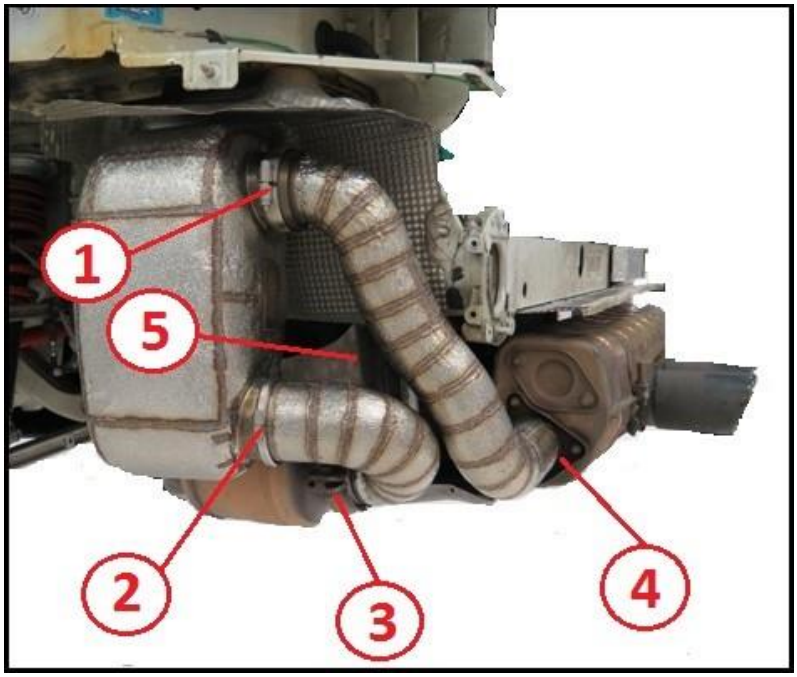
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NOTE

Prior to aligning and fixing the front muffler, the conditions of the connections should be observed (Figure 1.9.16)

The rear muffler is firmly connected to the engine bracket..

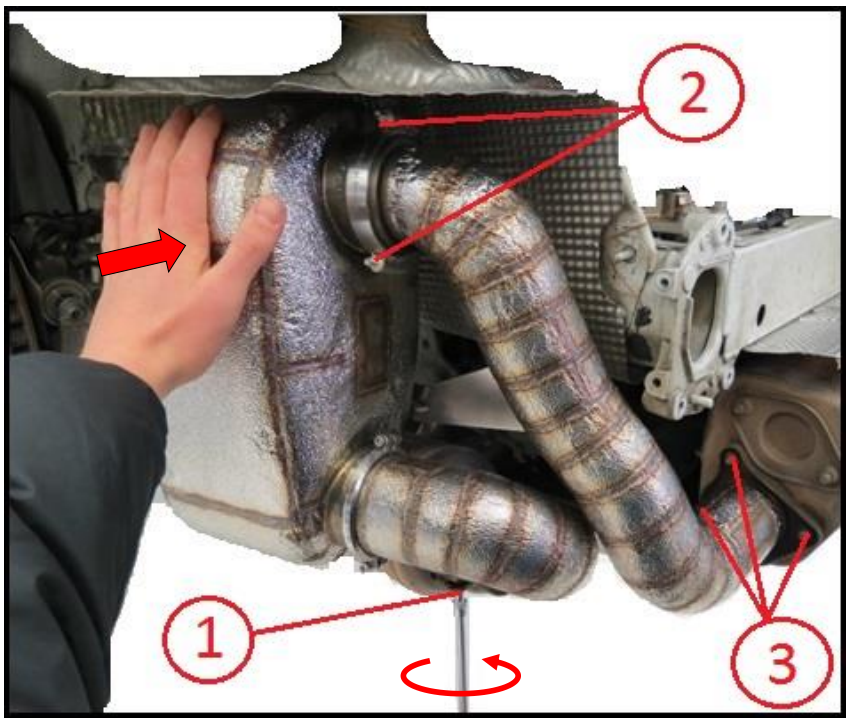
1. Ball clamp: **loose**
2. V-band-clamp: **fixed**
3. Ball clamp: **loose**
4. Connection: **loose**
5. Fron muffler bracket: **fixed**



1.9.16

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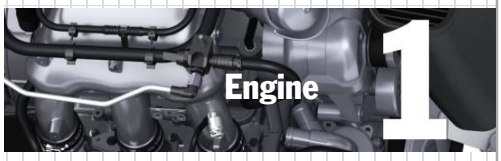
- Press the front muffler in the upper area with slight force in the direction oft he engine (Figure 1.9.17/arrow).
  Fully eliminate the freedom of movement and hold the front muffer in position.
- Tighten the screw (1) of the ball clamp, torque: **18 Nm**
- Tighten the screw (2) of the ball clamp, torque: **13 Nm**
- Tighten the nuts (3) on the connecting flange, torque: **23 Nm**.



1.9.17

NOTE Observe the distance to the heat protection parts!

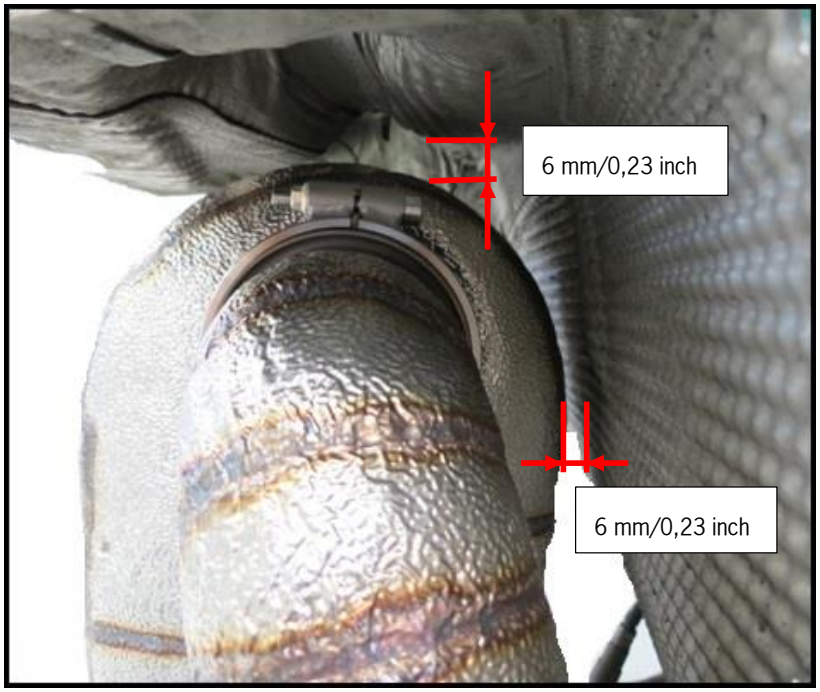
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NOTE

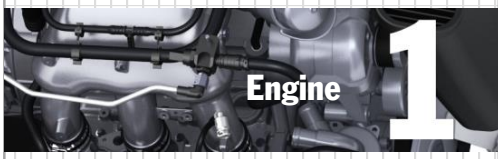
The clearance of the front muffler to the heat protection parts must not be less than **6 mm/0,23 inch**

If the muffler comes into contact with the heat shield during travel, the insulation can be damaged. The insulation effect is reduced. Thermal overloading of surrounding components may occur.



1.9.18

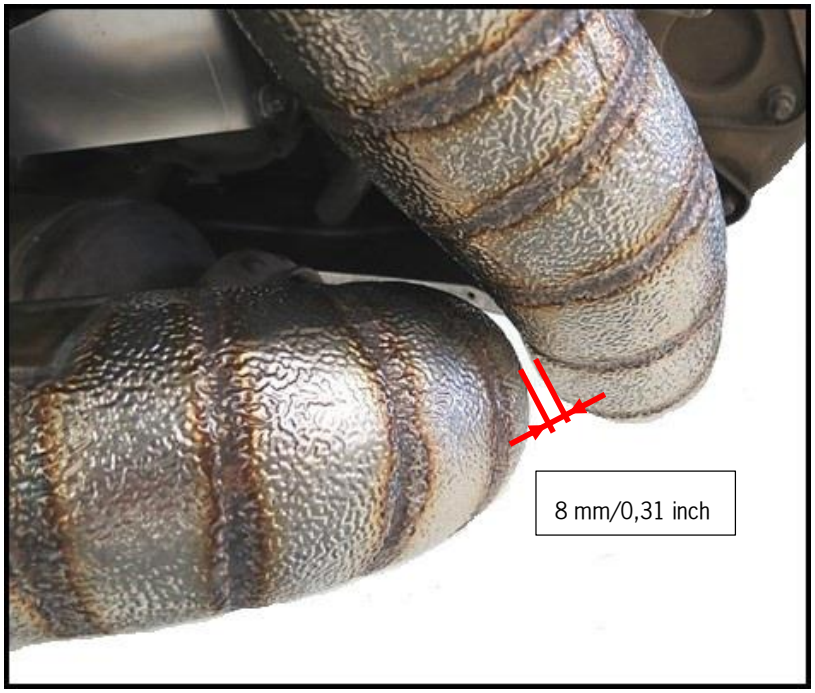
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NOTE

The clearance between the connecting pipes, at the narrowest point, should not be less than **8mm / 0.31 inch** (Figure 1.9.19).

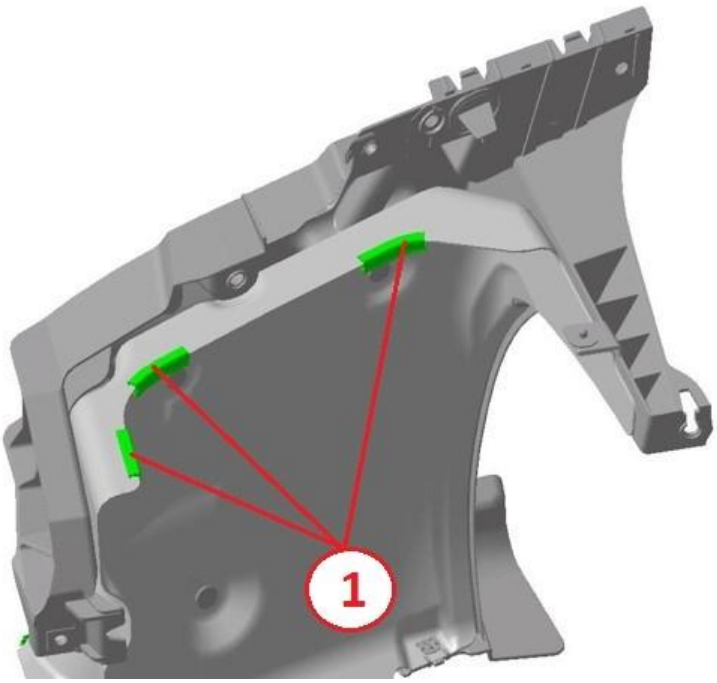
If the pipes touch during the ride, the insulation may be damaged. The insulation effect is reduced. Thermal overloading of surrounding components may occur.



1.9.19

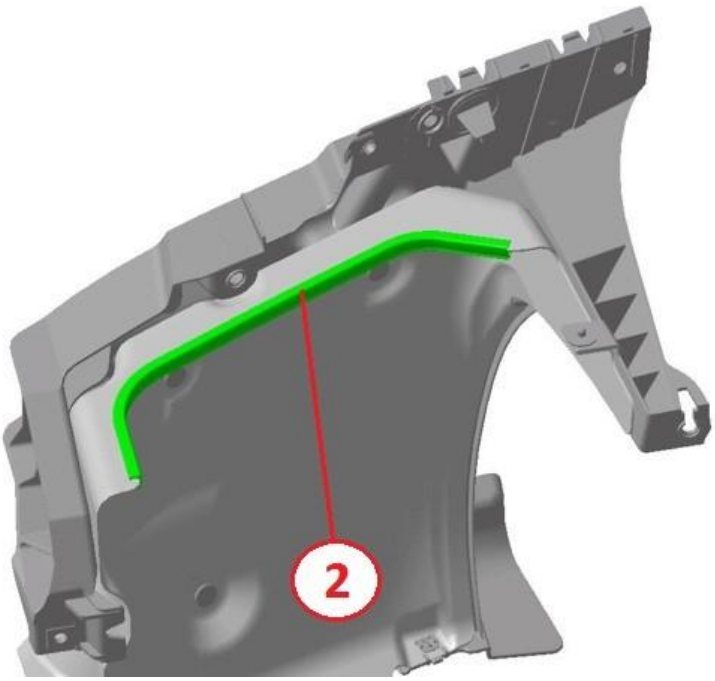
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- Remove the old seals (1) from the side heat shield (Figure 1.9.20).



1.9.20

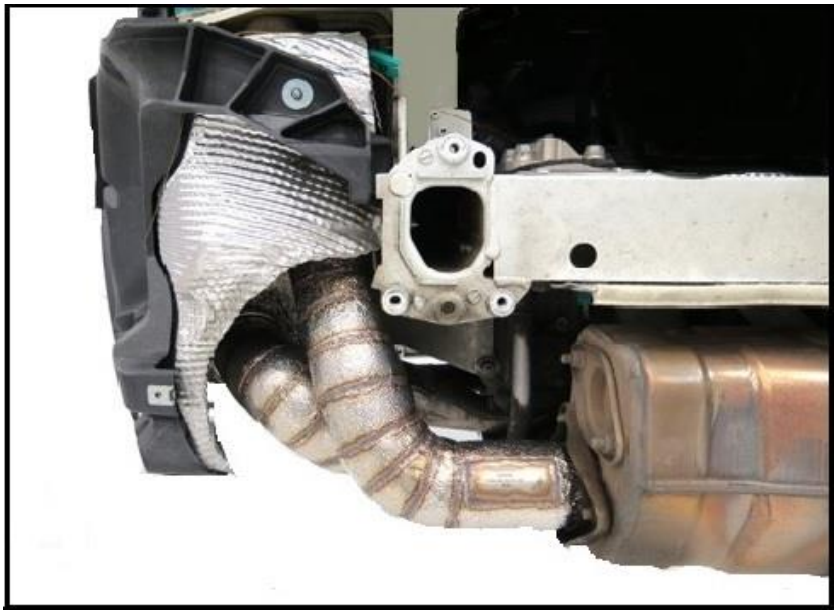
- Fit the new seal (2) (Figure 1.9.21).



1.9.21

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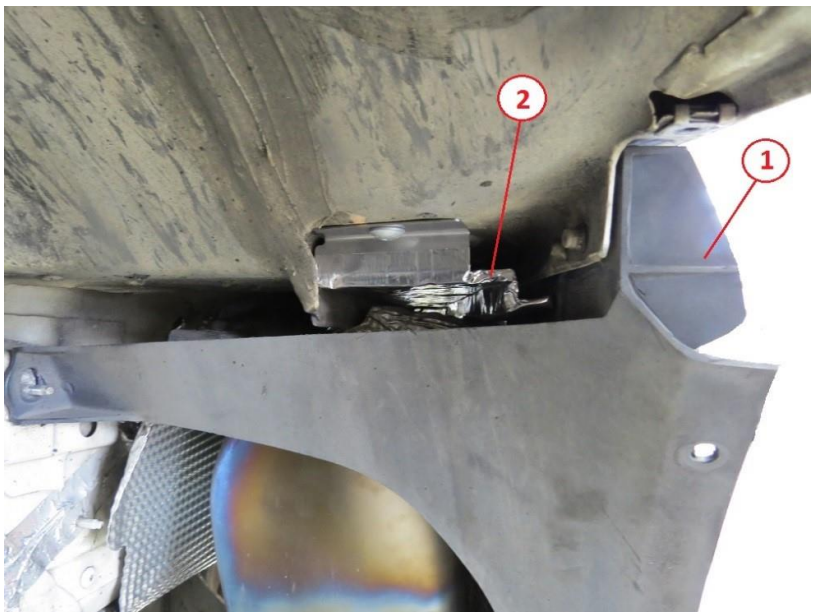
- Mount the side heat protection (Figure 1.9.22 / View from the rear).



1.9.22

NOTE

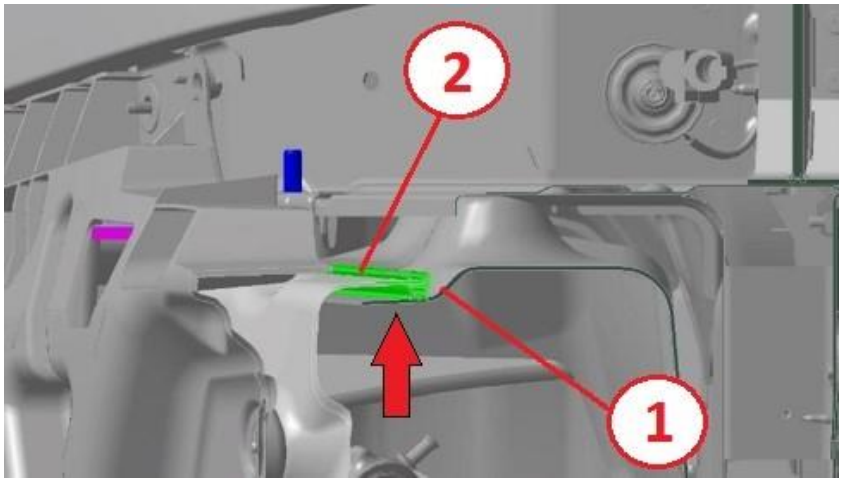
When installing the side heat protection (1), make sure that the edge of the vehicle - safe heat protection (2) is not folded or damaged. The correct fit of the two heat shields is important for the function of the overall system (Fig. 1.9.23 / front view).



1.9.23

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Press the heat shield (1) upwards until it rests against the seal (2) (Figure 1.9.24).



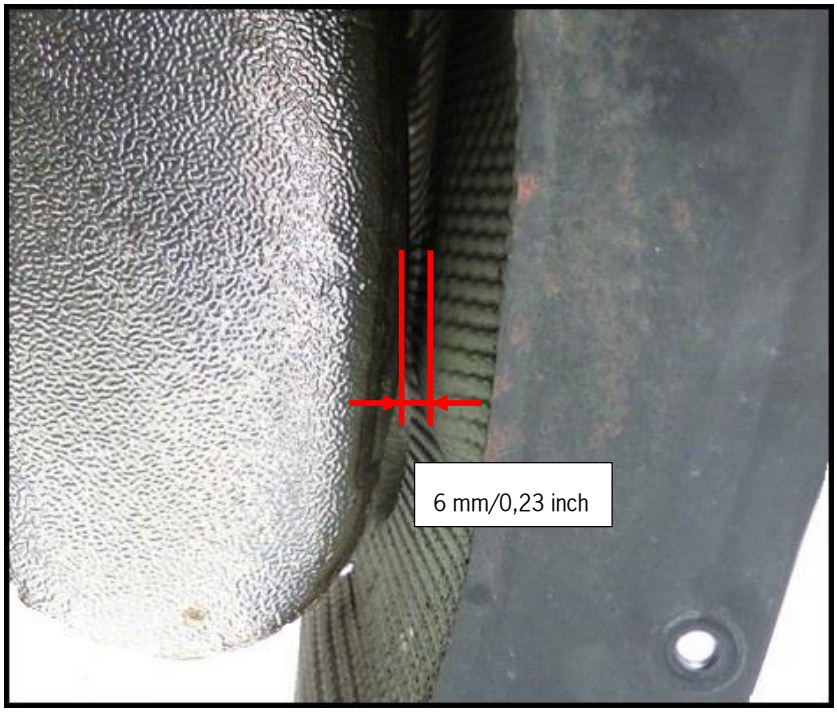
1.9.24

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NOTE

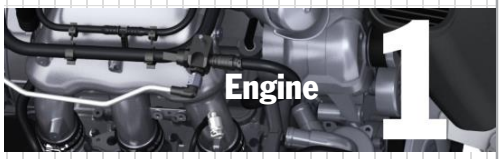
The clearance between the front silencers and the heat protection should not be less than **6 mm/0,23 inch!**

If the muffler comes into contact with the heat shield during travel, the insulation can be damaged. The insulation effect is reduced. Thermal overloading of surrounding components may occur.

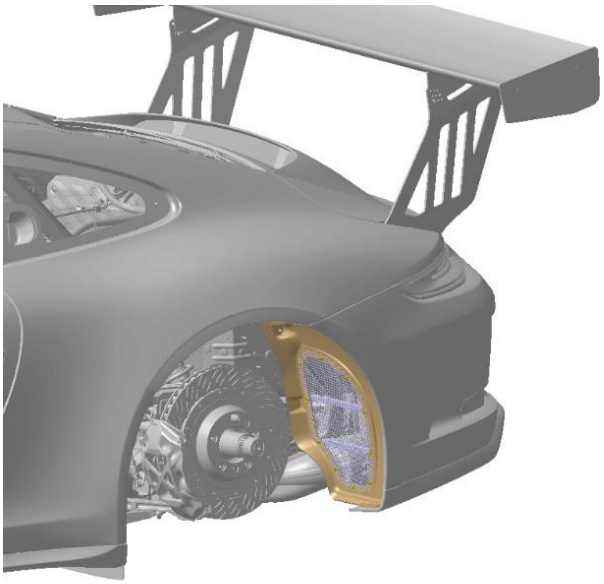


1.9.25

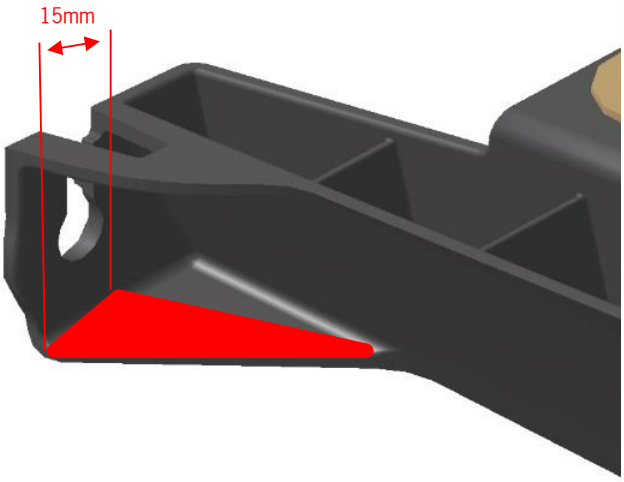
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1.10 Mounting wheel arch



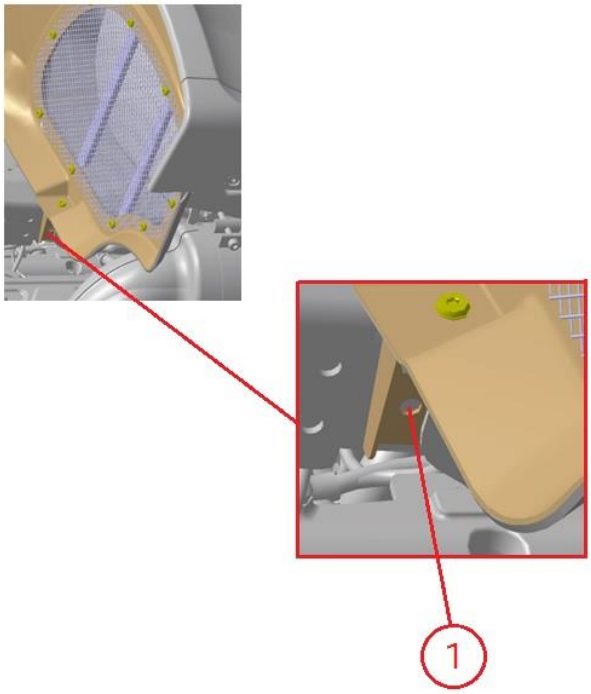
1.10.1



1.10.2

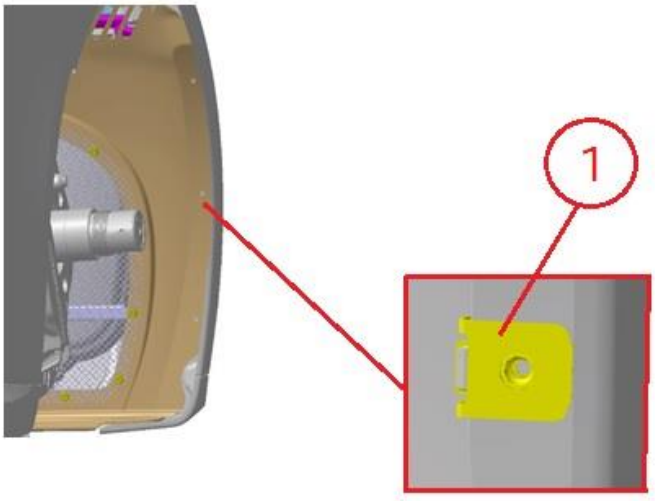
- Cut away the red marked area.

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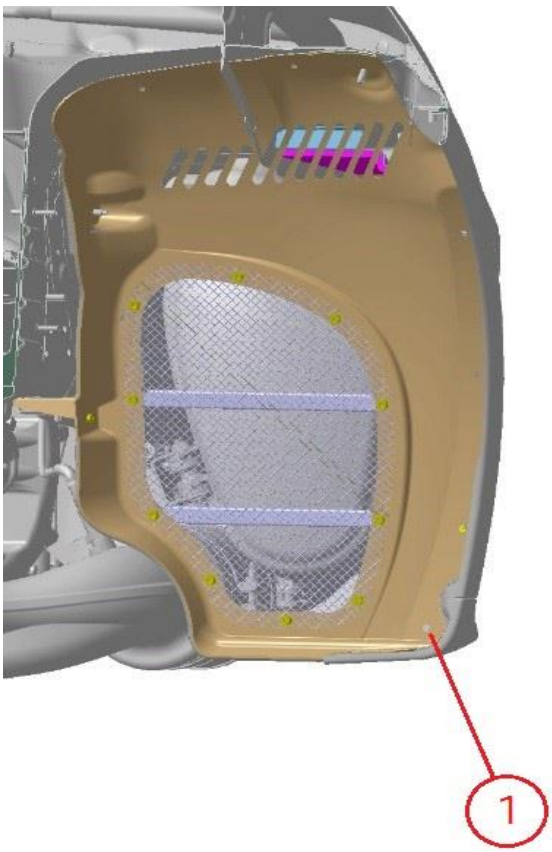
1.10.3

- Position the wheel arch, mark centre of bore (1).
- Drill hole using a 9.0-mm drill bit.
- Insert blind rivet nut in the frame.



1.10.4

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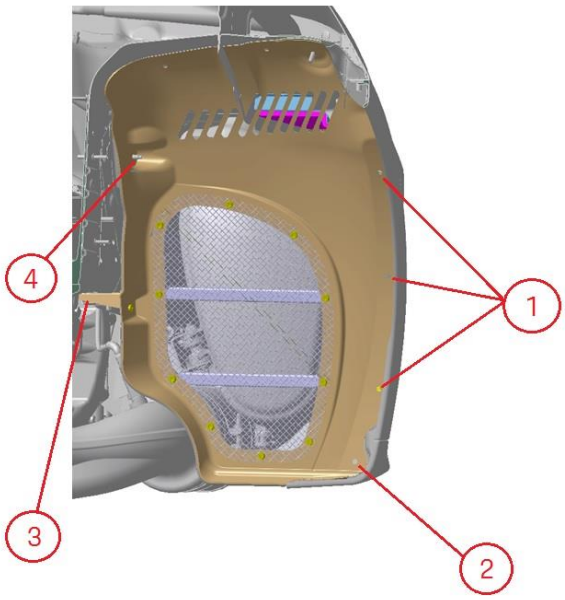


1.10.5

- Position the wheel arch.
- Mark centre of bore (1).
- Drill hole using a 9.0-mm drill bit.
- Insert blind rivet nut in the rear bodywork.

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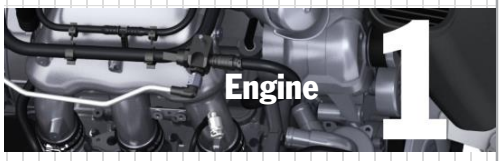


1.10.6

- Fasten wheel arch.

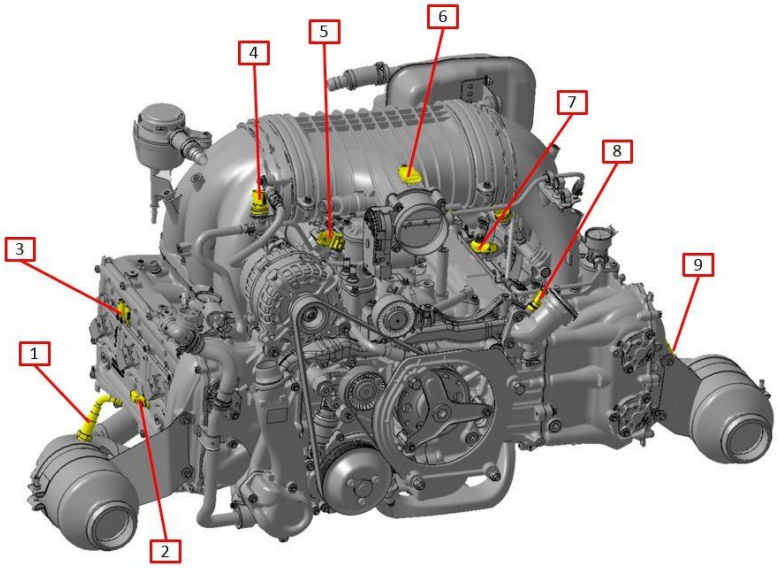
1. SELF-TAPPING SCREW ST4, 8x19
   3 Nm
2. IN-6RD-FLSH_SHR M6x12
   3 Nm
3. IN-6RD-FLSH_SHR M6x12
   3 Nm
4. 6KT-MU M6-S
   10 Nm

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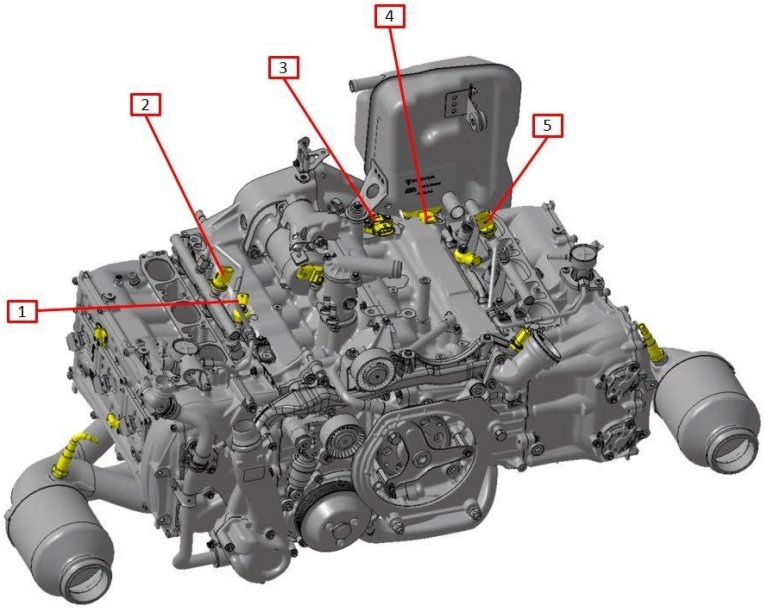
1.11 Sensors

1. Lambda probe 1
2. Phase Sensor outlet 1
3. Phase Sensor intake
4. Fuelpress. Sensor
5. Crankcasepress.-sensor
6. Manifold pressure and temp. Sensor
7. Knock Sensor 2
8. Cooling water temp. Sensor
9. Lambda probe 2



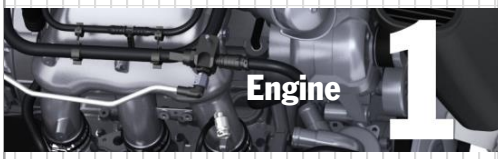
1.11.1

1. Knock Sensor
2. Fuel press rail Sensor (high pressure) 1
3. Engine oil temp. and pressure Sensor
4. Oil level (tank)
5. Fuel press rail Sensor (high pressure) 2



1.11.2

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1.12 Running time of engine

NOTE

Engine speed of 8,500 rpm exceeded

Serious damage to the engine

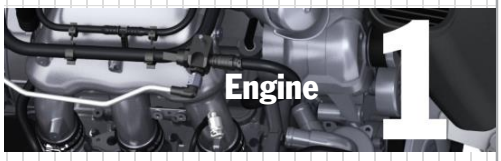
Porsche warranty voided

- Do not exceed an engine speed of 8,500 rpm.

The engine of the 911 GT3 Cup (991 II), which is based on the 991 GT3 RS standard-production unit, is designed for a maximum engine speed of 8,500 rpm.

Component	Running time
Stop-choc elements of the exhaust system (only installed in exhaust systems without muffler or with front mufflers)	60 h
Engine	100 h

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1.12.1 Behavior if the maximum engine speed is exceeded

The overhaul interval changes in accordance with the table below if the maximum engine speed of 8,500 rpm is exceeded.

Engine speed	Duration	Overhaul
8,500 – 9,000 rpm	-	After 60 hours
9,000 – 9,500 rpm	More than 6 seconds	Immediate inspection on the test stand
> 9,500 rpm	More than 2 seconds	Immediate engine overhaul
> 10,000 rpm	First time the engine speed is exceeded	Immediate engine overhaul

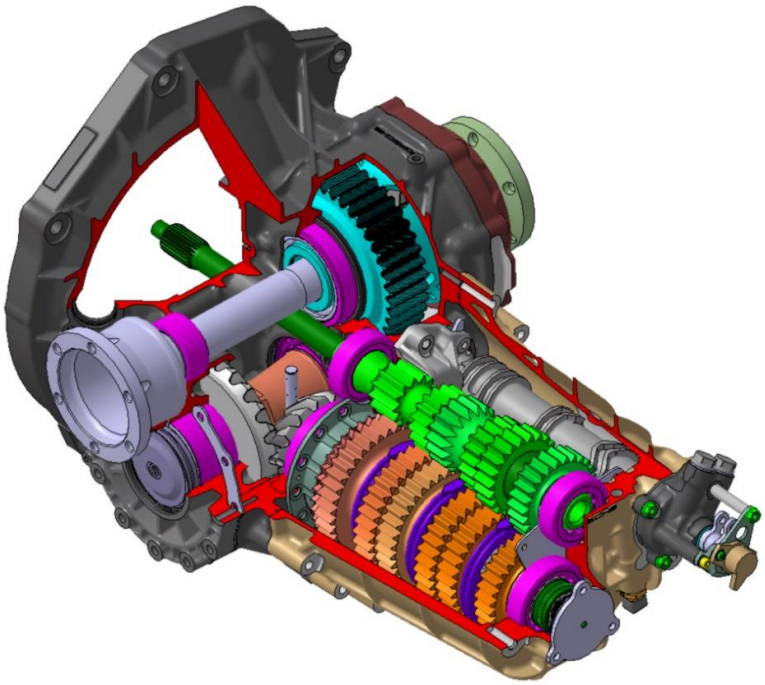
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2 Powertrain

2.1 General

The 911 GT3 Cup (991 II) integrates a sequential six-speed gearbox specially developed for use in motor sports. The shift mechanism has been designed for optimal efficiency, taking into account the pneumatic actuation by means of the compressed air system. To increase the ruggedness and the running time the gearbox is refined. In addition, the gearbox is equipped with a limited-slip differential, an oil filter and an oil/water heat exchanger for cooling. Despite the compact design of the gearbox, accessibility to the individual components has been enhanced. This is a significant improvement, especially, for facilitating any required maintenance work.



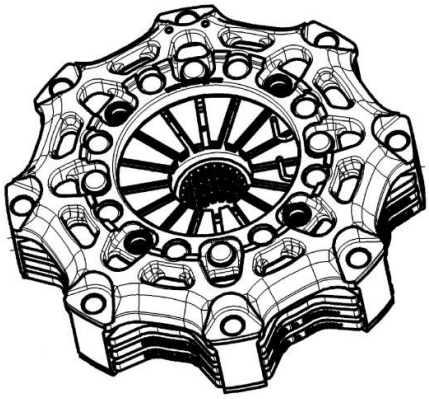
2.1.1

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2.2 Clutch

A Sachs three-disk sintered metal clutch is used in the 911 GT3 Cup (991 II). The clutch has been designed particularly for the loads in motor sports and combines high performance and temperature durability with reduced weight and low moment of inertia.



2.2.1

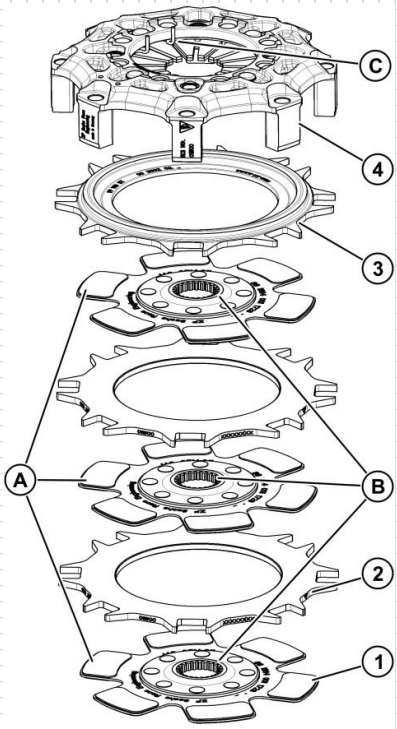


Information

Do not drive the vehicle with slipping clutch. This will cause excessive wear or overheating (maneuvering, loading and unloading, etc.).

2.2.1 Installation instructions

Make sure that the wings of the multiple-disk clutch sintered disks (1) are stacked and aligned (A) if possible. Lightly grease the gear teeth of the hub (B) and move the clutch disks back and forth on the connecting shaft gear teeth until the hub moves smoothly on the shaft. If required, remove excess grease.



2.2.1.1

1	Clutch disk
2	Intermediate plates
3	Pressure plate
4	Housing
A	Wings of sintered disks
B	Hub gear teeth
C	Clutch housing

NOTE

Contaminated/oily clutch linings

Clutch slips

- Do not allow greases/oils to come into contact with clutch linings.

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2.2.2 Clutch wear

New sintered lining	3.40 mm (0.13")
Replace at	3.00 mm (0.12")

The contact pressure of the cup spring remains constant up to this dimension (3 mm). Use "Racing Fluid-325 °C" from Performance Friction Brakes as clutch fluid. If it falls below the limit above, the clutch disk should be replaced.

2.2.3 Fluid for clutch actuation

Racing Brake Fluid-325° from Performance Friction Brakes is used as clutch fluid.

Porsche spare part No.: 991.355.960.8A

Porsche recommends to vent the system after each session and to change the fluid after each race weekend.

Venting:

WARNING

Corrosive fluids

Danger of chemical burns

- Wear personal protective equipment.
- Ensure good ventilation.
- Avoid contact with corrosive fluid.
- If you do come into contact, wash off immediately with plenty of warm water and contact a doctor if necessary.

- Depress the clutch pedal 2 to 3 times and keep it depressed
- Shortly open the vent valve rear cross member (illustration 2.2.3.1) – the clutch pedal has to be depressed and should not be released
- Close the vent valve again
- Increase pressure again by pumping pedal
- Repeat this procedure 2 to 3 times
- Check the fluid level on the fluid reservoir and replenish fluid, if required

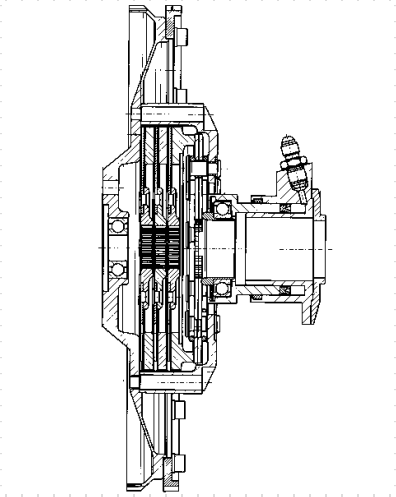


2.2.3.1

Replacement:

- Remove the old fluid from the reservoir and fill with new fluid
- Then proceed as for venting, perform approx. 10 times the steps mentioned above and replenish fluid in the reservoir if required.

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2.2.4.1

Set external mounting tool:
997.450.037.9A

2.2.4 Central release mechanism

The hydraulically actuated piston is controlled by the clutch pedal and the master cylinder. The thrust bearing integrated into the release piston transfers the force to the diaphragm spring of the clutch housing, thereby separating the positive engagement between engine and gearbox.

NOTE

Central clutch release lever seal

Damage to the central clutch release lever

Loss of clutch function

Do not allow the seal to come into contact with engine oil or transmission oil.

- The seal must only be fitted using the special tool from Sachs.

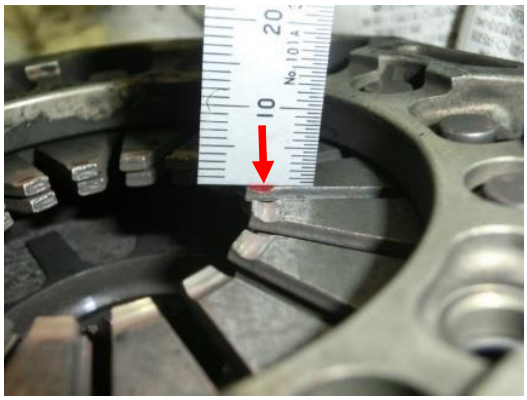
Also make sure to remove oil residues from your hands and the working environment before handling the seal (this also applies to engine oil and other oils).

According to the manufacturer, the seal is compatible only with hydraulic fluids with DOT4 and DOT5.1 specifications.

Cup spring wear

Information

The grinding chamfer on the cup spring (Figure 2.2.4.2) must not exceed a maximum depth of 0.5 mm (0.06 inches).



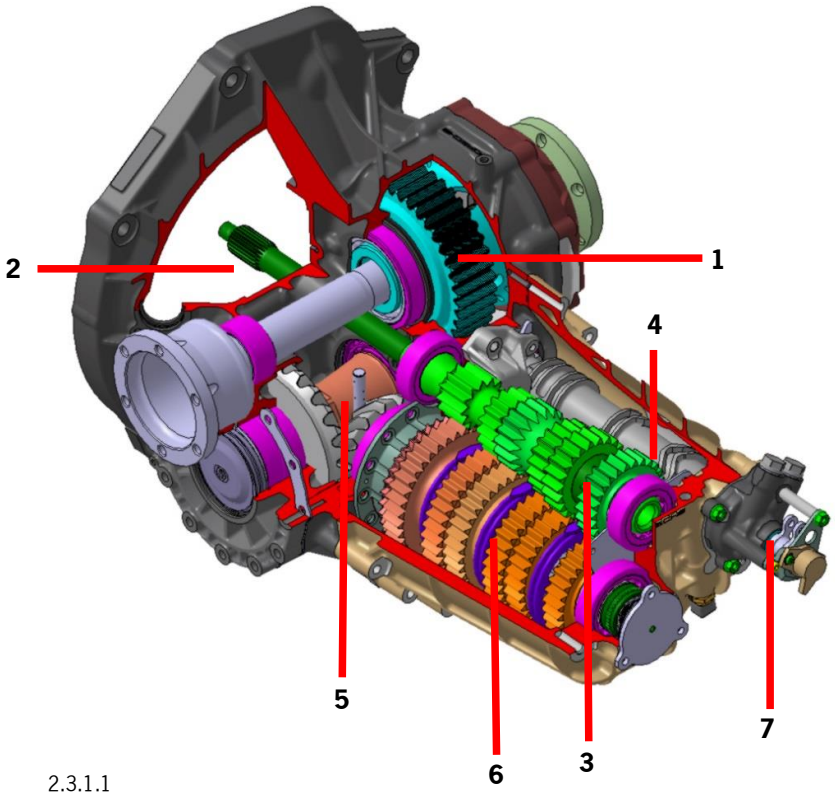
2.2.4.2

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2.3 Sequential six-speed gearbox

2.3.1 Overview



2.3.1.1

1 Limited-slip differential
2 Connecting shaft
3 Drive shaft
4 Gear shift drum
5 Cross shaft
6 Pinion shaft
7 Gear shift mechanisms

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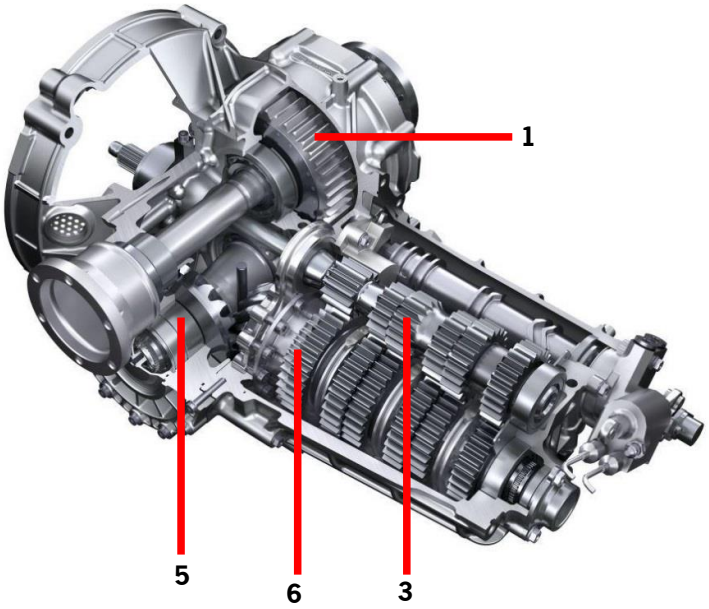
2.3.2 Technical specifications

Gearbox type	G91/70
Design	sequential
Number of forward gears	6
Fill quantity	3.0 l (3.17 qt.)
Weight	70 kg (154 lb.)

Gear	Teeth	i_gear	i_const.	i_bevel/ crown gear	i_total
1	13/41	3.154	2.412	1.571	11.951
2	17/40	2.353	2.412	1.571	8.916
3	19/36	1.895	2.412	1.571	7.181
4	19/29	1.526	2.412	1.571	5.782
5	24/30	1.250	2.412	1.571	4.737
6	34/35	1.029	2.412	1.571	3.899
Reverse	16/37	2.313	2.412	1.571	8.765
Constant	17/41		2.412		3.789
bevel/ crown gear	14/22			1.571	3.789

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2.3.3 Gear set

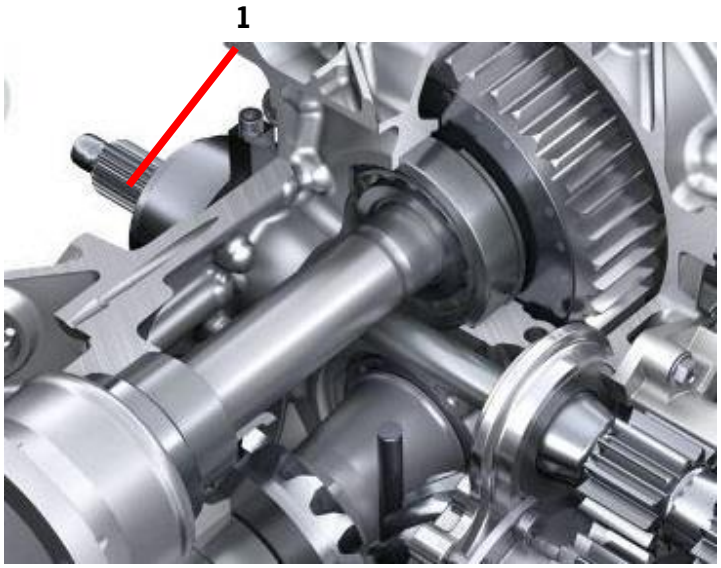


2.3.3.1

The gear set consists of the drive shaft (3) with fixed gears, the pinion shaft (6) with idlers, a cross shaft with constant ratio (5) and the limited-slip differential (1).

Connecting shaft

The connecting shaft (1) is the element that connects the clutch to the drive shaft. It transfers the torque generated by the engine directly to the fixed gears of the drive shaft.



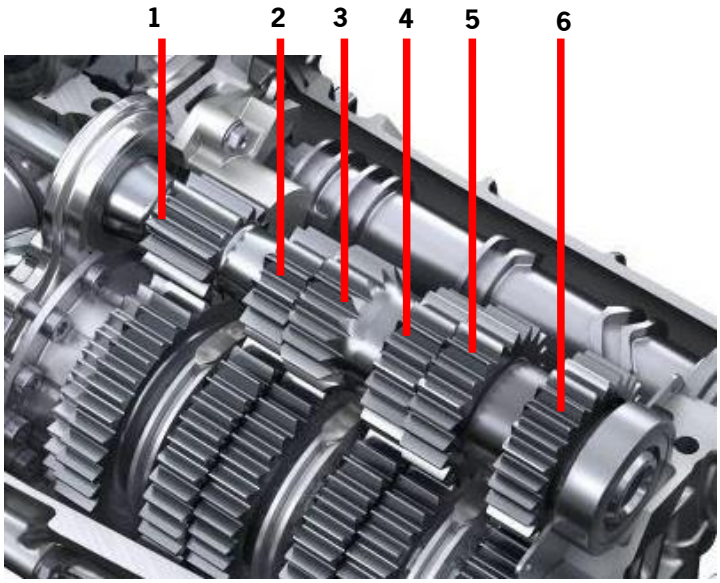
2.3.3.2

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1 Fixed gear, 1st gear
2 Fixed gear, 2nd gear
3 Fixed gear, 3rd gear
4 Fixed gear, 4th gear
5 Fixed gear, 5th gear
6 Fixed gear, 6th gear

Drive shaft design

The drive shaft is located above the pinion shaft and is mounted with two bearings in the gearbox housing. As typically found in motor sports, the fixed gears of the gear pairs are all located on this shaft.

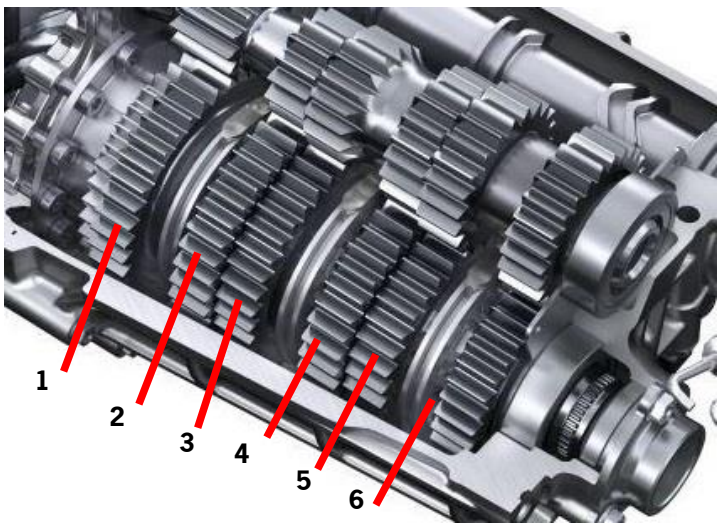


2.3.3.3

Pinion shaft design

The pinion shaft is located below the drive shaft and is mounted with three bearings in the gearbox housing. A special feature is the combination of cylindrical rollers and angular contact ball bearings directly in front of the bevel gear. This bearing arrangement directs the occuring forces into the housing in the best possible way. The pinion shaft accommodates all idlers of the gear pairs as well as the sliding sleeves, which are responsible for positive engagement.

1 Idler, 1st gear
2 Idler, 2nd gear
3 Idler, 3rd gear
4 Idler, 4th gear
5 Idler, 5th gear
6 Idler, 6th gear

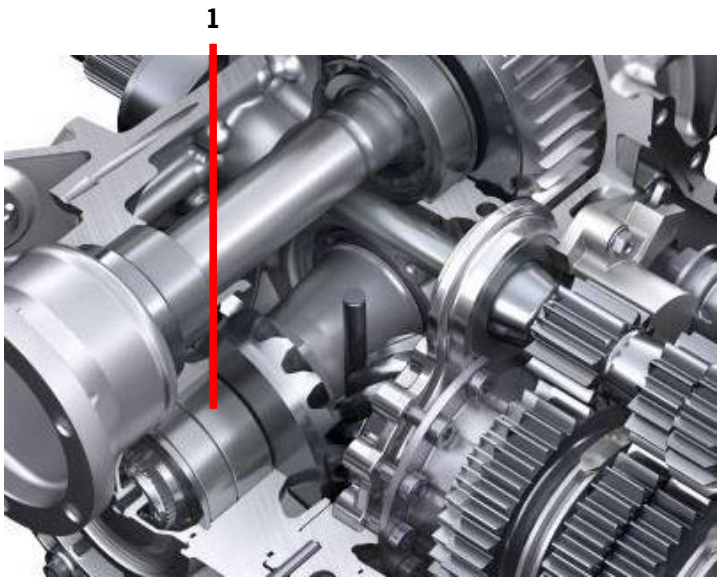


2.3.3.4

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Cross shaft design

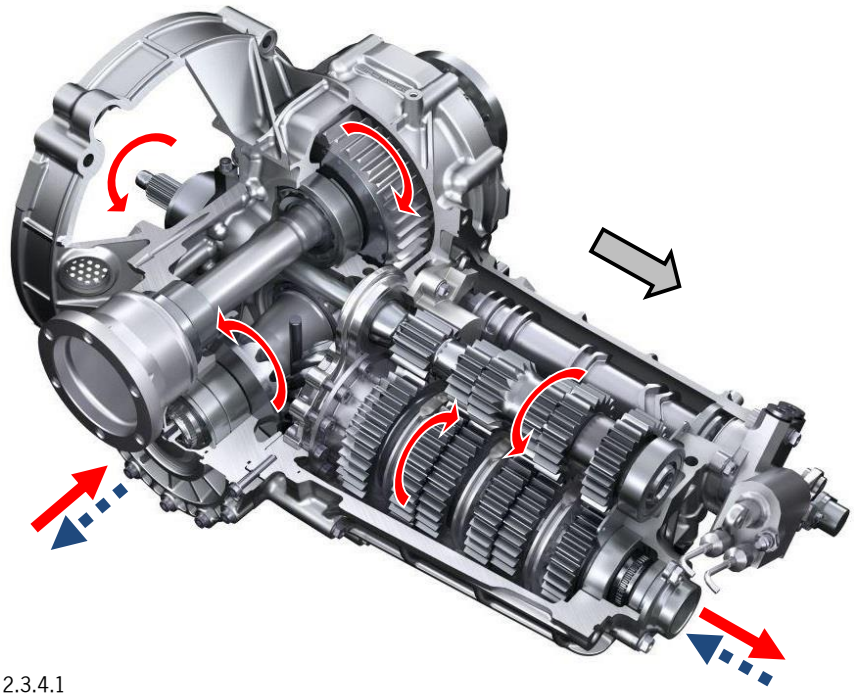
The cross shaft (1), offset by 90°, is located behind the pinion shaft and is used for changing the direction of the torque. The crown gear of the cross shaft is driven by the bevel gear of the pinion shaft. The torque is transmitted by means of the opposing spur gear teeth to the limited-slip differential located above it.



2.3.3.5

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2.3.4 Drive



Direction of rotation, traction
Shaft movement, traction
Shaft movement, coast
Driving direction

2.3.4.1

The torque is transmitted from the engine through the connecting shaft and drive shaft to the gearbox and then through the corresponding gear ratio from the drive shaft to the pinion shaft. The direction of the torque/speed is changed from the longitudinal to transverse direction by means of the cross shaft with constant ratio. The final drive ratio transmits the torque through the limited-slip differential to the axle flanges and finally through the axle shafts to the driving wheels.

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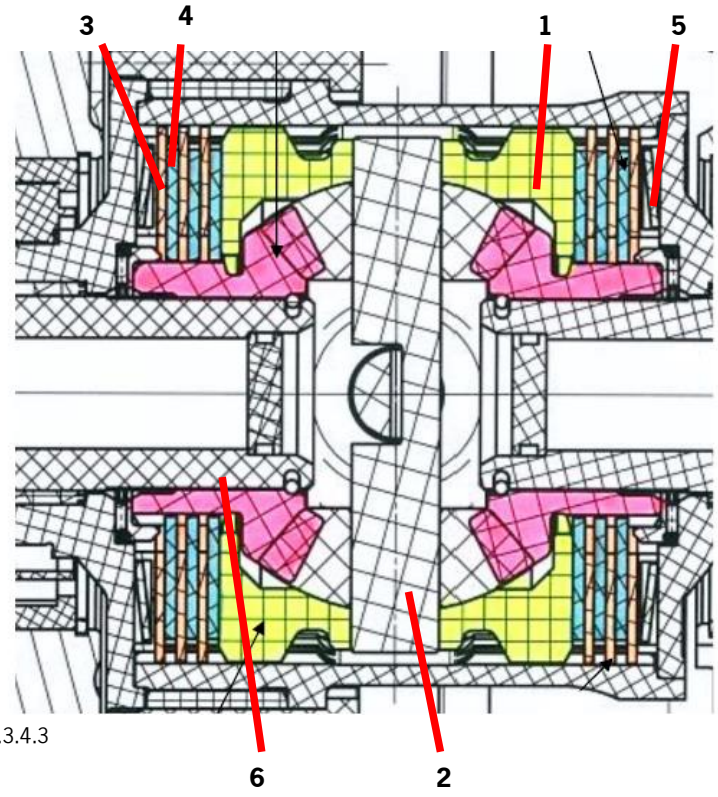
Limited-slip differential

The limited-slip differential is provided with 12 friction disks. The ramp angle of the pressure pieces is 52° on the traction side and 30° on the coast side. When fitting, pay attention to the correct orientation of the pressure pieces (illustration No. 2.3.4.2).

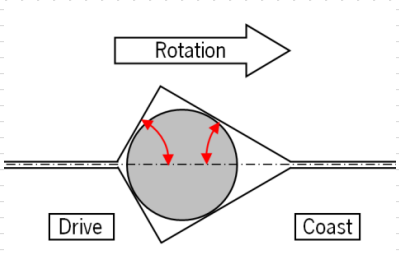
Operation

The pressure pieces (1) driven by the differential cage transmit the torque to the two cross pin bolts (2). The differential gears pivoted on these bolts drive the output shaft flanges by means of the lateral bevel gears. Depending on the torque gradient (traction/thrust), the cross pin bolts move the pressure pieces out and press the clutch disks (4), the pressure plates (3) and the cup springs (5) together.

Component overview



2.3.4.3



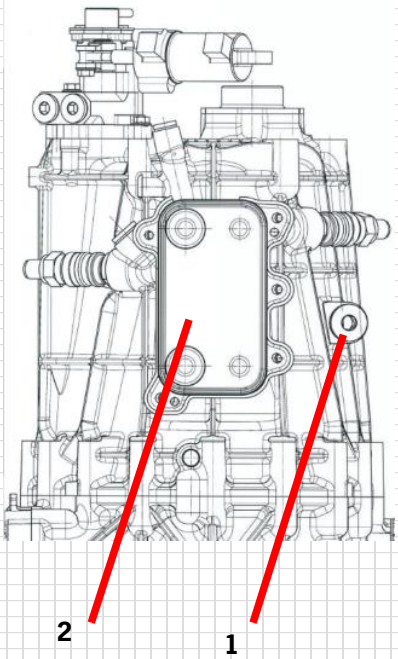
2.3.4.2

1	Pressure piece
2	Cross pin bolt
3	Pressure plate
4	Clutch disk
5	Cup spring
6	Drive shaft flange

Basic blocking torque

The basic blocking torque of the limited slip differential is approx. **100 Nm** (74 ft-lb) when new.

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2.3.5.1

2.3.5 Oil circuit

Oil grades and fill quantity

WARNING

Hot fluid

Danger of scalding

- Let the fluid cool down.
- Wear personal protective equipment.

The gearbox fill quantity is 3.0 liters (3,17 qts) of Mobilube 1SHC75W90. When filling, make sure that the gearbox is placed on a flat surface. Viewed in the driving direction, the inclined oil filler neck (1) is located on the right side of the gearbox.

Oil cooling

The gearbox is provided with a separate oil/water heat exchanger (2) for heating and cooling the gearbox oil.

The heat exchanger is fitted externally on the upper side of the gearbox. The internal oil pump is driven by the idler of the 1st gear on the pinion shaft, the cooling oil supply depends on the engine speed. An oil filter located in the gear housing purifies the oil before it is directed into the supply channels. This filter can be replaced separately and is easily accessible through the left side of the gearbox.

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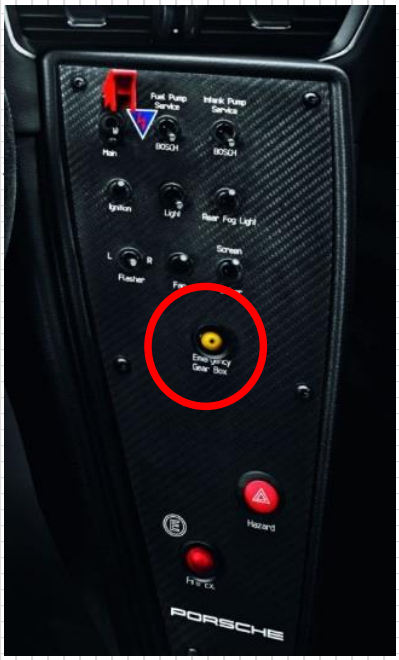
2.4 Gear shift mechanism

The G91/70 is a sequential gearbox with six forward gears and one reverse gear. Gear shifting is performed using two shift paddles located on the steering wheel and a pushbutton on the instrument panel connected to the steering wheel. Pull the right paddle to up-shift and the left paddle to down-shift. The reverse gear is engaged by pressing the "Reverse" pushbutton on the steering wheel and release the clutch.



2.4.1

Information The "Emergency Gearbox" switch is located on the center console. This switch is used to continue operation in case of sensor failure. Refer to chapter 2.4.3.

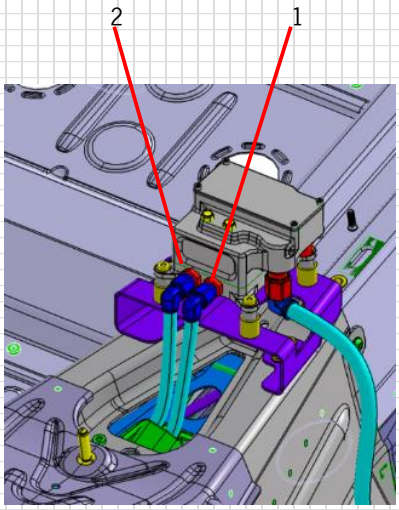


2.4.2

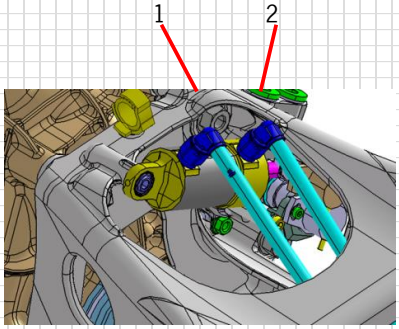
Paddle Shift

The paddle shift system is used by the driver to change gears and to protect the drive train against incorrect handling. Shift paddles on the steering wheel, pass electrical signals to the Bosch engine control unit when they are actuated. The shift request is evaluated in the Bosch ECU and transferred to the APS control unit. The compressor integrated in the APS unit generates compressed air and stores it in the unit's pressure reservoir. When the shift request from the paddle is transferred to the valve block by the controller, the gear shift cylinder engages the required gears. The system pressure is between 6 and 6.7 bar (87.0 – 97.2 psi). If system pressure falls below 6 bar (87.0 psi), the compressor is switched on automatically.

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2.4.3



2.4.4

Advantages of the system

- Gear shifting with both hands on the steering wheel
- Automatic double de-clutching when down-shifting
- Focusing on braking and steering
- Over-revving of the engine is less probably*
- Gearbox protection due to consistent gear shifting

*Blocking of the rear wheels during the braking process, may still allow over-revving. Therefore avoid blocked wheels.

Connenction of the components

Valve block (2.4.3):

1 = Upshift

2 = Downshift

Shift cylinder (2.4.4):

1 = Upshift

2 = Downshift

2.4.1 Gear shifting

Gear shifting is initiated by the paddles on the steering wheel. Different parameters (e.g. velocity, rpm) are checked by means of the CAN bus to determine whether gear shifting is possible. If this is the case, the pneumatic gear shift cylinder on the gearbox is actuated. The gear shift drum turns, actuates the shift forks and engages the desired gear.

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Gear shift conditions

Observe the following handling conditions to ensure the correct operation of the gear-shift system.

	Up-shifting			Down-shifting		
	R -> N	N -> 1	1 -> 6	6 -> 1	1 -> N	N -> R
Paddle/ pushb.	Right	Right	Right	Left	Left	Reverse button
Throttle	Not actuated	Not actuated	>20%	<20%	Not actuated	<17%
Clutch	Actuated	Actuated	-	-	Actuated	Actuated
Double de-clutching	-	-	-	Autom.	-	-
Engine speed	-	-	>3.000 rpm	-	-	<3.000 rpm
v vehicle	-	-	-	-	-	<5 km/h (3 mph)
System pressure	>3,2 bar	>3,2 bar	>3,2 bar	>3,2 bar	>3,2 bar	>3,2 bar

Example of how to read the diagram: Engaging the reverse gear

- Gearbox in neutral position (N)
- No actuation of the shift paddle
- The throttle must be < 17% (neutral position)
- Pressing the clutch pedal is required
- REVERSE pushbutton on the steering wheel
- The reverse gear is engaged

Downshifting

A down shift is possible only in thrust condition. In addition, the following conditions must be met: accelerator pedal = 0 % and the throttle position must be less than 20 %.

Functional testing at standstill:

When performing a functional test, the following conditions have to be met:

- Engine at standstill (neng = 0)
- Vehicle velocity < 5 km/h (3 mph)

Up-/down-shifting with and without clutch is possible.

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2.4.2 Gear recognition

For electronic recognition of the engaged gear, a potentiometer is installed on the gearbox. The potentiometer outputs a defined voltage depending on the gear currently engaged. Gear recognition is necessary for the interruption of the power flow when up-shifting.

Basic setting

The basic setting of the potentiometer must be performed in 6th gear. The corresponding potentiometer voltage at the "Vitals Page" on the display has to be 4.5 volts. Elongated holes at the potentiometer housing allow a fine adjustment.

Note: The cable of the potentiometer has to point to the bottom position, when mounted correctly.

2.4.3 „Emergency gearbox“ switch

In case of failure of certain sensors that normally ensure the correct operation of the gear shift system, an emergency program may be enabled by pressing the „Emergency Gearbox” switch.

The emergency program is automatically enabled in case of the following malfunctions:

1. Clutch pressure sensor defective or incorrect pressure signal
2. Gearbox potentiometer defective or incorrect pressure signal
3. Speed sensors defective or incorrect signals



2.4.3.1

NOTE

Activation of the “Emergency Gearbox” switch

Serious damage to the gearbox

Serious damage to the engine

- All safety functions are disabled.
- Shift requests are implemented without being verified.
- It is possible to damage the system or units through improper operation.

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2.4.4 Maintenance shift system

The maintenance includes the compressor, the valve block and the shift cylinder.

Small Service:

- Once p.a.
- Max. 10.000 km
- Max. 10 h compressor run time

Big Service:

- Every two years
- Max. 20.000 km
- Max. 20 h compressor run time

Contact data

MEGA-Line Racing ELECTRONIC GmbH
Haunersdorf Str. 3
D-93342 Saal a.d. Donau
Phone.: +49 9441 6866-0
Fax: +49 9441 6866-11
E-Mail: info@mega-line.de

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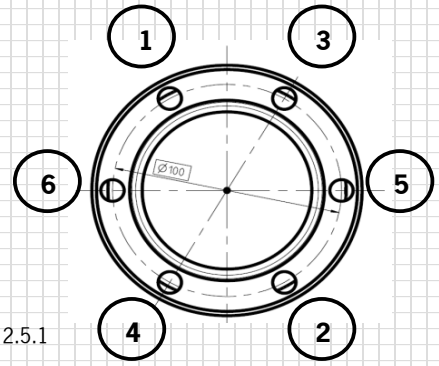
2.5 Drive shafts

It is recommended to run in drive shafts on new vehicles or newly fitted drive shafts for about 50 km (31 miles) with reduced load and at max. 200 km/h (124 mph).

- Only use HT 1 LF grease for lubrication when overhauling the drive shafts
- Do not interchange used drive shafts left-right

Grease quantity for joint on wheel side:	150 g (5.3 ounces)
Grease quantity for joint on gearbox side:	120 g (4.2 ounces)

Service partner addresse: GKN Service International GmbH see chapter 7.9



2.5.1

2.5.1 Tightening instructions

1. Tighten all bolts to **30 Nm** (22.1 ft-lb) in the specified order (figure 2.5.1)
2. Tighten all bolts to **60 Nm** (44.3 ft-lb) in the specified order (figure 2.5.1)
3. Tighten all bolts to **90 Nm** (66.4 ft-lb) in the specified order (figure 2.5.1)

Lightly oil the bolts. Follow these tightening instructions whenever the drive shaft bolt connections have been untightened.

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2.6 Gearbox run time

The gearbox running time is **60 hours**.

2.7 Gearbox tightening torques

Place	Designation	Number per gearbox	Tightening torque/Comment
Coupling on engine/flywheel	ZYL-SHR M8x45	8	pre-tightening 8 Nm final tightening 33 Nm
Gearbox on engine	6KT-MU M10	6	85 Nm
Gearbox on body/carrier3/top	6KT-SHR AM10X92	2	65 Nm
Gearbox on lengthwise strut	6KT-MU M12X1,5	1	120 Nm
Gearbox housing cover cross shaft	6KT-MU M8	11	22 Nm
Gearbox housing cover differential	6KT-MU M8	8	22 Nm
Gearbox housing-gear housing	6KT-MU M8	16	22 Nm
Gearbox housing carrier frame 4-point bearing	6KT-MU M8	11	33 Nm
Gearbox housing carrier frame 4-point bearing	Countersunk bolt M8x30	1	33 Nm
Gearbox housing-oil pump	6KT-MU M6	4	10 Nm
Gearbox housing-oil suction pipe	6KT-MU M6	1	10 Nm
Gearbox housing-gear shift drum	6KT-MU M6	2	10 Nm
Gearbox housing-thrust bearing with stop	6KT-MU M8	1	25 Nm
Gearbox housing-thrust bearing with stop	6KT-MU M6	1	10 Nm
Gearbox housing-oil bore cap	VSHL-SHR M10x1	3	15 Nm
Gearbox housing-oil bore cap	VSHL-SHR M12x1.5	3	9 Nm
Gearbox housing-central release mechanism	6KT-MU M6	4	10 Nm
Gear housing-heat exchanger	6KT-MU M6	5	10 Nm
Gear housing-oil filler opening	VSHL-SHR M22x1.5	1	40 Nm
Gear housing-bearing retaining plate	6KT-MU M5	4	6 Nm
Gear housing-baffle plate	6KT-MU M5	3	6 Nm
Gear housing-Z shift mechanism	6KT-MU M6	3	10 Nm
Gear housing-air conditioning compressor cover	6KT-MU M6	3	10 Nm
Gear housing-gearbox carrier	6KT-MU M10	4	45 Nm
Gear housing-water bore cap	VSHL-SHR M16x1.5	1	20 Nm
Gear housing-oil bore cap	VSHL-SHR M12x1.5	1	9 Nm
Gear housing-oil drain opening	VSHL-SHR M22x1.5	1	40 Nm

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Place	Designatio	Number per gearbox	Tightening torque/Comment
Pinion shaft-shaft end	lock nut M32x1.25	1	30 Nm +60°, then untighten 30 Nm + 60°
Reverse gear-intermediate gear-thrust bearing with stop	6KT-SHR AM8x75	1	25 Nm
Gear shift drum-shaft end	groove nut M30x1.25	1	60 Nm
Cross shaft-shaft end 4-point bearing	lock nut M32x1.25	1	50 Nm +60°, then untighten 50 Nm + 60°°
Gearbox housing-oil spray pipe	ZYL-SHR M5x10	3	6 Nm
Gearbox housing-oil spray pipe	ZYL-SHR M5x16	3	4 Nm
Gearbox housing-oil spray pipe	ZYL-SHR M5x15	2	6 Nm
Gearbox housing-oil spray pipe	6KT-MU M6	1	10 Nm
Gearbox housing-oil spray pipe	spring support M16x1.5	2	35 Nm
Gearbox housing-oil spray pipe	6KT-MU M6	1	10 Nm
Z differential housing	ZYL-SHR M8x40	20	15 Nm + 70° (max. 3 useable)

6KT-MU = hexagon nut

ZYL-SHR = socket head screw

VSHL-SHR = sealing screw

6KT-SHR = hexagon bolt

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2.8 Transmission dismantling

General: After dismantling, the individual components should be cleaned thoroughly and inspected visually for damage. The transmission is generally dismantled in the opposite order to that described for mounting. But some procedures and work steps are different and will be addressed in detail in the following. Any changes to the sequence can lead to component damage.

Preliminary work

Drain transmission oil

WARNING

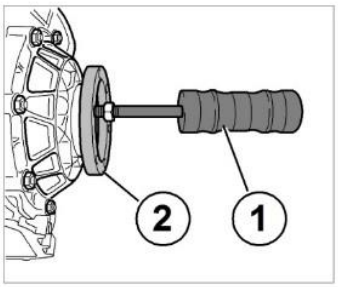
Hot fluid

Danger of scalding

- Let the fluid cool down.
- Wear personal protective equipment.

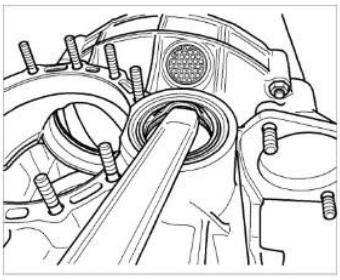
2.8.1 Dismantling of hang-on parts

Dismantle axle shaft flanges with panel puller (1) (Figure 2.8.1.1)



2.8.1.1

Remove the shaft sealing ring of the input flanges with the assembly lever (Figure 2.8.1.2)

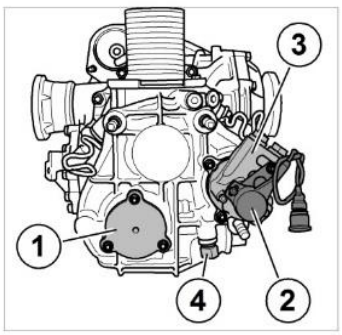


2.8.1.2

Remove gear potentiometer (2)

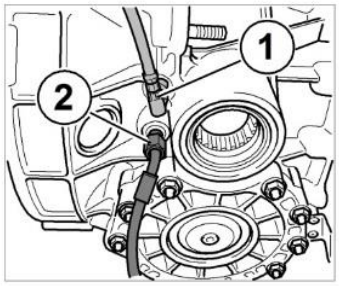
Remove shift control (3)

Remove the nuts of the pinion shaft lid and drive out the pinion shaft lid with panel puller and tool no. 38 (M6) (Figure 2.8.1.3)



2.8.1.3

Remove the hydraulic lines of the central clutch operator (Figure 2.8.1.4)



2.8.1.4

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Remove the heat exchanger

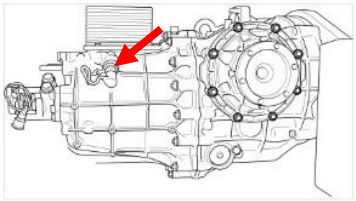
WARNING

Releasing pressure

Risk of eye injuries

Danger of scalding

- Let the fluid cool down.
- Wear personal protective equipment.



2.8.1.5

Reduce system pressure in a controlled manner via the connecting coupling (arrow).

WARNING

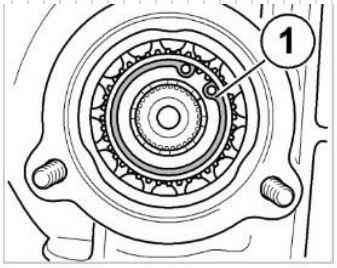
Corrosive fluids

Danger of chemical burns

- Wear personal protective equipment.
- Ensure good ventilation.
- Avoid contact with corrosive fluid.
- If you do come into contact, wash off immediately with plenty of warm water and contact a doctor if necessary.

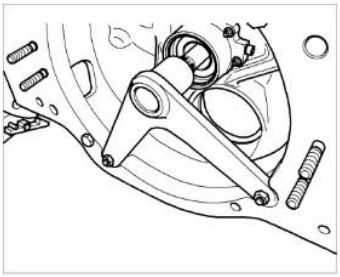
2.8.2 Gear housing dismantling

Remove the locking ring (1) of pinion shaft and rotation prevention (Figure 2.8.2.1)



2.8.2.1

By twisting the pinion shaft, engage gear 1 and fix the drive shaft in place with tool no. 19 (Figure 2.8.2.2)



2.8.2.2

Loosen the pinion shaft nut with socket SW 38 Porsche spare part No.: 9R6.450.304.00 (do not remove the pinion shaft nut)

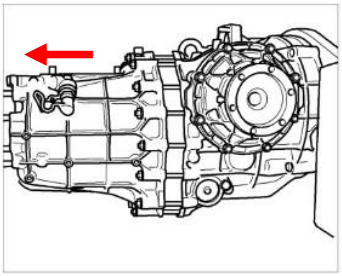


2.8.2.3

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Loosen the nuts of the gear housing flanging

Remove the gear housing. Use a rubber hammer, if necessary (Figure 2.8.2.4)



2.8.2.4

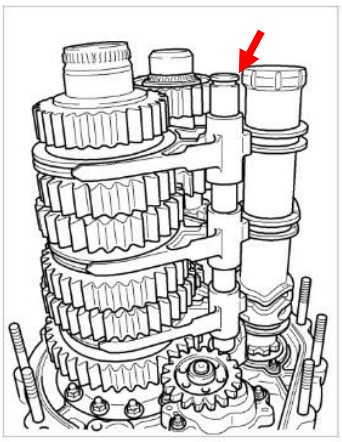
2.8.3 Gear set removal

Remove the O ring from the shift rod (Figure 2.8.3.1)

Pull out the shift rod toward the top; ensure that the shift forks do not drop out of the sleeves.

Remove the shift forks

Remove the reverse gear shift fork



2.8.3.1

Remove the locking ring drive shaft

Remove the pinion shaft nut

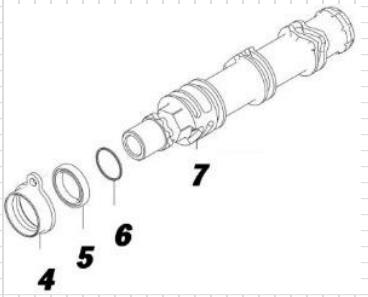
Remove gearwheels, needle bearing and guide sleeves, mark the installation position and rotational direction of the gearwheels and sleeves

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2.8.4 Dismantling the shift drum

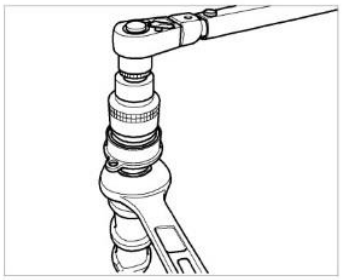
Loosen the fastening nut for the bushing (4)

Remove the shift drum (7) with the bushing (4)



2.8.4.1

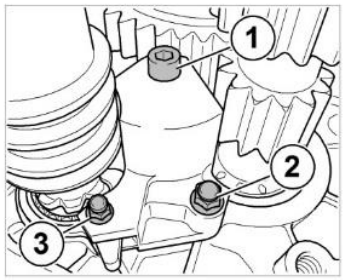
Secure the shift drum against twisting with an open-end wrench and loosen the shift drum nut with socket Porsche spare part No.: 997.450.306.00 (Figure 2.8.4.2)



2.8.4.2

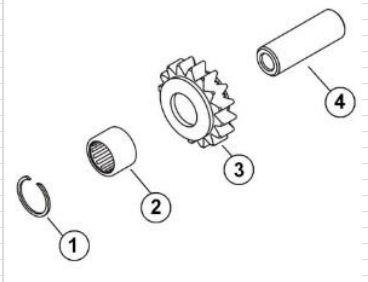
2.8.5 Dismantling the locking sleeve

Loosen the nut (2) and (3) and the screw (1) of the locking sleeve and remove the locking sleeve (Figure 2.8.5.1)



2.8.5.1

Remove the reverse idler gear (3) with the axle (4) (Figure 2.8.5.2)



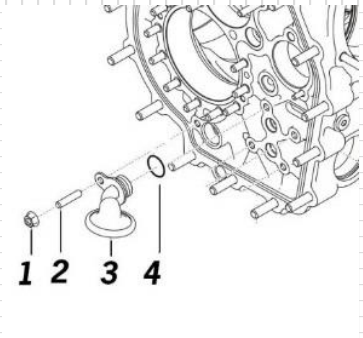
2.8.5.2

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2.8.6 Oil supply

Suction tube

Loosen the nut (1) and remove the suction tube (3) (Figure 2.8.6.1)

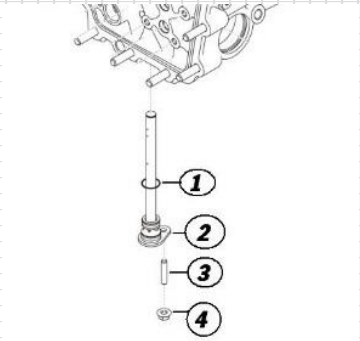


2.8.6.1

Injection tube

Loosen the nut (4) and remove the injection tube (2) with the panel puller (M6) (Figure 2.8.6.2)

Information The injection tube must be removed before taking out the shift module because the shift module cannot be pulled out otherwise



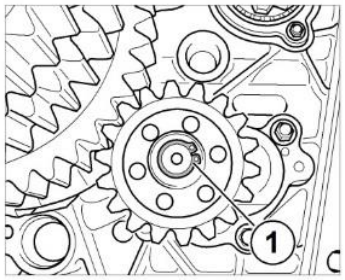
2.8.6.2

Oil pump

Remove the locking ring (1) of the oil pump gearwheel (Figure 2.8.6.3)

Pull off the gearwheel. Keep in mind the insert washers between shaft and gearwheel!

Loosen the fastening nuts of the oil pump and pull off the oil pump



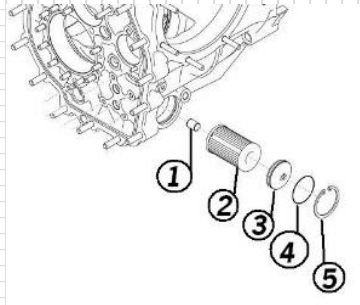
2.8.6.3

Oil filter element

Remove the locking ring (5)

Remove the closure cap (3) with a panel puller

Remove the oil filter element (2)



2.8.6.4

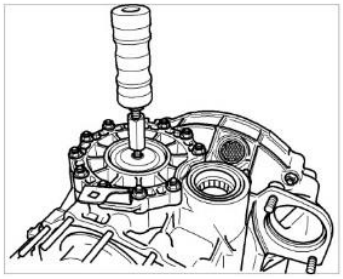
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2.8.7 Cross shaft dismantling

Remove the locking ring of the cross shaft lid (Figure 2.8.7.1)

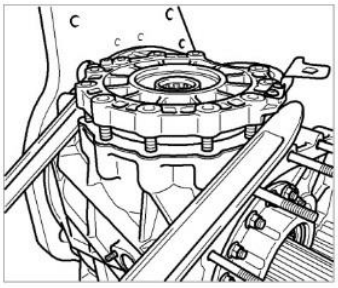
Pull the closure cap with the panel puller (Figure 2.8.7.1)

Remove the cross shaft lid catch



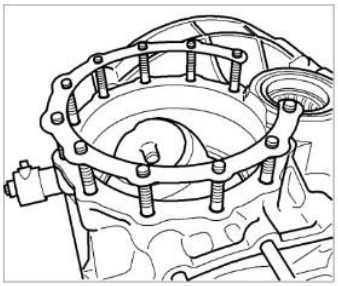
2.8.7.1

Open the cross shaft lid with the assembly lever (Figure 2.8.7.2)



2.8.7.2

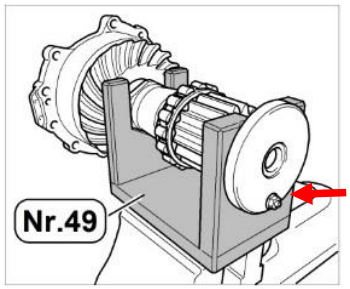
Remove adjusting disk P2 of the anti-lash plate (Figure 2.8.7.3)



2.8.7.3

Clamp tool no. 49 into the vice and insert the cross shaft (Figure 2.8.7.4)

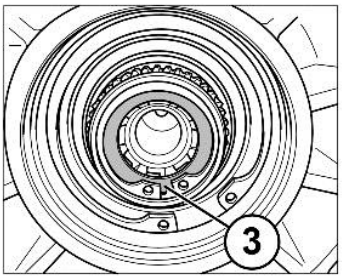
Fix the cross shaft in place with the nut (arrow)



2.8.7.4

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Take out locking ring and rotation prevention (3)



2.8.7.5

Loosen the nut of the cross shaft with socket Porsche spare part No.: 9R6.450.304.00

Information Be careful when removing the cross shaft nut. The bearing shell of the four-point bearing is behind it.

Remove the bearing shell of the four-point bearing

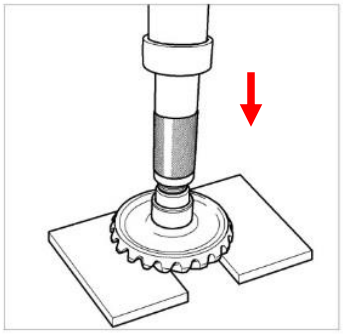
Carefully tap out the shaft of the cross shaft lid with a rubber hammer

WARNING

Mechanical, hydraulic or pneumatic press

Risk of crush injuries

- Read specific safety information for the press.
- Check that the press is working perfectly before use, particularly the safety components.

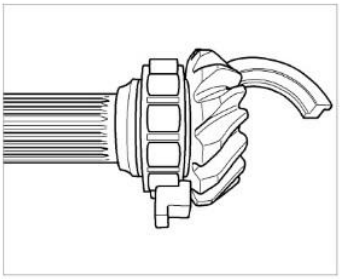


2.8.7.6

Press the ring gear out with the hydraulic press. Put the ring gear on aluminum plates (Figure 2.8.7.6)

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Insert the cross shaft in tool no. 44. Ensure the correct seat of the two insert washers!
The insert washers are supported by the cylinder rolls of the bearing (Figure 2.8.7.7)



2.8.7.7

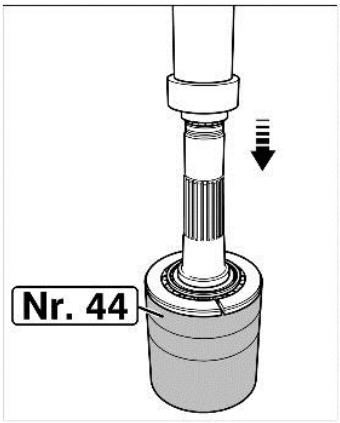
WARNING

Mechanical, hydraulic or pneumatic press

Risk of crush injuries

- Read specific safety information for the press.
- Check that the press is working perfectly before use, particularly the safety components.

Push the cage out of the cylinder roll bearing (cross shaft) with tool no. 44 (Figure 2.8.7.8)



2.8.7.8

Caution

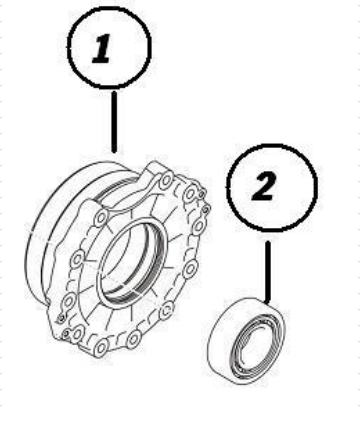
Hot components

Danger of burns

- Wear personal protective equipment.

Heat the cross shaft lid (1) at 130 °C (266 F) for 30 minutes

Take the outer ring of the cylinder roll bearing (2) out of the cross shaft lid (1) (without applying great force)



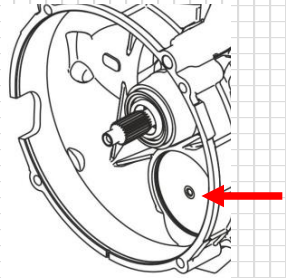
2.8.7.9

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2.8.8 Pinion shaft dismantling

Remove locking ring and mounting lid (arrow) of the pinion shaft in the transmission shell (Figure 2.8.8.1)

Take out the pinion shaft through the assembly opening



2.8.8.1

WARNING

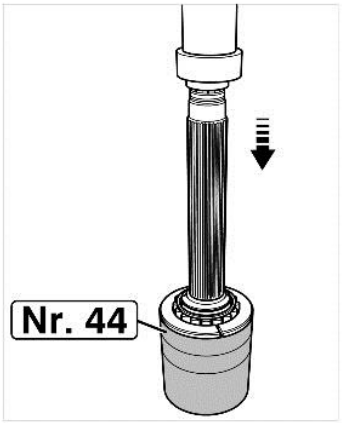
Mechanical, hydraulic or pneumatic press

Risk of crush injuries

- Read specific safety information for the press.
- Check that the press is working perfectly before use, particularly the safety components.

Press out the cylinder roll bearing of the pinion shaft with tool no. 44 (Figure 2.8.8.2)

See 2.8.7 cross shaft dismantling



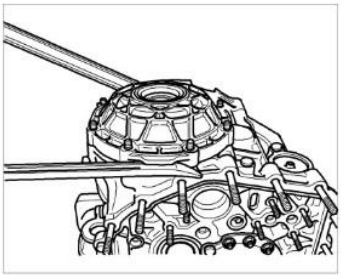
2.8.8.2

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2.8.9 Differential removal

Loosen the differential lid catch evenly using a crisscross pattern and remove it

Remove the differential lid with the assembly lever (Figure 2.8.9.1)



2.8.9.1

Remove the locking ring of the cylinder roll bearing differential lid

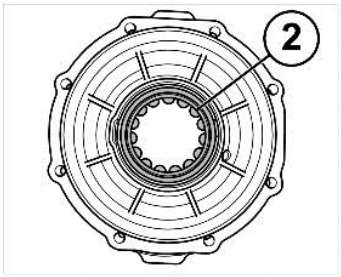
Caution Hot components

Danger of burns

- Wear personal protective equipment.

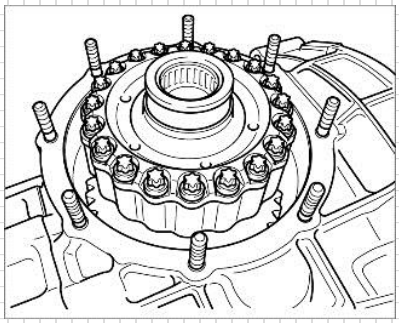
Heat the differential lid at 130 °C (266 F) for 30 minutes

Remove the bearing (2) without applying great force



2.8.9.2

Remove the differential from the gearbox housing (Figure 2.8.9.3)

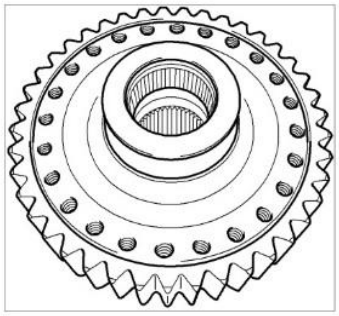


2.8.9.3

Loosen the differential lid screws evenly using a crisscross pattern

Screw two panel pullers on the differential lid and separate the lid from the housing

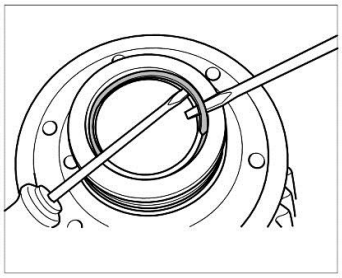
Information The inner threads in the differential lid must be cut with a die and degreased before the reconstruction.



2.8.9.4

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Remove snap ring and needle cage from the differential housing (Figure 2.8.9.5)



2.8.9.5

2.8.10 Central clutch operator removal

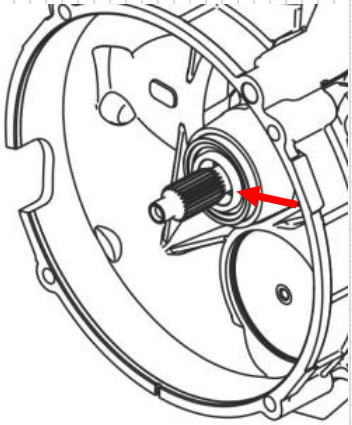
WARNING

Corrosive fluids

Danger of chemical burns

- Wear personal protective equipment.
- Ensure good ventilation.
- Avoid contact with corrosive fluid.
- If you do come into contact, wash off immediately with plenty of warm water and contact a doctor if necessary.

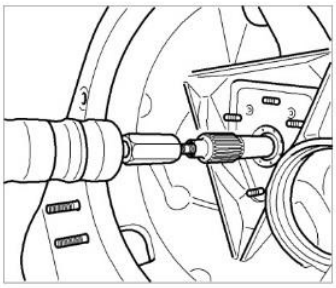
Remove the central clutch operator (Figure 2.8.10.1)



2.8.10.1

2.8.11 Connecting shaft dismantling

Drive out the connecting shaft with the panel puller (Figure 2.8.11.1)



2.8.11.1

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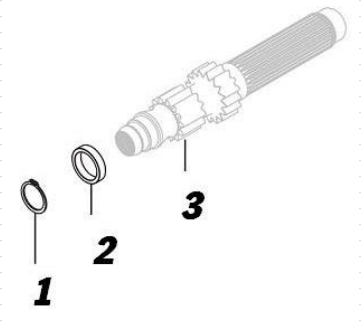
2.8.12 Drive shaft dismantling

Take out the drive shaft locking ring (1)

Use the shortened locking ring pliers (Figure 2.8.12.2). The handles of the pliers are shortened so that the pliers can be used inside the gearbox housing.

Take out the thrust plate (2)

Remove the drive shaft (3) from the gearbox housing



2.8.12.1



2.8.12.2

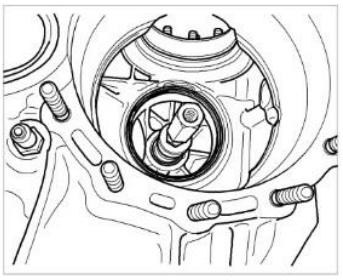
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2.8.13 Bearing dismantling

Gearbox housing

Remove the needle bearing of the cross shaft with puller HAZET 788-37 (Figure 2.8.13.1)

Information The pulling off motion requires the utmost care. The gearbox housing could be damaged in the process!



2.8.13.1

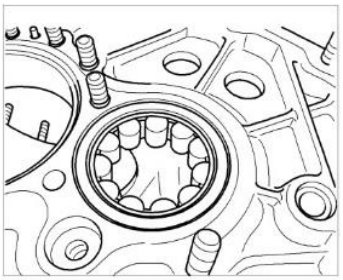
Clean the gearbox housing and remove any oil

Caution Hot components

Danger of burns

- Wear personal protective equipment.

Heat the gearbox housing at 130 °C (266 F) for 30 minutes



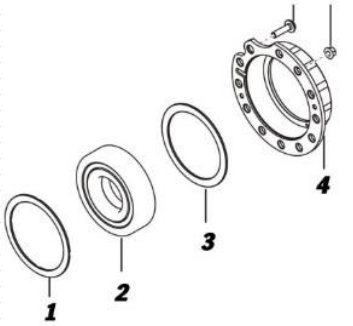
2.8.13.2

Remove the outer rings of the bearings in the housing. The outer rings of the bearing can be dismantled without applying great force.

Outer ring of the drive shaft bearing (Figure 2.8.13.2)

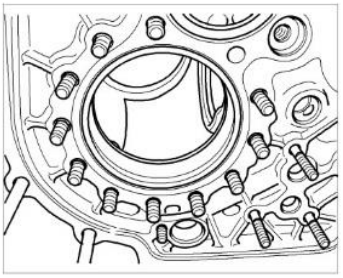
Screw the pinion shaft retaining frame (4) off the gearbox housing

Take out the four-point bearing (2)



2.8.13.3

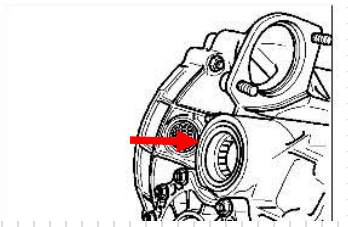
Remove the outer ring of the pinion shaft cylinder roll bearing (Figure 2.8.13.4)



2.8.13.4

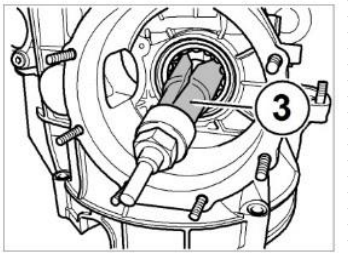
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Outer ring of the axle shaft flange needle bearing, left side (arrow)



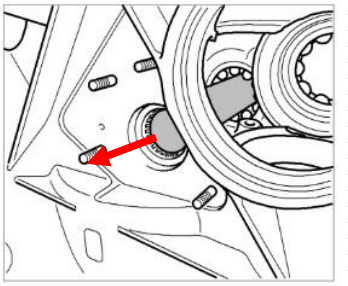
2.8.13.5

Drive out the differential cylinder roll bearing (Figure 2.8.13.5) with removal tool HAZET 788 – 70 (3) and panel puller



2.8.13.6

Press out the connecting shaft needle bush in the direction of the arrow with tool no. 46 (Figure 2.8.13.7)



2.8.13.7

Gear housing

Remove the baffle of the bearings (4)

Caution

Hot components

Danger of burns

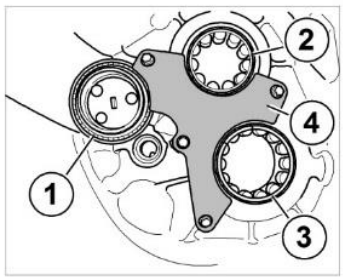
- Wear personal protective equipment.

Heat the gear housing at 130 °C (266 F) for 30 minutes

Push out the outer ring of the drive shaft (2)

Push out the outer ring of the pinion shaft (3)

Push out the ball bearing of the shift drum (1)



2.8.13.8

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2.9 Transmission assembly

2.9.1 Gearbox housing pre-assembly

Before putting together the transmission, all components of the transmission must be cleaned and degreased thoroughly. In addition, a visual inspection must be carried out. Especially the visual check of the oil holes is necessary to ensure perfect function of the transmission. Because some work processes in these instructions are linked with each other, completing individual work processes is possible only keeping the complete assembly instructions in mind.

Mounting studs

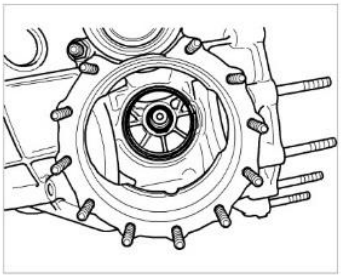
Before mounting the studs, the thread holes must first be cleaned thoroughly with petroleum benzine (brake cleaner) and afterwards with acetone. The gearbox housing and the gear housing must finally be blown out with oil-free compressed air. A special installation tool must be used to screw in the studs. The studs are not tightened with a turning torque. After the studs are inserted, the adhesive connections have to set in an oven at 130°C (266 F) for approx. 40 minutes. The heat of the housing can be used for the next work step (inserting the bearings).



2.9.1.1

Cross shift lid studs

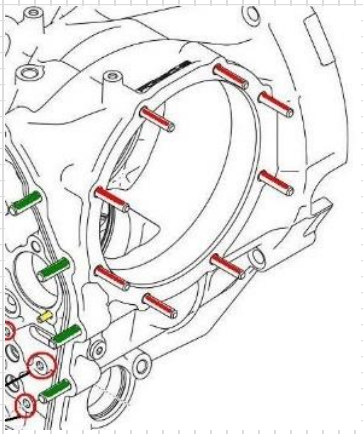
Dimensions:	M8x30
Projection:	30 mm (1.18")
Adhesive:	Loctite 2701 green
Thread position:	Screw in short thread



2.9.1.2

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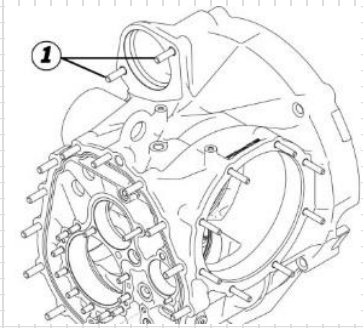




2.9.1.3

Differential lid studs (red)

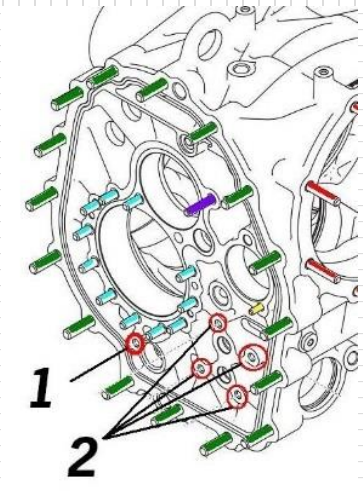
Dimensions:	M8x30
Projection:	30 mm (1.18")
Adhesive:	Loctite 2701 green
Thread position:	Screw in short thread



2.9.1.4

Starter studs (1)

Dimensions:	M10x22
Projection:	24 mm (0.94")
Adhesive:	Loctite 2701 green
Thread position:	Screw in short thread



2.9.1.5

Gear housing connection studs (green)

Dimensions:	M8x50
Projection:	50 mm (1.97")
Adhesive:	Loctite 2701 green
Thread position:	Screw in short thread

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Retaining frame pinion shaft studs (light blue)

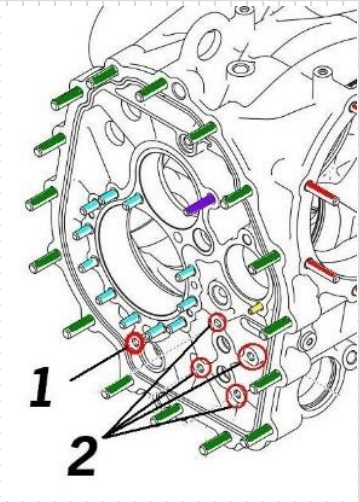
Dimensions:	M8x26
Projection:	14.5 mm (5.71")
Adhesive:	Loctite 2701 green
Thread position:	Screw in long thread

Oil pump studs (2)

Dimensions:	M6x28
Projection:	27 mm (1.06")
Adhesive:	Loctite 2701 green
Thread position:	Screw in short thread

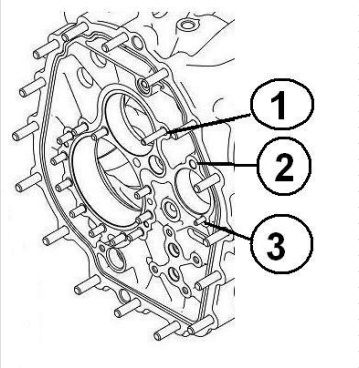
Screw in suction tube screw stud (1)

Dimensions:	M6x10
Projection:	9 mm (0.35")
Adhesive:	Loctite 2701 green
Thread position:	Screw in long thread



2.9.1.6

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2.9.1.7

Shift drum stud (1)

Dimensions:	M6x10
Projection:	11 mm (0.43")
Adhesive:	Loctite 2701 green
Thread position:	Screw in long thread

Shift drum stud (2)

Information Bushing must first be pressed in.

Dimensions:	M6x35
Projection:	29 mm (1.14")
Adhesive:	Loctite 2701 green
Thread position:	Screw in long thread

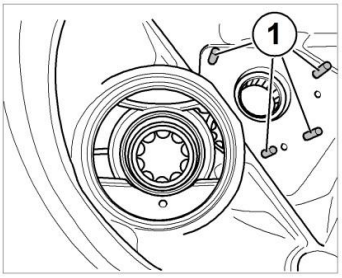
Locking sleeve screw connection stud

Dimensions:	M8x30
Projection:	27.5 mm (1.083")
Adhesive:	Loctite 2701 green
Thread position:	Screw in long thread

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Central clutch operator screw connection stud (arrow)

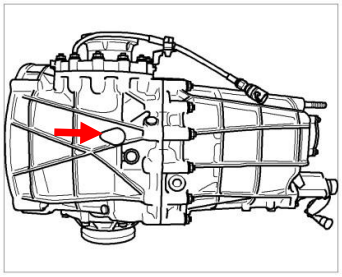
Dimensions:	M6x18
Projection:	19 mm (0.75")
Adhesive:	Loctite 2701 green
Thread position:	Screw in long thread



2.9.1.8

Injection tube stud

Dimensions:	M6x10
Projection:	10 mm (0.39")
Adhesive:	Loctite 2701 green
Thread position:	Screw in long thread



2.9.1.9

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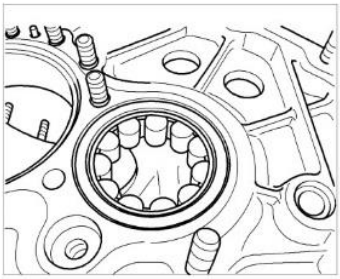
Bearing assembly

Inserting the bearings requires the heating of the gearbox housing analogous to the setting of the adhesive connection (see above). All bearings must be inserted quickly before the housing has cooled off. To ensure the proper seat of the bearings, all bearings must be tapped with an appropriate tool after the housing has cooled off.

⚠ Caution	Hot components Danger of burns

- Wear personal protective equipment.

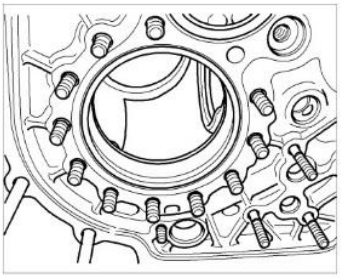
Drive shaft bearing



2.9.1.10

Dimensions:	34x62x17
Type:	Cylinder roll bearing
Tool:	No. 1

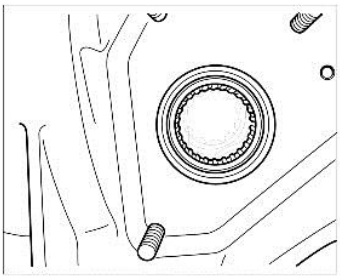
Pinion shaft cylinder roll bearing (outer ring)



2.9.1.11

Dimensions:	40x90x23
Type:	Cylinder roll bearing
Tool:	No. 3

Input shaft/connecting shaft bearing



2.9.1.12

Dimensions:	30x37x16
Type:	Needle bearing
Tool:	No. 14

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Cross shaft bearing

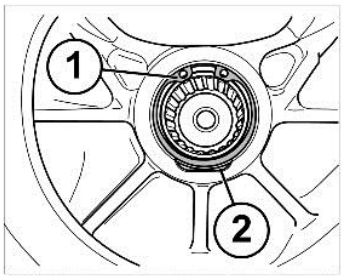
Dimensions: 28x37x30

Type: Needle bearing

Tool: No. 5

Insert locking ring (37x1.5)

Information Insert locking ring (1) at a 180° offset to the opening (2)!



2.9.1.13

Outer ring of cross shaft bearing

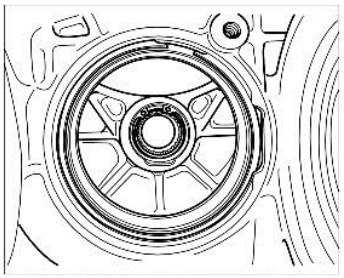
Dimensions: 50x90x20

Type: Cylinder roll bearing

Tool: No. 6

Locking ring (90x2.5)

Information Insert locking ring at a 90° offset to the opening!



2.9.1.14

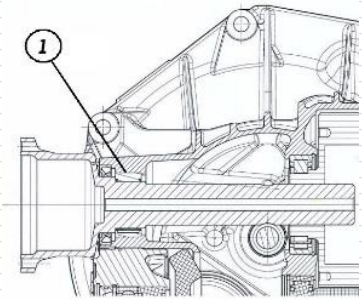
Needle bearing for long axle flange (1)

Dimensions: 40x55x22

Type: Needle bearing

Tool: No. 9

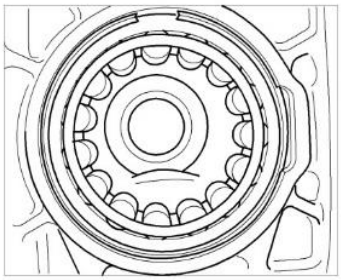
Press in all the way to the stop.



2.9.1.15

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2.9.1.16

Differential cylinder roll bearing in the gearbox housing

Dimensions:	59,5x90x23
Type:	Cylinder roll bearing
Tool:	No. 8b

With locking ring

Information Insert locking ring at a 90° offset to the opening!

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Pressing in the bushings

Caution Hot components

Danger of burns

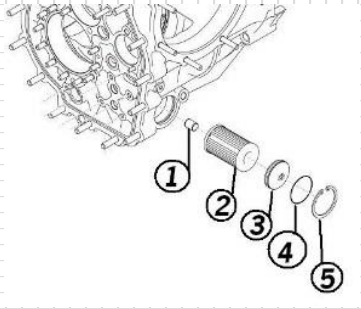
- Wear personal protective equipment.

Pressing in the bushings requires heating the housing (see 2.9.1 Pre-assembly/bearing assembly).

Pressing in the bushing for the oil filter (1)

Adhesive: Loctite 638

Press in up to the limit



2.9.1.17

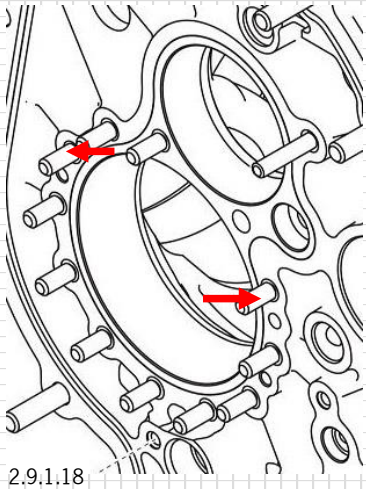
Gearbox housing-gear housing screw connection bushing (12x6x16)

Press in fitting sleeve

Pinion shaft retaining frame locating pins

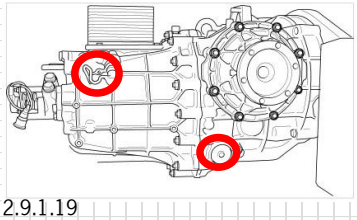
Press in up to the limit

Attach perforated panel of clutch bleeding and secure with locking ring

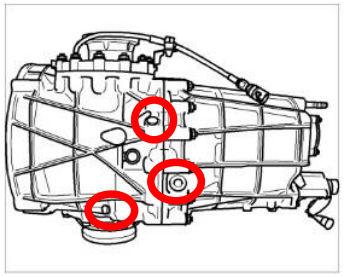


2.9.1.18

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2.9.1.19



2.9.1.20

Screwing in the sealing plug:

General

All sealing plugs must be sealed with surface sealant Loctite 574. Apply sealant thinly on the thread surface for this.

Oil hole closure

Dimensions: M12x1.5 alu

Torque: **9 Nm** (6.6 ft-lb)

Attach with sealing ring (12x18).

Plug without pressure sensor

Dimensions: M10x1

Torque: **9 Nm** (6.6 ft-lb)

Use sealing ring 10x14x1

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Mounting hydraulic connections for the clutch:

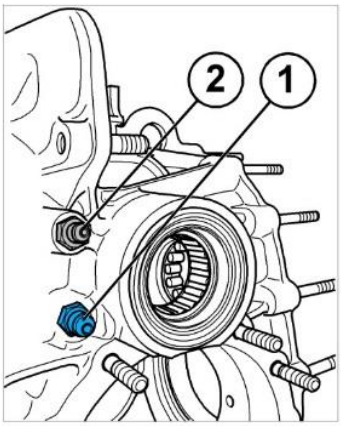
Information Use Loctite 574 orange.

Bleeding (2)

With Sealing ring

Pressure line (1)

With Sealing ring



2.9.1.21

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2.9.2 Gear housing pre-assembly

General

Before assembling the gear housing, all components must be cleaned and degreased thoroughly. Furthermore, a visual inspection must be carried out. Especially all oil holes must be checked to ensure the perfect running of the transmission. The gear housing must finally be blown out with compressed air.

Caution Hot components

Danger of burns

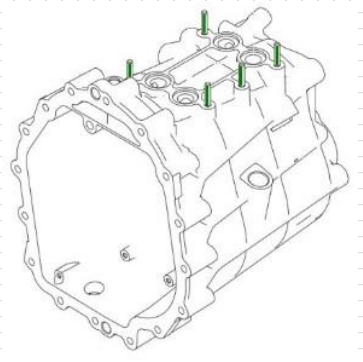
- Wear personal protective equipment.

The studs must be cleaned thoroughly with petroleum benzine. After the studs are inserted, the gear housing has to set in an oven for approx. 40 minutes at 130°C (266 F).

Screwing in the gear housing studs

Heat exchanger studs (green)

Dimensions:	M6x15
Projection:	16 mm (0.63”)
Adhesive:	Loctite 2701 green
Thread position:	Screw in long thread

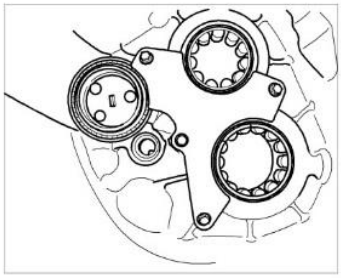


2.9.2.1

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Bearing baffle studs

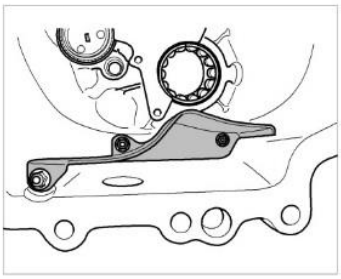
Dimensions:	M5x10
Projection:	10 mm (0.39")
Adhesive:	Loctite 2701 green
Thread position:	Screw in long thread



2.9.2.2

Threaded pin of the baffle

Dimensions:	M5x20 12.9
Projection:	7 mm (0.27")
Adhesive:	Loctite 2701 green



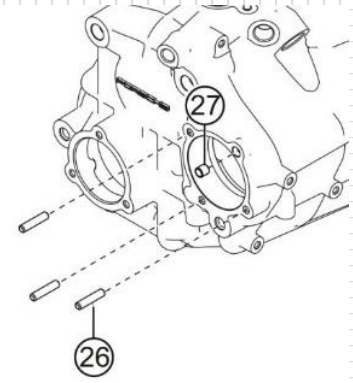
2.9.2.3

Shift module screw connection stud (26)

Dimensions:	M6x18
Projection:	17 mm (0.67")
Adhesive:	Loctite 2701 green

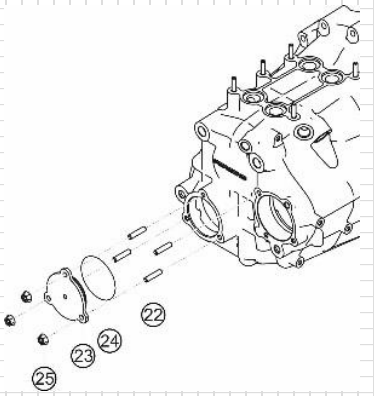
Thread position: Screw in long thread

Information One hole (top right) is left for one bushing (27).

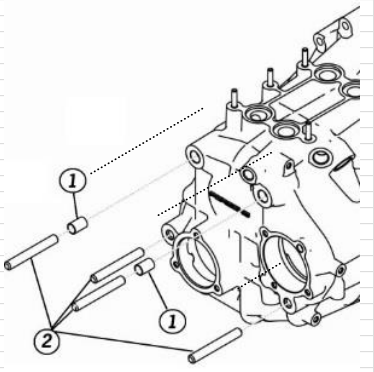


2.9.2.4

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2.9.2.5



2.9.2.6

Closure cap/pinion shaft stud (22)

Dimensions: M6x10

Projection: 11mm (0.433")

Adhesive: Loctite 2701 green

Thread position: Screw in long thread

Gearbox bracket stud (2)

- Top:

Dimensions: M10x52 10.9

Projection: 45 mm (1.77")

Adhesive: Loctite 2701 green

Thread position: Screw in short thread

Information Press in fitting sleeve (1) Porsche spare part No.: 991.301.641.9B up to the limit

Bottom:

Dimensions: M10x45 10.9

Projection: 45 mm (1.77")

Adhesive: Loctite 2701 green

Thread position: Screw in short thread

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Pressing in gear housing bearings and bushings

Caution

Hot components

Danger of burns

- Wear personal protective equipment.

After the studs are inserted, the gear housing has to set in an oven for approx. 40 minutes at 130°C (266 F). The heat is also required for the next work step (inserting the bearings).

All bearings must be inserted quickly before the housing has cooled off. To ensure the proper seat of the bearings, all bearings must be tapped with an appropriate tool after the housing has cooled off.

Labels of outer and inner bearing rings generally point in the direction of the pressing tools during the pressing in process!

Gearbox bleeding bushing

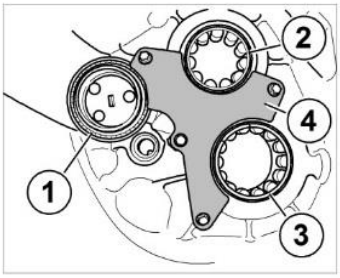
Adhesive: Loctite 638

Press in up to the limit

Drive shaft cylinder roll bearing (2)

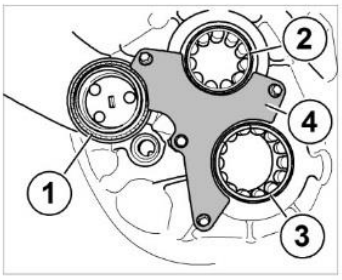
Dimensions: 34x62x17

Tool: No. 1



2.9.2.7

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2.9.2.8

Pinion shaft cylinder roll bearing (3)

Dimensions: 44x72x17

Tool: No. 4

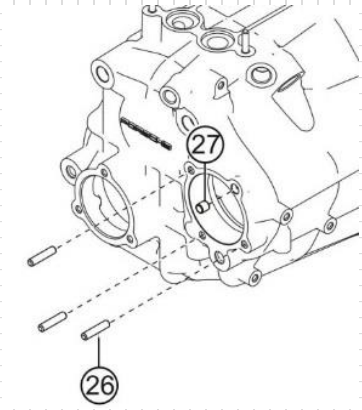
Grooved ball bearing of the shift drum (1)

Dimensions: 50x65x7

Tool: No. 31

Screw connection of baffle M5

Torque: **6 Nm** (4.4 ft-lb)



2.9.2.9

Shift module bushing (27)

Dimensions: 6x8x8

Press in up to the limit

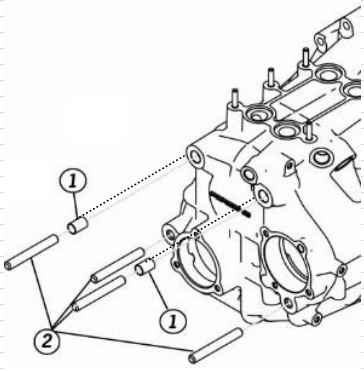
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Gearbox bracket bushing (1)

Dimensions: 13x6x13.5

Press in up to the limit



2.9.2.10

Top sealing plug

Dimensions: M16x1.5

Torque: **20 Nm** (14.8 ft-lb)

Adhesive: Loctite 574 orange

Sealing ring

Sealing plug

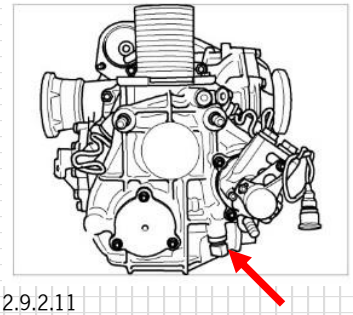
Dimensions: M12x1.5

Torque: **9 Nm** (6.6 ft-lb)

Adhesive: Loctite 574 orange

Sealing ring

Temperature sensor (arrow)



2.9.2.11

Torque: **15 Nm** (11 ft-lb)

Screw in the sealing ring included in the scope of delivery with Loctite 574

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2.9.3 Differential lid pre-assembly

Caution Hot components

Danger of burns

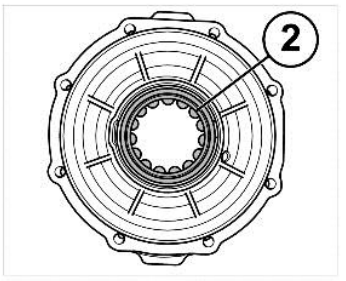
- Wear personal protective equipment.

Heat the lid in the oven to 130°C (266 F) for 40 minutes

Cylinder roll bearing (2)

Dimensions: 54,5x85x19

Tool: No.8/8a



2.9.3.1

Information Point the label from the bearing to the top and secure with snap ring. Mount the locking ring at a 180° offset to the housing opening.

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2.9.4 Pinion shaft bearing assembly

Place spacing washer (1) H1 2 mm on the gearbox housing with the oil grooves; the oil grooves must be on the side of the four-point bearing (2).

NOTE

Incorrect installation of spacers

Lack of lubrication
Damage to the gearbox

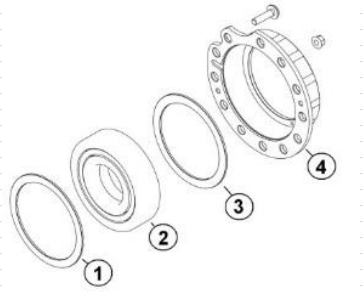
- The oil grooves on the spacers must touch the bearing.

Put on the four-point bearing (2) with the label in the direction of the retaining frame pinion shaft (4)

Screw the pinion shaft retaining frame in place on the gearbox housing with 4 nuts (5)

Information

The adjusting disk H2 (3) is not inserted yet because its thickness is not determined until the next step.



2.9.4.1

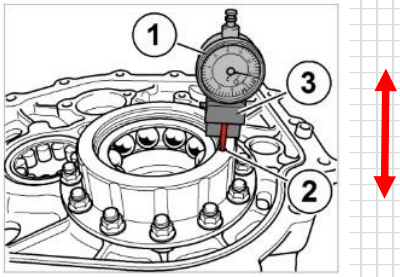
Determining adjusting disk H2

The four-point bearing must be fitted with a compression of 0.03 mm in the retaining frame of the pinion shaft. The compression is calculated as follows:

Fix the probe indicator (1) in place on the retaining frame with bracket (3) no. 37.

Apply probe indicator needle (2) to four-point bearing with prestressing through the hole in the retaining frame.

Check the clearance between retaining frame and bearing; move the bearing evenly from the bottom stop to the upper stop (retaining frame) for that (direction of the arrow).



2.9.4.2

Add the measured free travel to the compression (0.03-0.05) and insert an appropriate adjusting disk H2 (3) between retaining frame and four-point bearing. Base washer H2 has a thickness of 2.18 mm.

Put on the retaining frame

Loosely put on the nut!

Information

Do not tighten the retaining frame nuts yet. The four-point bearing must first be centered (see chapter 2.9.5)!

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2.9.5 Pinion shaft

Caution Hot components

Danger of burns

- Wear personal protective equipment.

Heat the interior of the cylinder roll bearing at 130° C (266 F) for 20 minutes

Press the inner ring on the pinion shaft up to the limit (Figure 2.9.5.1)

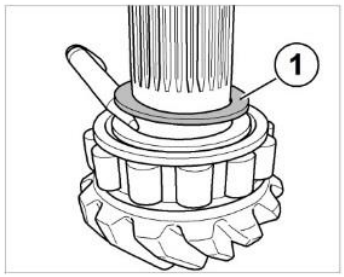
Insert the base adjusting disk (1) (2.00 mm P1) (Figure 2.9.5.1)

Put on the bottom inner ring of the four-point bearing

Insert the pinion shaft through the gearbox housing

Put on the top inner ring of the four-point bearing

Put on mounting ring no. 25 (reverse gear replacement)

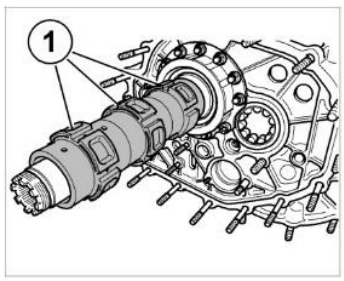


2.9.5.1

Information The mounting ring no. 25 in this case only serves as a substitute and is replaced with the reverse gear wheel (spur gear) during final assembly (2.9.7 Assembly of gear sets).

Put on the three guide sleeves (1), the position of the sleeves is not relevant here (Figure 2.9.5.2)

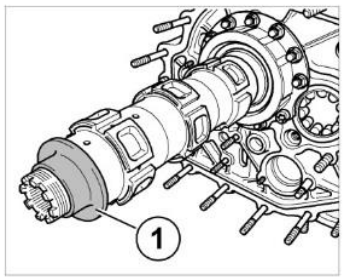
Use tool no. 27 (counter torque wrench) for the outer guide sleeve



2.9.5.2

Lubricate the inner ring of the pinion shaft (1) well and put it on (Figure 2.9.5.3)

Lubricate the pinion shaft nut well and put it on loosely (do not tighten yet)



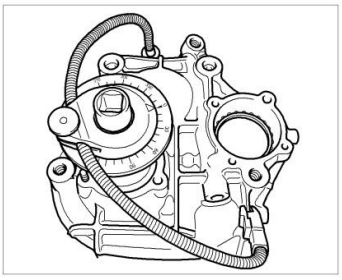
2.9.5.3

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Put on the cutted gear housing and fix it in place with 4 nuts (Figure 2.9.5.5)

Tightening the pinion shaft nut:

Information The counter torque wrench no. 27 touches the cutted gear housing and thus fixes the pinion shaft in place. (Figure 2.9.5.5)



2.9.5.4

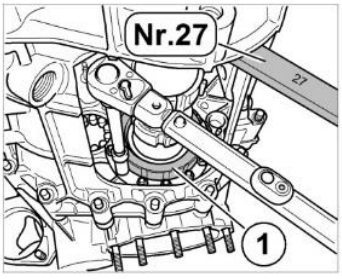
Tightening instructions:

Use tool no. 20 (Figure 2.9.5.4)

Pre-tightening: **30 Nm** (22 ft-lb) + 60° angle of rotation

Loosening

Final tightening: **30 Nm** (22 ft-lb) + 60° angle of rotation



2.9.5.5

Tighten the pinion shaft retaining frame with 11 nuts using a crisscross pattern

Torque: **33 Nm** (24.3 ft-lb)

Adhesive: Loctite 243

The four-point bearing is now centered.

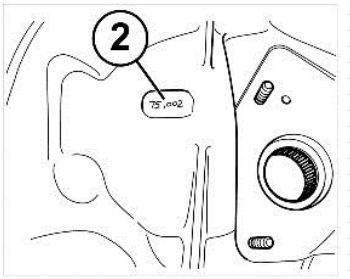
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2.9.6 Pinion shaft position adjustment

Adjustment is done in two steps. In the first step, the distance between the top of the bevel gear and the projection of the gearbox housing opening (blue arrow) is determined. This is the measurement that the pinion shaft must ultimately be set to.

The actual distance between gearbox housing opening and the top of the bevel gear is measured in the second step. The difference between the two measurements is adjusting measurement P1.

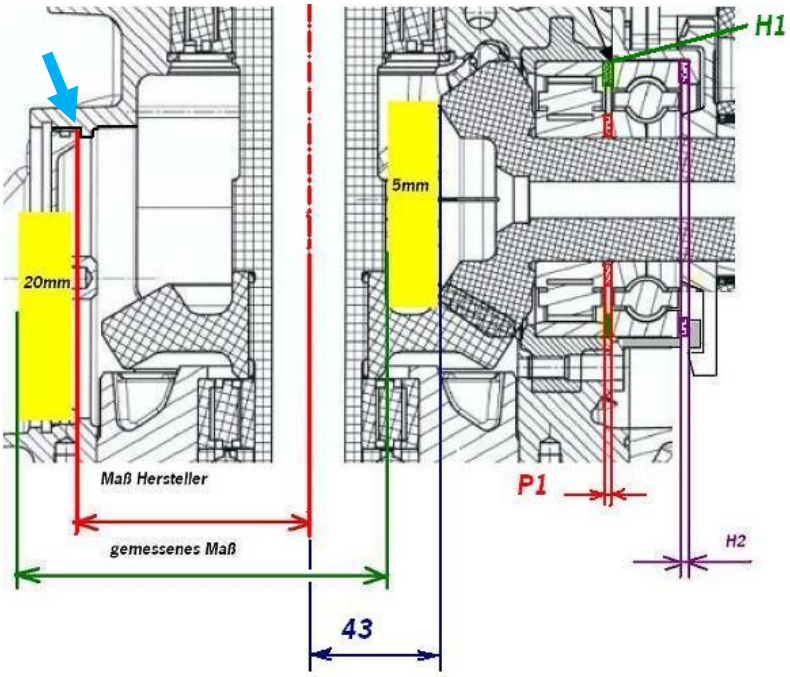
Adjusting disk P1 is used to precisely adjust the position of the bevel gear in relation to the ring gear. There is a manufacturing dimension (2), e.g. 75.002, measured by the manufacturer on the gearbox housing. This measurement is the distance between the gearbox housing opening and the shift module axis (red dotted line). The measurement from the bevel gear top to the shift module axis (red dotted line) is always **43 mm** (no tolerance) which also enters into the calculation. Measurement requires a magnetic disc (thickness = 5mm) and a measuring plate (thickness = 20mm); the resulting thickness of 15 mm also enters into the calculation. (Measuring plate 20mm – magnetic disc 5 mm = **15 mm**).



2.9.6.1

Calculation process

Calculation example: 75.002 + **15** + **43** = 133.002 mm. This calculated measurement of the installation position of the pinion shaft must now be compared with the actual measured distance and then adjusted accordingly.



2.9.6.2

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Measurement process

Put the transmission in an upright position

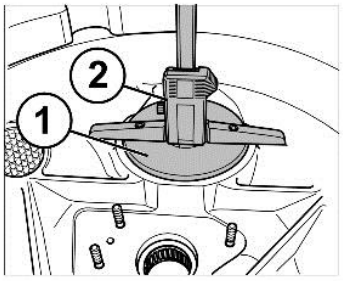
Put magnetic disc (Figure 2.9.5.4) (5 mm) no. 28 on the pinion shaft head (bevel gear). Put measuring plate (1) (20 mm) no. 23 on the gearbox housing. With the depth gauge (2), measure the distance (green arrow in the diagram) e.g. 132.98 mm. This value corresponds to the measurement actually taken and must be compared with the measurement calculated above.

133.002 mm -132.98 mm = 0.022 mm (difference) i.e. the measurement is not within the tolerance and disk P1 must be exchanged.

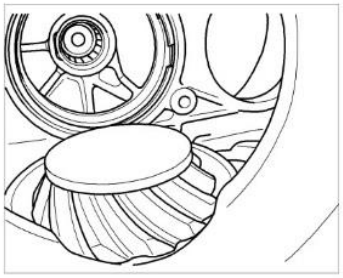
Tolerance = 0.00 to +0.02

The adjusting disk P1 is inserted between cylinder roll bearing and four-point bearing (see Figure 2.9.5.3.) Observe the assembly of the pinion shaft in 2.9.5. The basic P1 disk used in chapter 2.9.5 is then replaced with the calculated P1 disk.

Subsequently repeat the measurement process



2.9.6.3



2.9.6.4

Loosening the pinion shaft nut

NOTE

Loosening the pinion shaft

Damage to the bearings

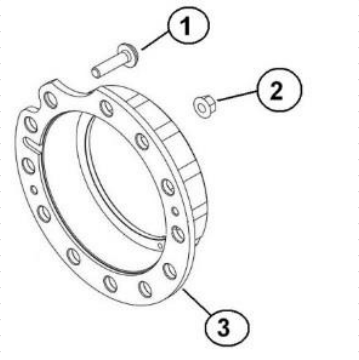
- The auxiliary housing must always be tightened fast.

Remove the cutted gear housing

Remove the pinion shaft

After correctly adjusting the pinion shaft position, the process for the assembly of the retaining frame described in chapter 2.9.4 must be repeated.

Finally tighten the retaining frame of the pinion shaft (3) with nuts (2) and flathead screw (1) with **33 Nm** (24.3 ft-lb) and use Loctite 270



2.9.6.5

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2.9.7 Assembly of gear sets

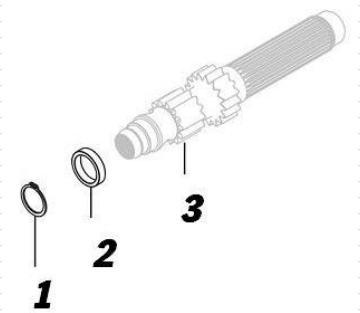
During the fitting of the gear sets, the gearbox housing is in the position where the upper side of the transmission points to the right.

Lubricate the drive shaft bearing running surfaces (3) well

Insert the drive shaft (3) in the gearbox housing

Push on thrust plate (2)

Secure with locking ring (1) (30x1.5); use the shortened snap ring pliers (Figure 2.9.6.2).



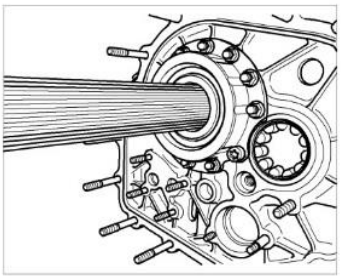
2.9.7.1



2.9.7.2

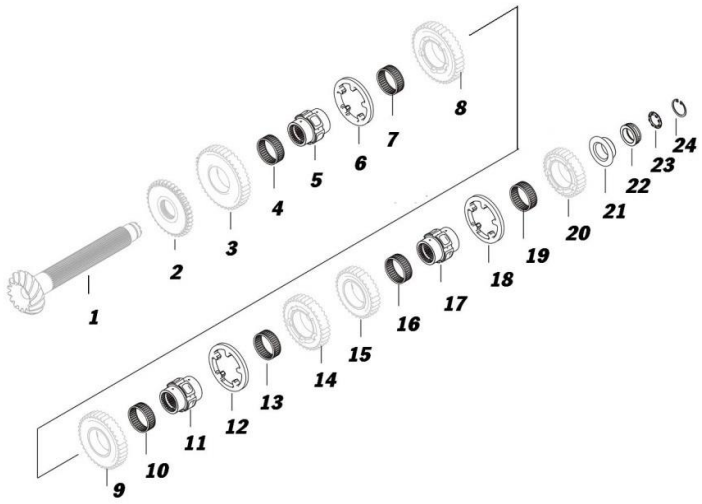
Moisten the pinion shaft with oil and insert it with the bottom inner ring of the four-point bearing through the assembly opening in the transmission shell (Figure 2.9.7.3)

Put on the top inner ring of the four-point bearing (arrow)



2.9.7.3

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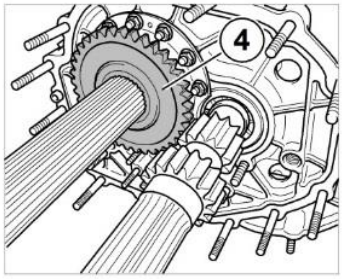


2.9.7.5

Push the spur gear of the reverse gear (2) on pinion shaft. In doing so, point the labeled side in the direction of idler gear 1st gear, the conically beveled side points in the direction of the gearbox housing (Figure 2.9.7.5)

Insert idler gear 1st gear (3) without the bearing, the claws then point away from the pinion head (Figure 2.9.7.5)

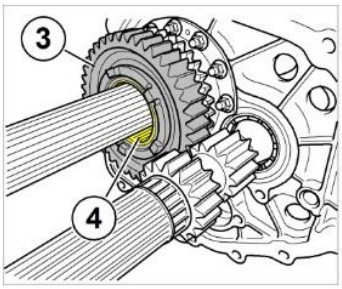
Insert idler gear bearing (needle cage) (4) (Figure 2.9.76)



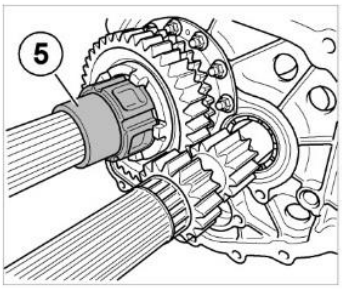
2.9.7.4

Moisten the guide sleeve running surface (5) with oil

Insert the guide sleeve (5) (Figure 2.9.7.7) (maintain the rotational direction for reuse). In doing so, please ensure that the oil holes of pinion shaft and guide sleeve are not directly on top of each other (extensive oil supply).

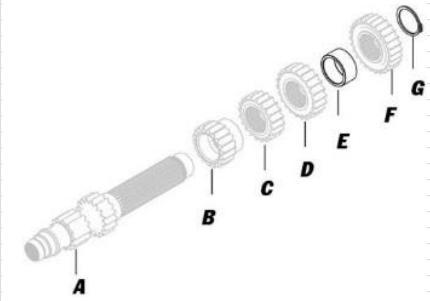


2.9.7.6

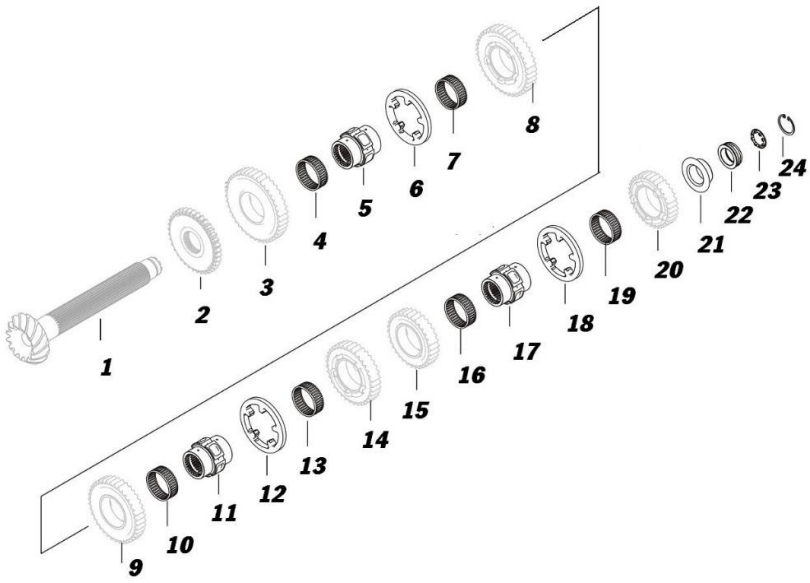


2.9.7.7

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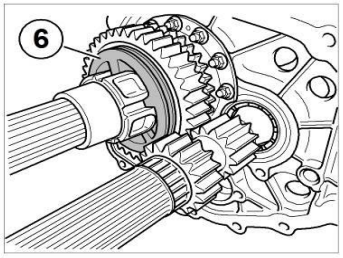


2.9.7.8



2.9.7.9

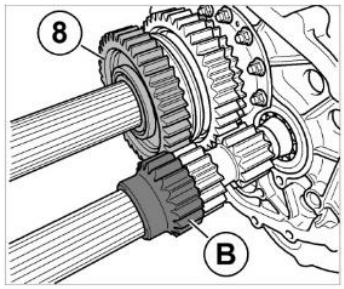
Insert selector sleeve (6) with the label facing outward (Figure 2.9.7.10)



2.9.7.10

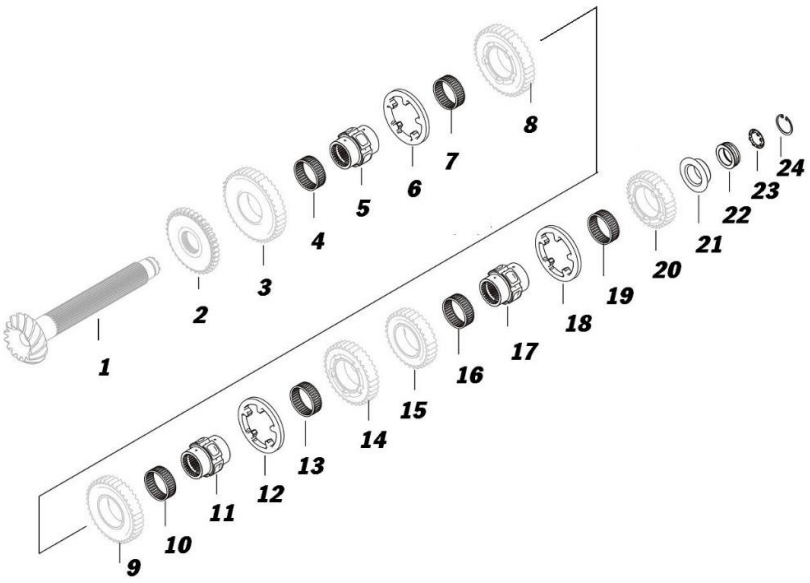
Insert the 2nd gear idler gear (8) with the idler gear bearing (7), the claws point toward the selector sleeve (6) here (Figure 2.9.7.11)

Push the fixed gear 3rd gear (B) on the drive shaft (A) (Figure 2.9.7.11)

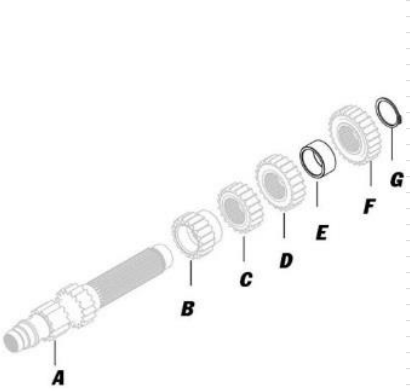


2.9.7.11

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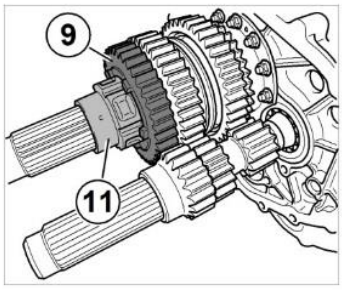


2.9.7.13



2.9.7.12

Push the idler gear 3rd gear (9) with idler gear bearing (10) on the guide sleeve (11) (claws toward 4th gear) and thread onto the pinion shaft (Figure 2.9.7.14). Please ensure in doing so that the oil holes of pinion shaft and guide sleeve are not directly on top of each other (extensive oil supply).

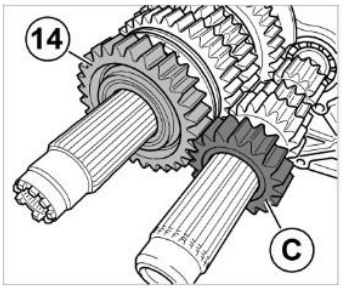


2.9.7.14

Push on selector sleeve 3rd/4th gear (12) with the label facing outward (Figure 2.9.7.15)

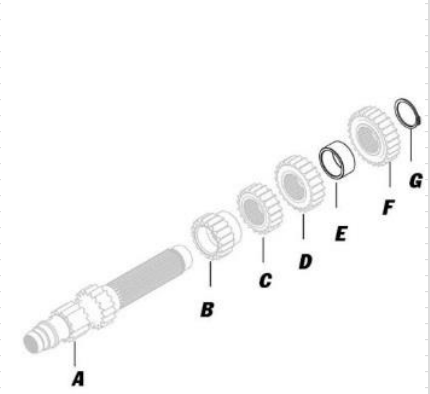
Push the idler gear 4th gear (14) with idler gear bearing (13) (claws in the direction of the 3rd gear) onto the guide sleeve (Figure 2.9.7.15)

Push on fixed gear 4th gear (C) (installation direction toward fixed gear: label of fixed gear (C) and label of idler gear (14) on the same side) (Figure 2.9.7.15)

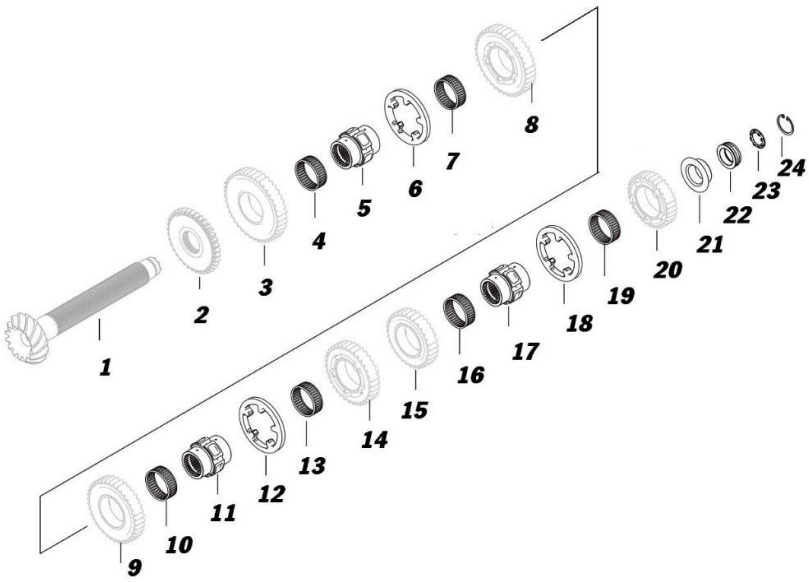


2.9.7.15

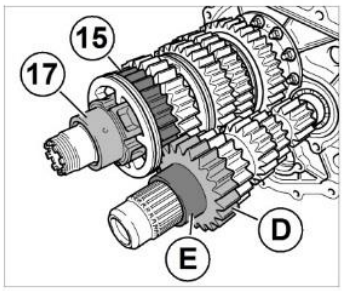
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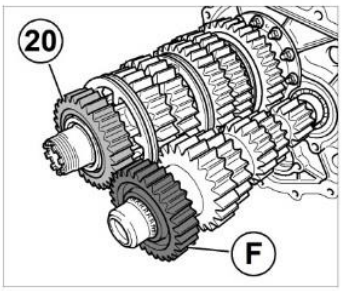
2.9.7.16



2.9.7.17



2.9.7.18



2.9.7.19

Push on guide sleeve 5th/6th gear (17) with idler gear 5th gear (15) and idler gear bearing (16) (claws pointing toward 6th gear) (Figure 2.9.7.18)

Push on fixed gear (D) gear 5 (installation direction: label of fixed gear (D) and idler gear (15) on the same side) (Figure 2.9.7.18). In doing so, please ensure that the oil holes of pinion shaft and guide sleeve are not placed directly on top of each other (extensive oil supply).

Put on the selector sleeve (18) (Figure 2.9.7.18)

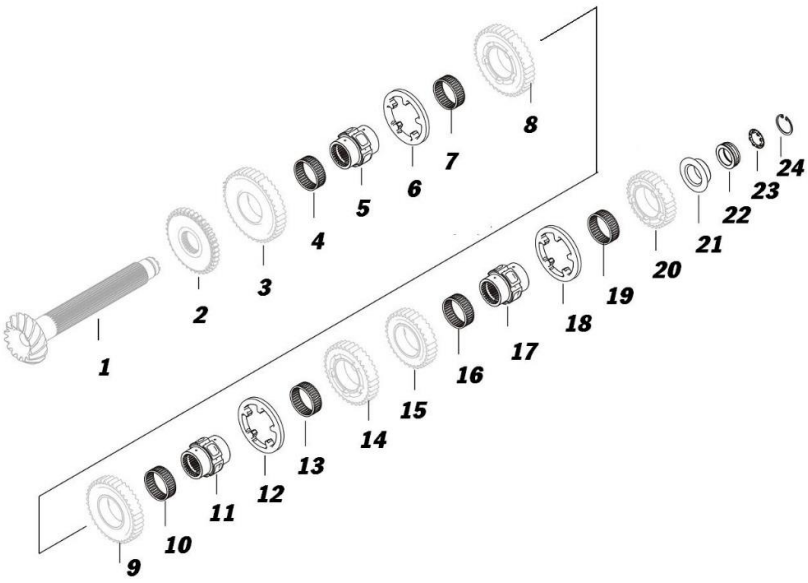
Push the spacer sleeve (E) between 5th and 6th gear fixed gears (Figure 2.9.7.18)

Push on idler gear 6th gear (20) with idler gear bearing (19) (claws pointing toward 5th gear) (Figure 2.9.7.19)

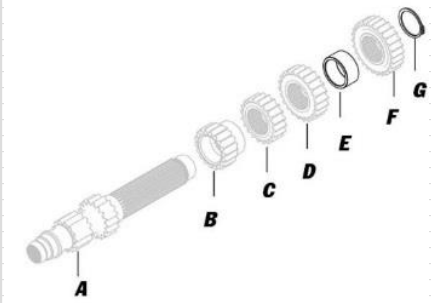
Push on fixed gear 6th gear (F) (installation direction: label of idler gear (20) and fixed gear (F) on the same side) (Figure 2.9.7.19)

Moisten the pinion shaft end with oil

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2.9.7.21



2.9.7.20

The Secure locking ring (G) of the drive shaft (Figure 2.9.7.20) has a sharp-edged and a rounded edge.

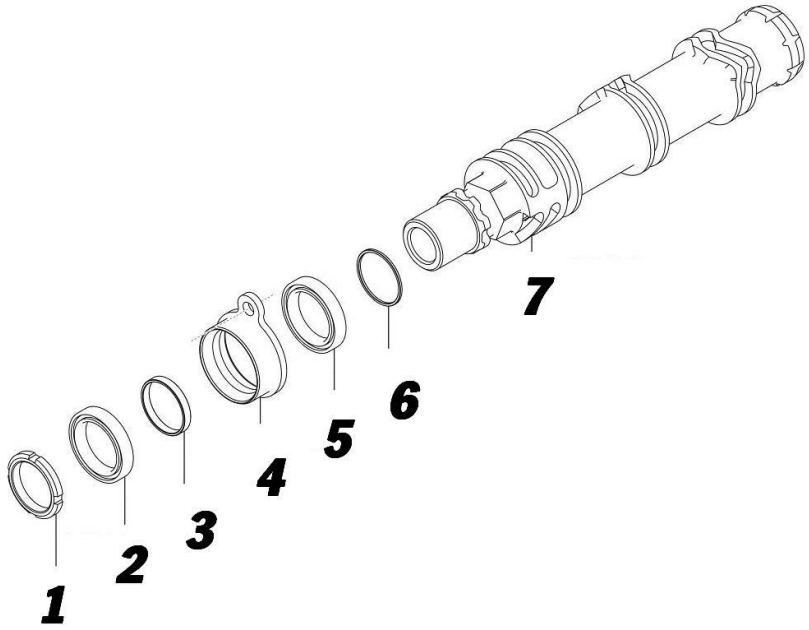
- The sharp edge of the secure locking ring must point outwards (shaft end)
- Fixate secure locking ring by hand and then install it.
- Keep secure locking ring in correct fit
- Turn the drive shaft against the secure locking ring and check the correct fit

- Put on the inner ring of the pinion shaft (21)
- Put the nut (22) loosely on the pinion shaft

Information Do not tighten the nut (22), final tightening is not done until step 2.9.20. Putting on the gear housing

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2.9.8 Premounting shift drum



2.9.8.1

Put adjusting disk (6) Basic (1.4 mm) on the shift drum (7)

Insert the grooved ball bearing (5)

Put on the bushing (4) (observe installation position)

Insert the gearshift shaft spacing washer (3)

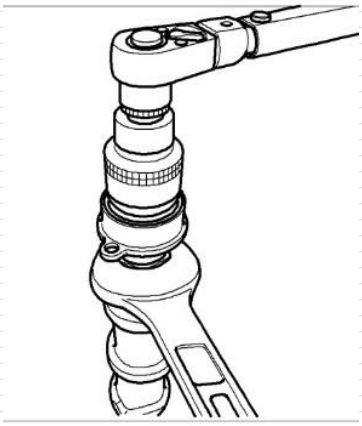
Insert the grooved ball bearing (2)

Screw on the nut (1) (flattened side in the direction of the grooved ball bearing (2)) and tighten with **60 Nm** (44.3 ft-lb) with tool no. 21 (Figure 2.9.8.2) Use Loctite 243.

Moisten the bushing (4) with oil

Insert the shift drum (7)

The bushing (4) and locking sleeve are not screwed onto the gearbox housing until chapter 2.9.11 Locking sleeve.



2.9.8.2

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2.9.9 Oil pump assembly

Grease O rings (1) and insert them in the oil pump housing

Remove the drive gear

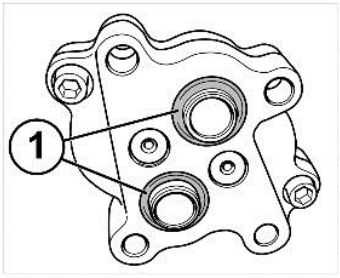
Put on the oil pump and four nuts and then tighten with **4 Nm** (3 ft-lb) using a crisscross pattern. Check whether the shaft can be spun smoothly at that.

Final tightening of the oil pump with **10 Nm** (7.4 ft-lb)

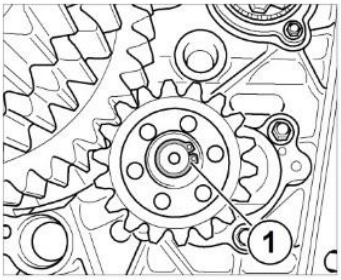
Put on the oil pump gearwheel; ensure that the feather key is inserted in the shaft here

Information The label the gearwheel must point toward the oil pump because the oil pump gearwheel is not fully covered with idler gear 1st gear otherwise.

Insert locking ring (1) 10x1 (Figure 2.9.9.2)



2.9.9.1



2.9.9.2

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2.9.10 Reverse idler gear

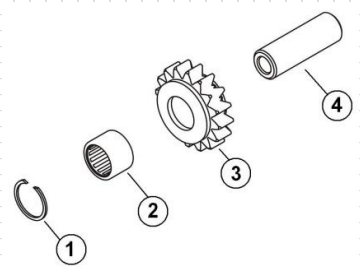
Caution Hot components

Danger of burns

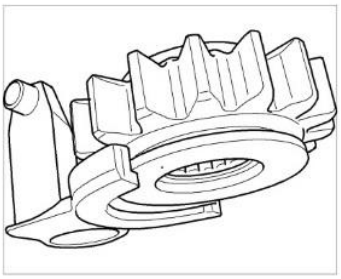
- Wear personal protective equipment.

The needle bearing sleeve (2) must be assembled first during reconstruction. Heat the reverse idler gear (3) to 130° (266 F) C for 30 minutes and press in the needle bearing sleeve with tool no. 32

Secure the needle bearing sleeve (2) with the locking ring (1)



2.9.10.1



2.9.10.2

Insert reverse idler gear (3) with bearing spindle (4) and shift fork (Figure 2.9.9.2); the gearshift shaft must be in the neutral position to allow sufficient space for inserting

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2.9.11 Locking sleeve

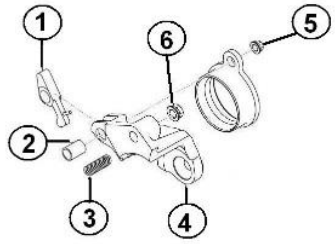
Abutment assembly:

Insert the lever (1) into bearing spindle abutment (4)

Press in bushing (2)

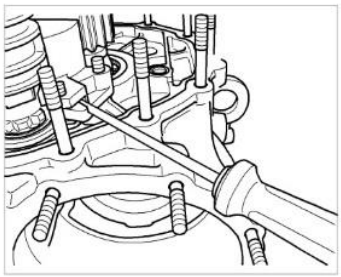
Insert the compression spring (3) between housing and lever

The bushing (2) must be flush with the housing (4)



2.9.11.1

Tension the lever with a slot screwdriver and insert the locking sleeve in the gearbox housing

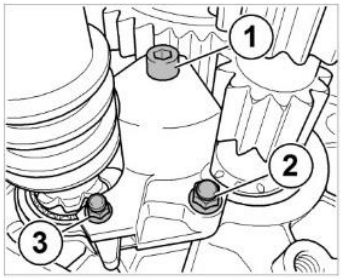


2.9.11.2

Put on Simmonds nuts (3) and tighten with **10 Nm** (7.4 ft-lb)

Put on the screw (1) with adhesive Loctite 243 and tighten with **25 Nm** (18.4 ft-lb)

Tighten Simmonds nut M8 (2) with **25 Nm** (18.4 ft-lb)



2.9.11.3

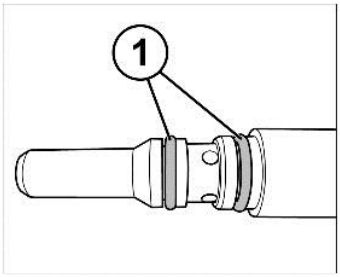
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2.9.12 Shift rod and shift forks

Put the shift drum in the neutral position

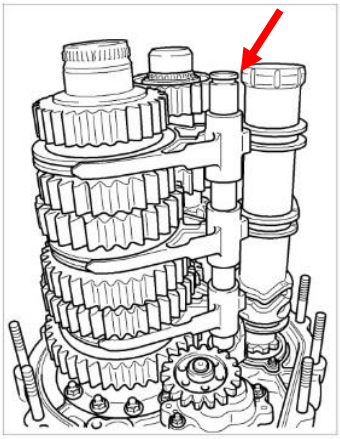
Insert shift forks

Grease two O rings (1) (11x2) with Optimol Paste MP3 and put on the shift rod (1)



2.9.12.1

Lubricate the shift rod and put it in all the way to the stop



2.9.12.2

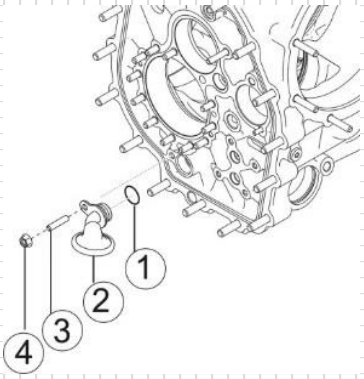
Information Do not insert the upper O ring (arrow) of the shift rod until the final assembly. See 2.9.20

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2.9.13 Suction tube assembly

Put greased suction tube (2) and O ring (1) (15x2.5) on the gearbox housing

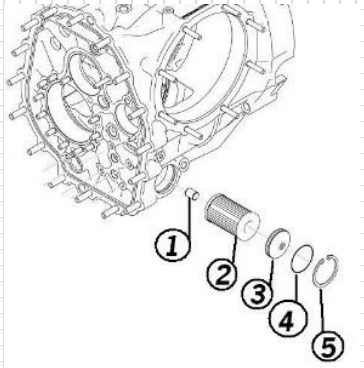
Put on nut (4) and tighten with **10 Nm** (7,4 ft-lb)



2.9.13.1

Oil filter

Insert the oil filter element (2) in the gear housing (without a specific installation direction), put on closure cap (3) with greased O ring (4) and secure with the locking ring (5)



2.9.13.2

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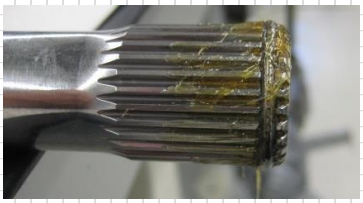


Inserting the connecting shaft

Press snap ring onto the shaft

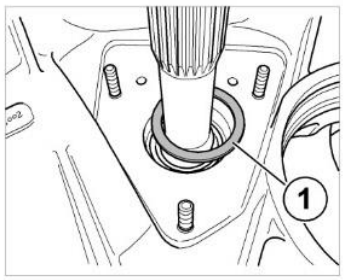
Center the snap ring (Figure 2.9.13.3) with grease to facilitate shaft assembly

Insert the connecting shaft in the drive shaft until it engages clearly



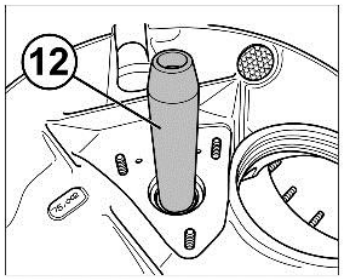
2.9.13.3

Put guide ring (connecting shaft) on the bearing

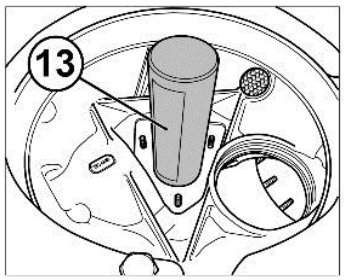


2.9.13.4

Grease shaft sealing ring (connecting shaft) (26x41x6) with Optimol and drive in with tools no. 12 and 13. Tool no. 12 serves as a guide and prevents damage to the shaft sealing ring.



2.9.13.5



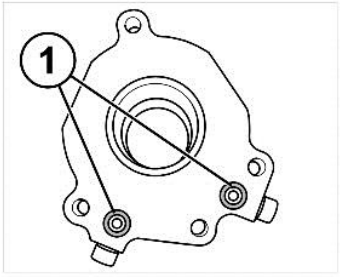
2.9.13.6

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2.9.14 Central clutch operator assembly

Put in grease O rings (1)

Tighten the central clutch operator with **10 Nm** (7.4 ft-lb) on the gearbox housing, use nut.



2.9.14.1

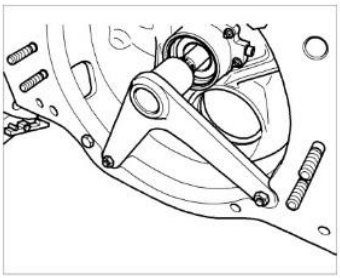
2.9.15 Cutted gear housing assembly

Information The cutted gear housing is assembled to check the backlash of bevel gear to ring gear. The gear housing is fitted only after a check and possibly a correction.

Push on the cutted gear housing and fix in place with four nuts

Engage the 1st gear (by turning the shift drum)

Fix drive shaft in place with tool no. 19 (Figure 2.9.15.1)

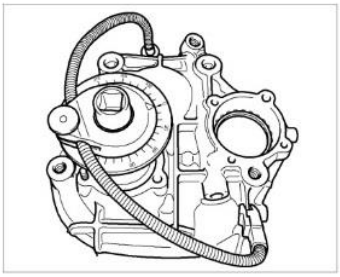


2.9.15.1

Pre-tighten the pinion shaft with **30 Nm** (22 ft-lb)

Put on the angle disk and rotate the nut (drive shaft) 60° (Figure 2.9.15.2)

Loosen the nut and repeat the tightening process (**30 Nm (22 ft-lb) + 60°** angle of rotation)



2.9.15.2

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Check the gearshift clearance

Put the transmission in the installation position

The selector sleeves must be centered and move freely

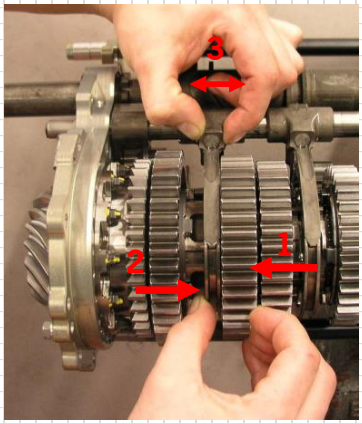
Check the shifting of all gears while rotating drive shaft/pinion shaft

Check the clearance of the reverse gear shift fork

Check the backlash of the gearwheel pairings

Check the position of the gearwheel pairings

Check the free movement of the shift fork



2.9.15.3

The necessary consistent axial clearance of the shift forks in all gears can be achieved only with correct adjustment of the shift drum:

Engage any gear and pull the idler gear to the guide sleeve (1)

Press the sliding sleeve on the engaged gearwheel (2) and check the clearance (3) of the shift fork in the groove of the sliding sleeve

Carry out this check for all shift forks in all gears

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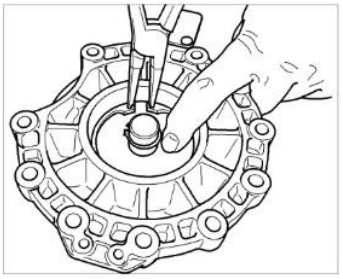
2.9.16 Determining cross shaft bearing adjusting disk Q1

The bearing unit in the cross shaft lid is installed using adjusting disk Q1 with compression. Determining adjusting disk Q1 requires measurement device.

Measurement process

Insert measurement device Porsche spare part No.: 991.450.348.9A in the cross shaft lid. The touching surfaces of the components must be free from dirt.

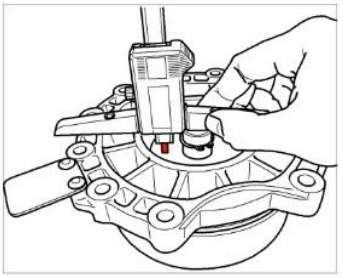
The measurement device is clamped in with locking ring. The locking ring that is also ultimately used for installation must be used (Figure 2.9.16.1)



2.9.16.1

Aligning the depth caliper

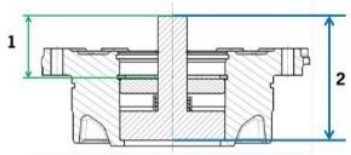
Carry out the distance measurement (Figure 2.9.16.2) from stamp end to ring disk (1). Carry out three reference measurements (20.10 mm)



2.9.16.2

Measure the total length of the measurement device (2) (62.09 mm)

Measure the total length of both bearings (Figure 2.9.16.4) (39.95 mm)



2.9.16.3

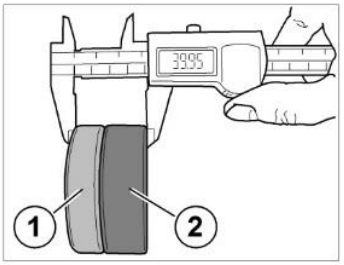
Calculating the Q1 measurement

Total length of the measurement device – total length of the bearings – distance measurement + compression (0.15 mm) = adjusting disk Q1

Example:

62.09 – 39.95 – 20.10 + 0.15 = 2.19

As a consequence, an adjusting disk with a thickness of 2.19 mm must be inserted.



2.9.16.4

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2.9.17 Cross shaft setup

Caution Hot components

Danger of burns

- Wear personal protective equipment.

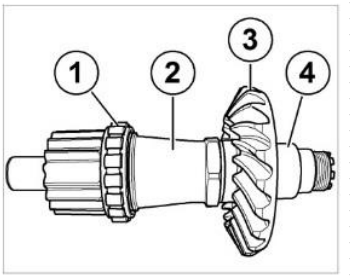
Heat the cylinder roll bearing inner ring on a hot plate for 30 minutes at 130° C (266 F)

Lubricate the shaft

Press the heated bearing (1) quickly onto the shaft. It must be possible to mount the bearing without applying great force.

Put the bushing on the shaft (2)

Put on the ring gear (3) (observe installation position)



2.9.17.1

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2.9.18 Cross shaft assembly

In the first step, the four-point bearing must be centered in the housing lid. Housing lid and four-point bearing are pre-assembled with an auxiliary shaft (tool no. 36) for that. The four-point bearing is fixed in place with the locking ring. The cross shaft is inserted in the housing lid in the second step.

Caution

Hot components

Danger of burns

- Wear personal protective equipment.

Heat the housing lid (1) at 140 °C (284 F) for 30 minutes

Insert the cylinder roll bearing (2) in the housing with tool no. 7 (bearing label must face toward the top)

Clamp tool no. 36 (auxiliary shaft) into the vice

Put the housing lid (1) on auxiliary shaft no. 36

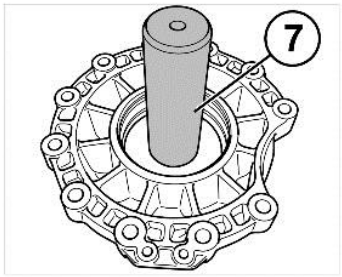
Insert the bottom inner ring of the four-point bearing (3) in the housing lid

Insert the four-point bearing (3) (label toward the top)

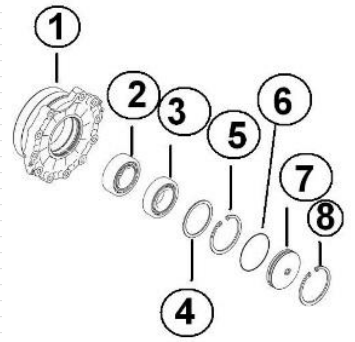
Insert the top ring of the four-point bearing (3)

Lubricate and put on the nut (1)

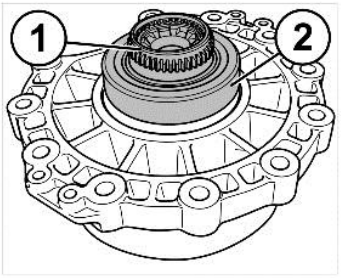
Pre-tighten the shaft by tightening the nut (1)



2.9.18.1



2.9.18.2



2.9.18.3

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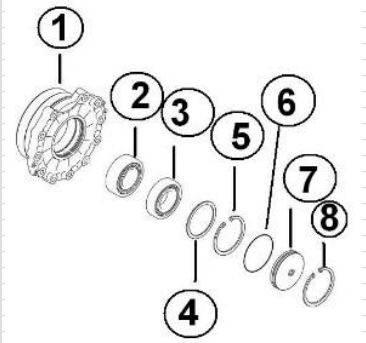
Insert the calculated adjusting disk Q1 (4)

Insert the locking ring (5). The oil hole must stay open (Figure pos.)

Drive in ring with copper drift (four-point bearing is fixed in place)

Use compressed air to blow out any chippings

Loosen the nut and take the housing lid of the centering tool (auxiliary shaft)



2.9.18.4

Lubricate the inner bearing ring of the cylinder roll bearing

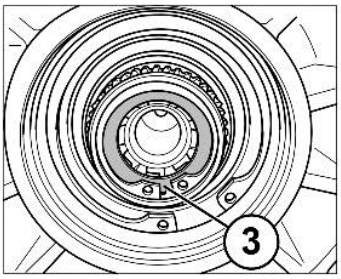
Put the housing lid on the cross shaft

Loosely put on the nut

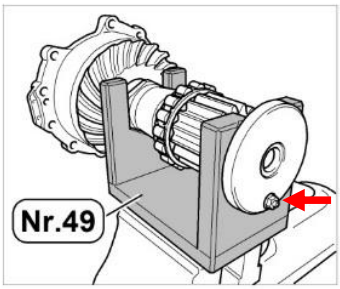
Clamp tool no. 49 into the vice

Insert shaft with lid in tool no. 49 (Figure 2.9.18.6) and fix in place with the nut (arrow)

Tighten the nut for the cross shaft, **50 Nm (36.9 ft-lb) + 60°**, loosen and tighten finally with **50 Nm (36.9 ft-lb) +60°**



2.9.18.5



2.9.18.6

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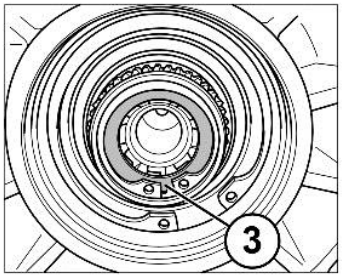
Check the ease of movement of the bearing

Attach locking ring (3) for the nut

Attach locking ring

Place the greased O ring (130x2.5) on the lid

Visually check the gearbox housing

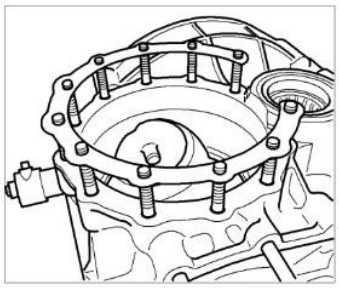


2.9.18.7

Put on the adjusting disk (basic 1.4) P2

Insert the shaft with the lid (rotate shaft slightly to prevent two teeth of ring gear and bevel gear from touching directly)

Tighten the lid with every second nut using a crisscross pattern (**25 Nm** (18.4 ft-lb))


2.9.18.8

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Checking the backlash of the angle drive

Clamp tool no. 15 onto the shaft

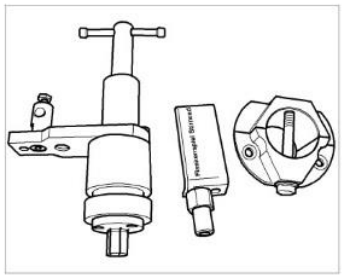
Screw tool no. 26 onto the housing

Attach the probe indicator; the needle (1) must touch tool no. 26 pre-tightened

Block the pinion shaft in the position „drive“ with tool no. 18, fix the tool well in place on the cutted gear housing to allow a precise measurement.

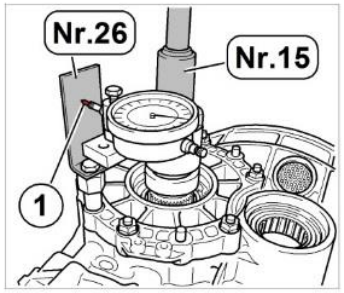
Rotate the cross shaft from stop to stop

Adjustment value: 0.15 to 0.19 mm



2.9.18.9

Loosen tools and rotate the cross shaft 90°; repeat the measurement process three more times.



2.9.18.10

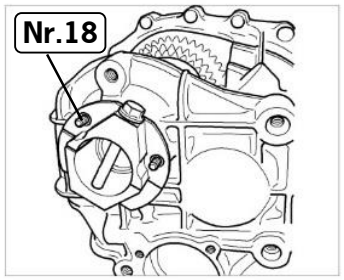
Information If the clearance is too big, a thinner adjusting disk P2 must be inserted. If the clearance is too little, use a thicker adjusting disk.

Block the pinion shaft in the position „coast“ with tool no. 18, fix the tool well in place on the cutted gear housing to allow a precise measurement.

Rotate the cross shaft from stop to stop

Adjustment value: 0.10 to 0.14 mm

Loosen tools and rotate the cross shaft 90°; repeat the measurement process three more times.



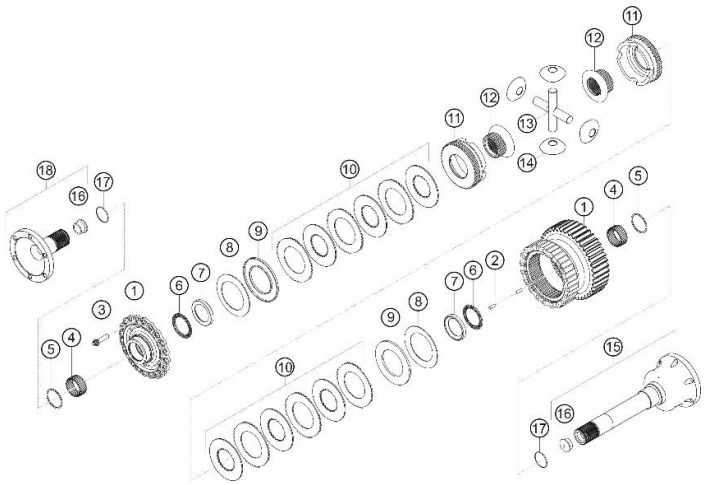
2.9.18.11

Information If the clearance is too big, a thinner adjusting disk P2 must be inserted. If the clearance is too little, use a thicker adjusting disk.

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2.9.19 Differential setup

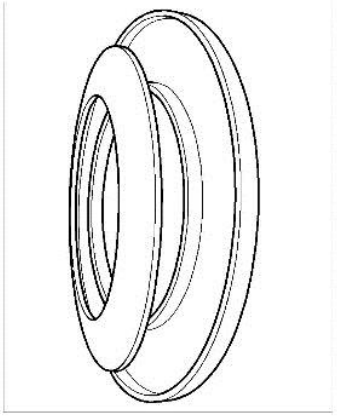
The differential can be replaced even if the transmission is filled with oil. The oil level should still always be checked after working on the transmission (see 7.3.1). Friction disks, bevel gears, bevel pinions, axial bearings, and ramps must be lubricated well before the assembly. The measure of the assembly of pressure plates (external geared), clutch disks (internal geared), thrust rings, thrust pieces and cross pins has to be within a specified dimension. The actual dimension has to be measured during reassembly and must be corrected to the specified dimension by using a variety of pressure plates in different sizes.



2.9.19.1

Grease the axial needle bearing (6), mount into the ring (7) and assemble into the differential housing (round side of the bearing is pointing to the outside).

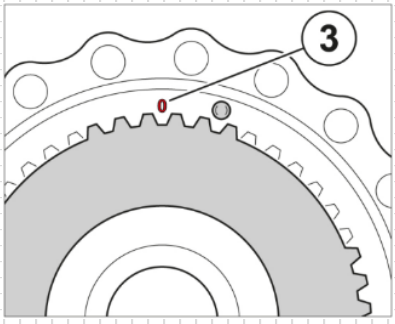
Insert disk spring (8) and thrust ring (9) (observe installation position) with the thrust ring label towards the top (Figure 2.9.19.2)



2.9.19.2

Disk package (10):

Information The teeth of the disks must be centered on the housing mark (zero) (3).



2.9.19.3

Insert outer disk 1

Insert inner disk 1

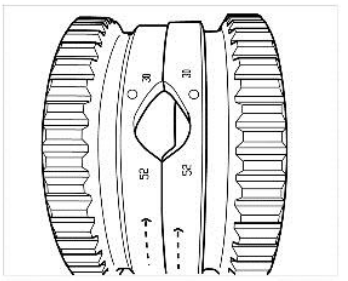
Insert outer disk 2

Insert inner disk 2

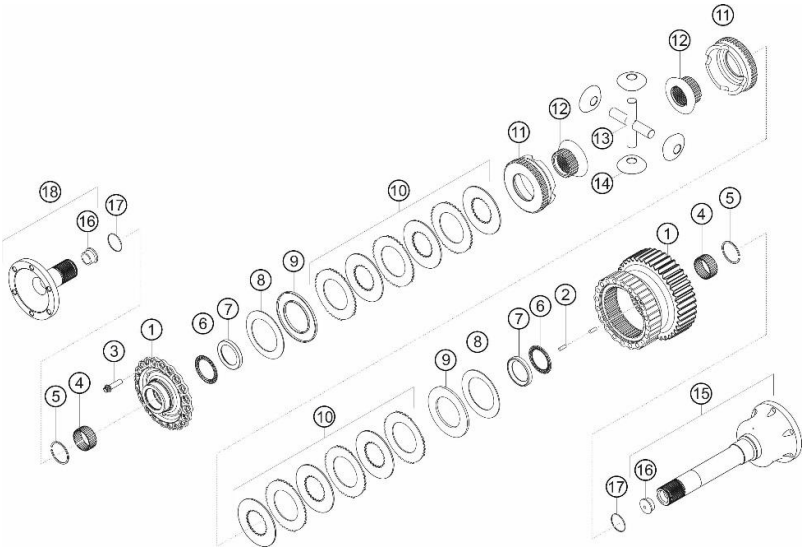
Insert outer disk 3

Insert inner disk 3

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2.9.19.4



2.9.19.5

Insert the pressure piece (11); keep in mind rotational direction and 0 mark (Figure 2.9.19.4)

Insert bevel gear (12)

Insert cross pin (13) with bevel pinion (14)

Insert bevel gear (12)

Insert pressure piece (11), keep in mind rotational direction/mark!

Disk package (10):

Insert inner disk 3

Insert outer disk 3

Insert inner disk 2

Insert outer disk 2

Insert inner disk 1

Insert outer disk 1

Insert pressure plate (9) + disk spring (8) (observe installation position)

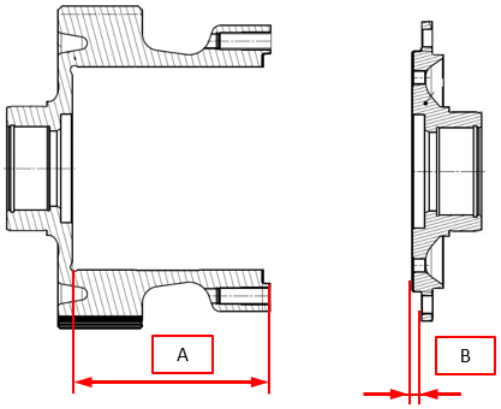
Insert ring (7)

Grease the axial needle bearing (6), mount into the ring and assemble into the differential housing (round side of the bearing is pointing to the outside).

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Measure the friction package

Measurement of the differential housing depth from the bottom surface to the top face of the gearing (A) - measurement of the step within the diff cap (B) = C + tolerance (0.1 - 0.3 mm)



2.9.19.6

Measurement of pressure plates and clutch discs including test weight.



2.9.19.7

Stack and align the pressure plates and clutch discs in alternating sequence.

Zero the depth gauge relative to the test weight (4.5 kg).

Place the test weight on the stacks and measure the thickness.

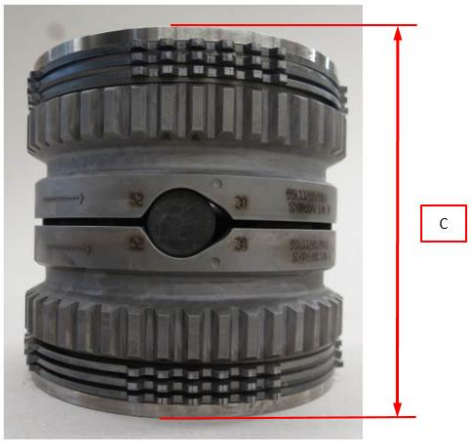
Measurement:

A – B = C + (0,1- 0,3 mm)

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Measurement of pressure plates/clutch discs/ramp/cross pin package

Measurement without springs!



2.9.19.8

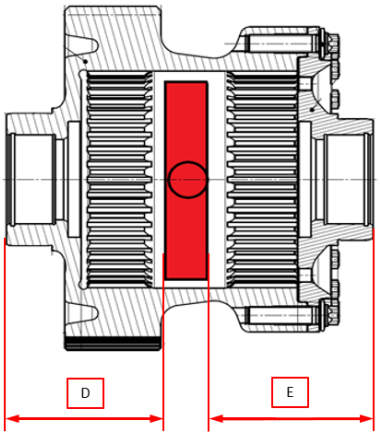
The measurement of the friction package has to be 0.1- 0.3 mm less than the measurement (A-B). In case the measurement of the friction package is not within the tolerance it must be corrected by reassembling with pressure plates of different thickness.

Symmetry of the cross pin

During the assembly of the friction package please note, that the cross pin has to be in symmetric position of the friction package as otherwise the axle flanges might be pushed out of their latching position within the thrust pieces. Therefore the layered arrangement of the friction package has to be measured from the differential housing face/the differential housing cap face to the cross pin (marked red) and the difference between the sides may not exceed 0.2 mm. In case the difference is bigger, the friction package must be reassembled with a different arrangement of the clutch disks and pressure plates (thickness).

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Meassurement:



2.9.19.9

Check the differential lid/differential housing pairing!

Lubricate the edge and put on the lid (2)

The inner threads must be free from residue of the screw locking device agent. All screws (1) and threads must be degreased.

Bolting differential lid (2):

- Tighten lid with 4 assembly bolts with **15 Nm** Sequence 1, 11, 6, 16

Check the basic locking action

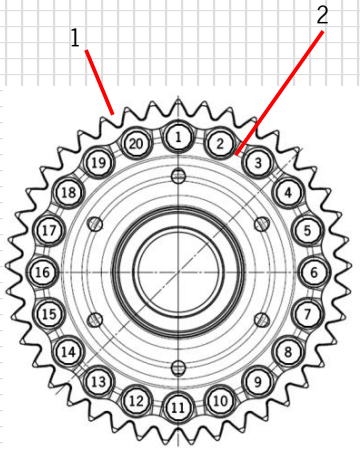
Clamp tool no. 52 into the vice (Figure 2.9.19.11)

Put on tool no. 53

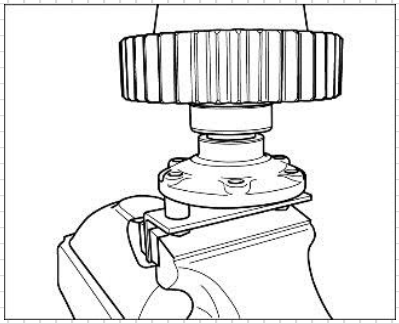
Check the locking action with drag torque wrench no. 59

- Tighten 16 bolts with torque **15Nm+70°** (apply Loctite 262 on thread) Sequence 2, 12, 7, 17, 3, 13, 8, 18, 4, 14, 9, 19, 5, 15, 10, 20
- Remove assembly bolts
- Tighten 4 bolts with torque **15Nm+70°** (apply Loctite 262 on thread) Sequence 1, 11, 6, 16

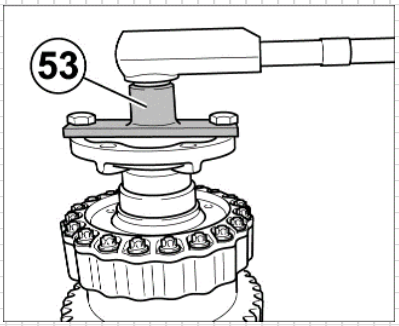
D = E ± 0.2 mm



2.9.19.10



2.9.19.11



2.9.19.12

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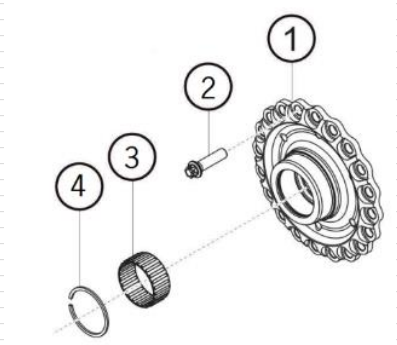


Differential installation

Insert needle cage (3)

Dimensions: 35x40x17

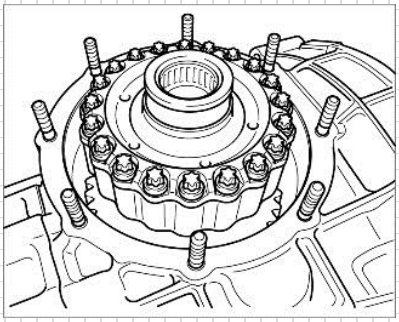
Put on snap ring (4)



2.9.19.13

Insert the differential in the gearbox housing (Figure 2.9.19.14)

Put on differential lid with greased O ring and tighten with **25 Nm** (18.4 ft-lb)



2.9.19.14

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Checking the backlash of cross shaft/differential

The backlash of cross shaft/differential cannot be adjusted due to the design. It must still be checked though whether the clearance is within the specified measurement value.

Attach tool no. 16 on the lateral differential lid

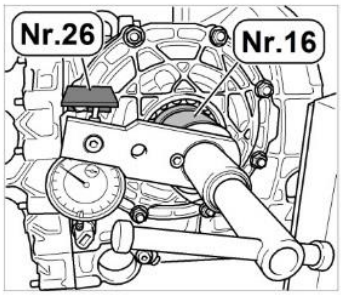
Attach the probe indicator

Attach stop no. 26 on the differential lid catch (Figure 2.9.19.15)

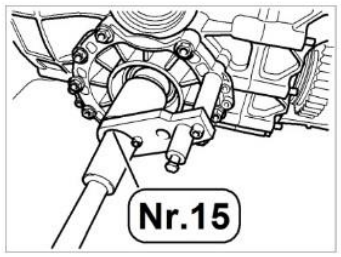
Block the cross shaft with tool no. 15 (Figure 2.9.19.16)

Check the measured value by rotating the differential (measured value: 0.10 – 0.20 mm)

Check the test device on four points at an offset of 90°



2.9.19.15

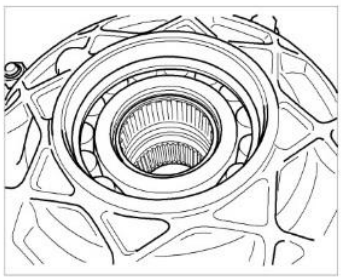


2.9.19.16

Put the needle cage into the differential (Figure 2.9.19.17)

Insert the snap ring

Insert the shaft sealing ring into the differential lid

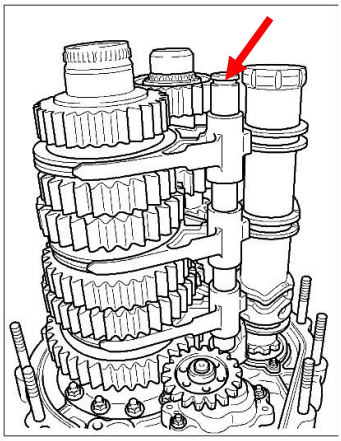


2.9.19.17

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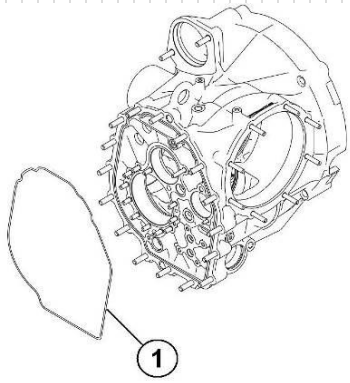
2.9.20 Mounting gearhousing

Insert the upper O-ring of the shift rod into the notch (Bild 2.9.20.1)



2.9.20.1

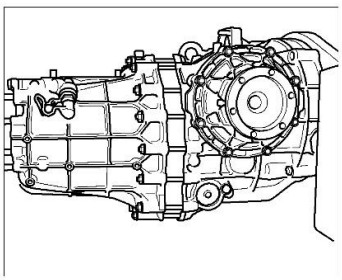
O-ring (1) and insert into gearbox housing (Bild 2.9.20.2)



2.9.20.2

Once all adjustments have been made, the cut housing can be replaced by the wheel housing. Drive and pinion shaft are already equipped with this section.

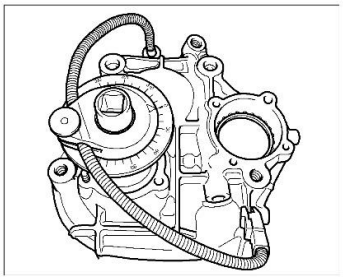
Attach housing and tighten evenly (**25 Nm**)



2.9.20.3

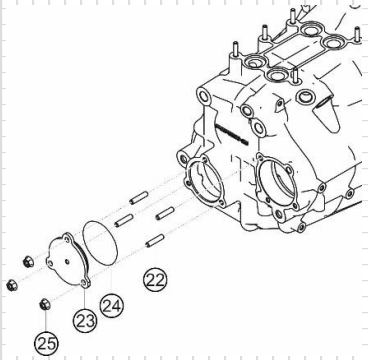
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Tighten pinion shaft nut with **30 Nm + 60 °**, then loosen and tighten again with **30 Nm + 60 °** (Bild 2.9.20.4)



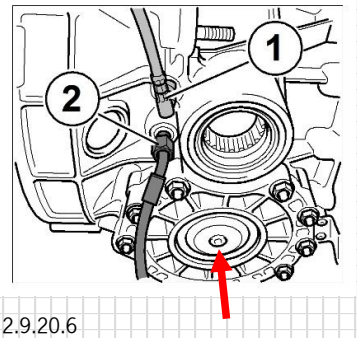
2.9.20.4

Fit cover pinion shaft (23) with greased sealing ring (24) and tighten nuts (25) to **10 Nm** (Bild 2.9.20.5)



2.9.20.5

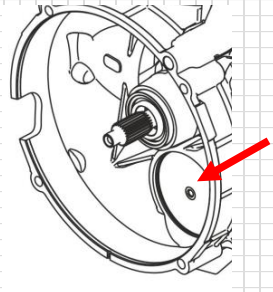
Cover Install the cross shaft cover with a greased O-ring and fix it with the retaining ring (Bild 2.9.20.6)



2.9.20.6

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Cover Installation opening Insert the coupling housing (arrow) with a greased O-ring and fix it with a securing ring

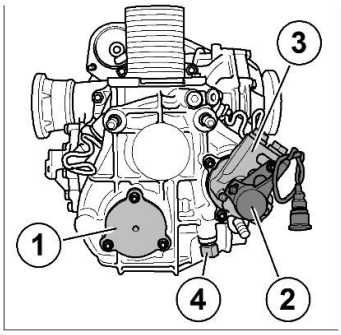


2.9.20.7

Connect switch actuator (3) and tighten with **10 Nm**

Connect switching actuator potentiometer (2) to switching actuator

Calibrate potentiometer operation (6th gear 4.5 V)

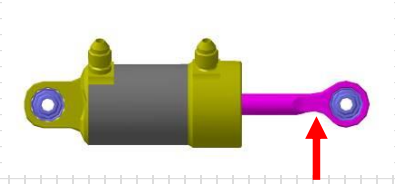


2.9.20.8

Gearbox holder to gearbox screw **45 Nm**

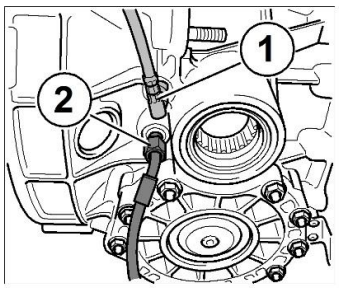
Shift cylinder on gearbox holder and shift actuation screws **12 Nm**

Information Pay attention to the installation position of the shift cylinder on shifting operation (Fig. 2.9.20.9) The round indentation on the shift cylinder points to the Rolex shaft.



2.9.20.9

Install the hydraulic lines (4 and 6) of the central dumper.



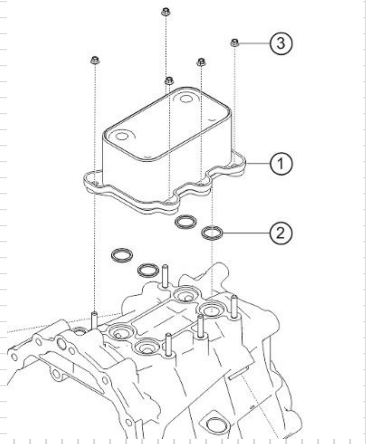
2.9.20.10

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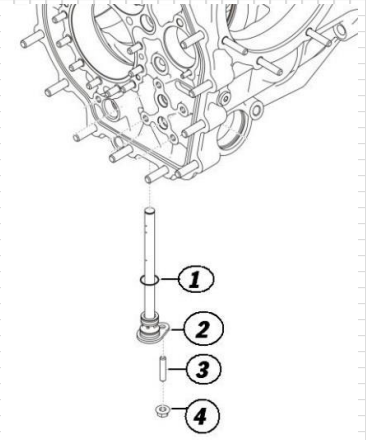
Seal rings (2) Place oil / water heat exchanger greasy, place heat exchanger (1)

Apply heat exchanger to **10 Nm**



2.9.20.11

Insert the oil injection pipe (2) for the pinion shaft with a greased sealing ring (1) into the gearbox housing and tighten the nut (4) to **10 Nm** tightening torque and Loctite 2701



2.9.20.12

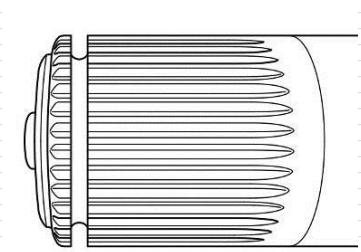
Fill the gearbox with 3 liters of oil (see chapter 2.3.5 Oil circuit)

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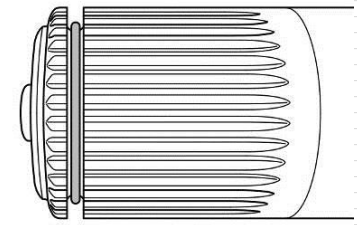
Porsche Motorsport points out that the mounting of the sprengren on the articulated flange has to be carried out by the following procedure. The assembly is carried out with the support of an O-ring in the sprengren groove, the instruction applies to both joint flanges.

Clean the joint flange as well as the sprengren groove



2.9.20.13

Grease the O-ring, push it onto the articulated flange and insert it into the cutting groove groove

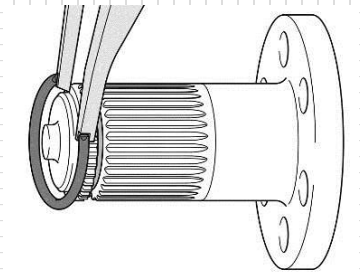


2.9.20.14

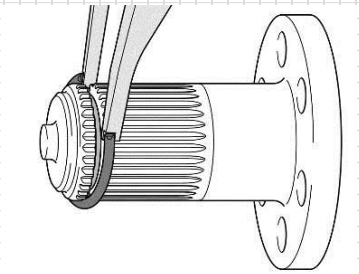
NOTE

Make sure the sprengring fits securely. O-ring must not be damaged during assembly

Insert the Sprengring with the Sprengring pliers in the Sprengring groove.



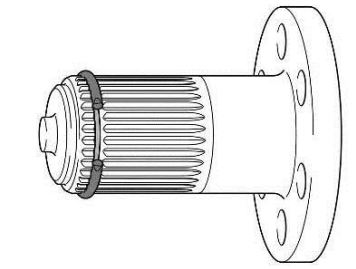
2.9.20.15



2.9.20.16

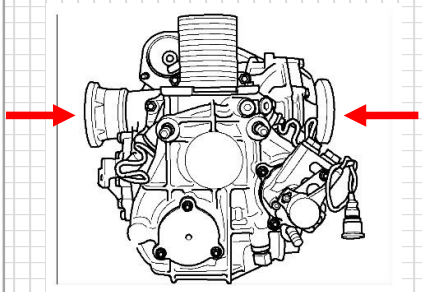
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Sprengring is centered by O-ring, grease axle flange teeth.



2.9.20.17

Insert drive shaft flanges (arrow)



2.9.20.18

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2.10 Rolex assembly

Disassemble Rolex old stock, clean the parts and carefully place all parts.

These old stock parts are for reuse in Rolex-Status 4.0:Gehäuse (Deckel):

2* Sliding Sleeve

2* Compression Spring

2* Spring Mount

1* Bracket (Potentiometer)

1* Potentiometer

1* Connecting Tube

2* Fillister Screw Potentiometer

2* Fillister Screw Bracket

2* Washer

1* Control Lever

1* Stop Disk

1* Coupling Part

1* Driver Potentiometer

1* Washer

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Required new parts

Following new parts must be present and replaced:

1* Rolex Housing

1* Shaft Sealing Ring

1* Stud Holder (Potentiometer)

2* Sealing Ring Spring Mount

1* Needle Bush for Coupling Part

2* Pin

1* O-Ring for Rolex Housing

1* Bearing Sleeve

1* Stop Guide Plate

3* Torx Screw

2* Compression Spring - Driver

2* Driver

2* Locking Ring

1* Additional Grooved Ball Bearing

1* Locking Ring Driver Potentiometer

3* Fillister Srew

1* O-Ring – Driver Potentiometer

2* Spring Lock Washer Bracket

4* Hexagon Nut

2* Spring Lock Washer Potentiometer

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Assembly

Technical aids to use: Loctite 574; Loctite 243 blue; Loctite 2701 green; Optimol-MP3-Grease; Gearbox Oil; Porsche Special-Tools; Standard Tools as shown in Picture; Heating Plate; Torque- Wrench

Important: Use only a Rubber hammer!

Clean all components with benzine and arrange the old and new parts as follows.
Important: All screws must be cleaned with acetone!

Overview



2.10.1

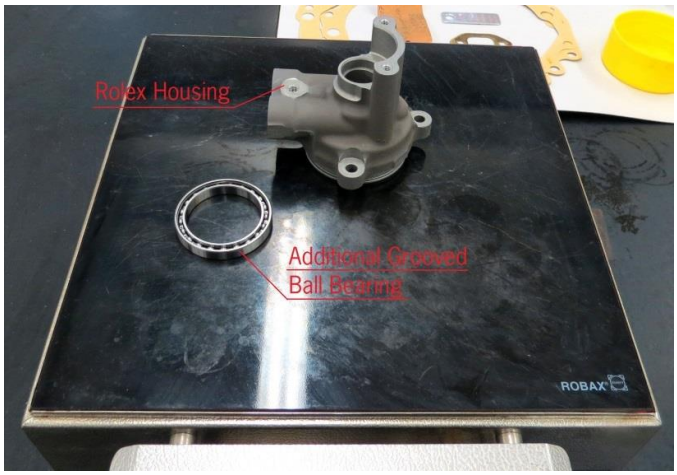
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Caution Hot components

Danger of burns

- Wear personal protective equipment.

- Heat up the rolex housing and the additional grooved ball bearing with the heating plate to 100°C – 120°C (212-248 °F).



2.10.2

- As these parts are heating up, install the grooved ball bearing for the coupling part in the shifting element. Secure the bearing with the locking ring. Important: The sharp edge of the secure ring must face up and the bearing has to be checked on free movement.

- Take the additional grooved ball bearing from the heating plate and fit it on the shaft of the shifting element. Important: Bearing must be placed without high force actions!



2.10.3

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- Take the rolex housing from the heating plate, lay the needle bush for the coupling part into the housing and fix it with the special tool no. 30 and the rubber hammer.

Important: Do not use the hammer directly on the bearing!



2.10.4



2.10.5

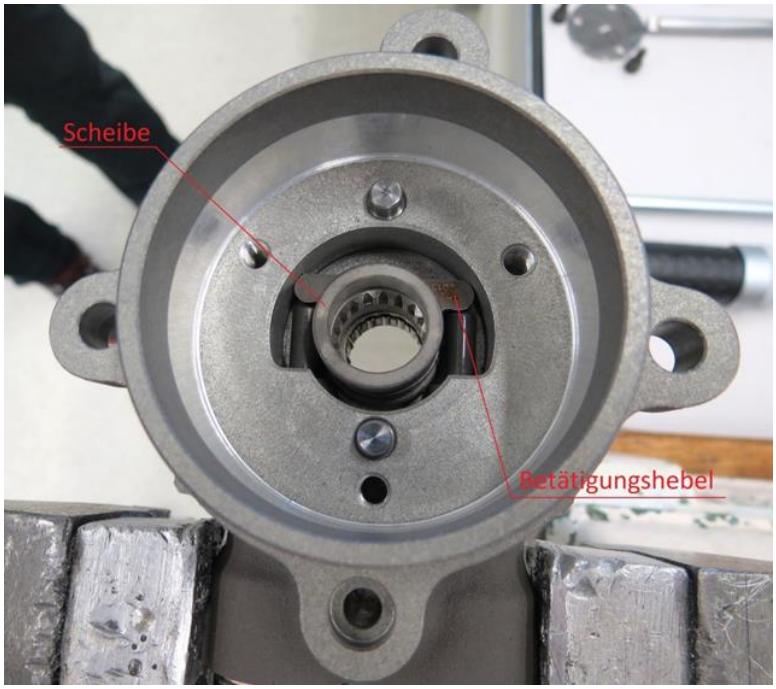
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- Countersink the pins into the rolex housing.
- Let the housing cool down.
- Coat the sliding sleeve and the compression spring with oil and put it into the housing. Important: The oil should not contact the thread of the housing. Place the shaft sealing ring and the spring mount on the housing, secure it with Loctite 574 and screw it into the housing. **35Nm** (25,8 ft-lb)



2.10.7

- Lay following parts into the rolex housing Washer – Control lever – Washer. Coat them with oil.



2.10.6

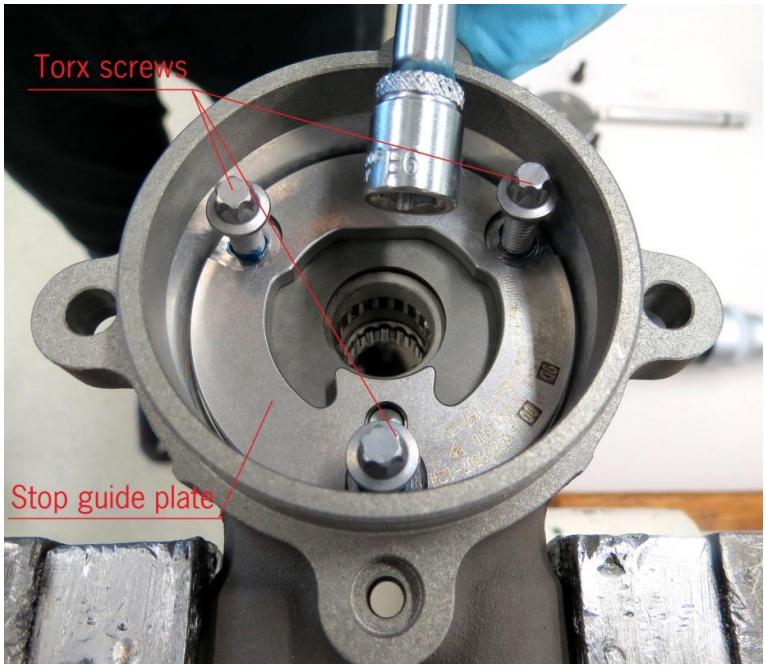
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- Insert the stop disk with the writing face down into the housing as shown in the picture.



2.10.8

- Lay in the stop guide plate with the sinkings facing up into the housing. Use the three torx screws and Loctite 243 to secure and fix the stop guid plate. Torque: **4 Nm** (3 ft-lb). To make assembly easier use the special tool Torx-E6.



2.10.9

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Caution Hot components

Danger of burns

- Wear personal protective equipment.

- Heat up the rolex housing again to 100°C - 120°C (212-248 °F) and insert the bearing sleeve for the additional grooved ball bearing.

Important: Ensure that the bearings sleeve is seated correctly.

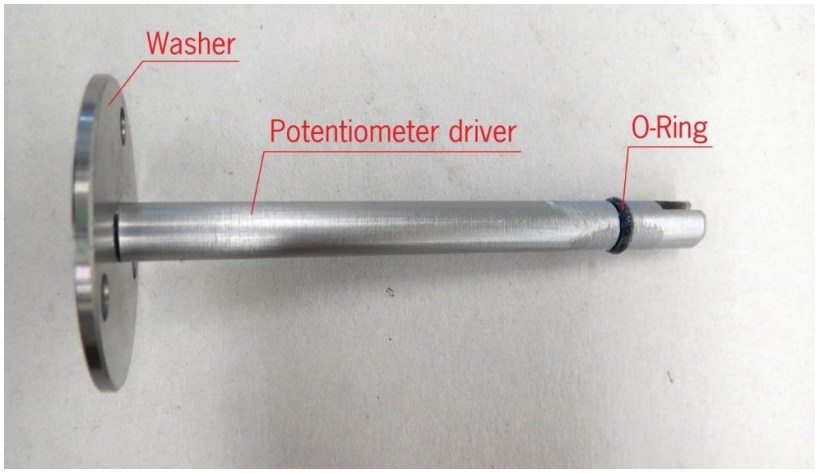
- Let the housing cool down.



2.10.10

- Put the potentiometer driver, the washer and the O-Ring together.

Important: The O-Ring has to be coated with grease.



2.10.12

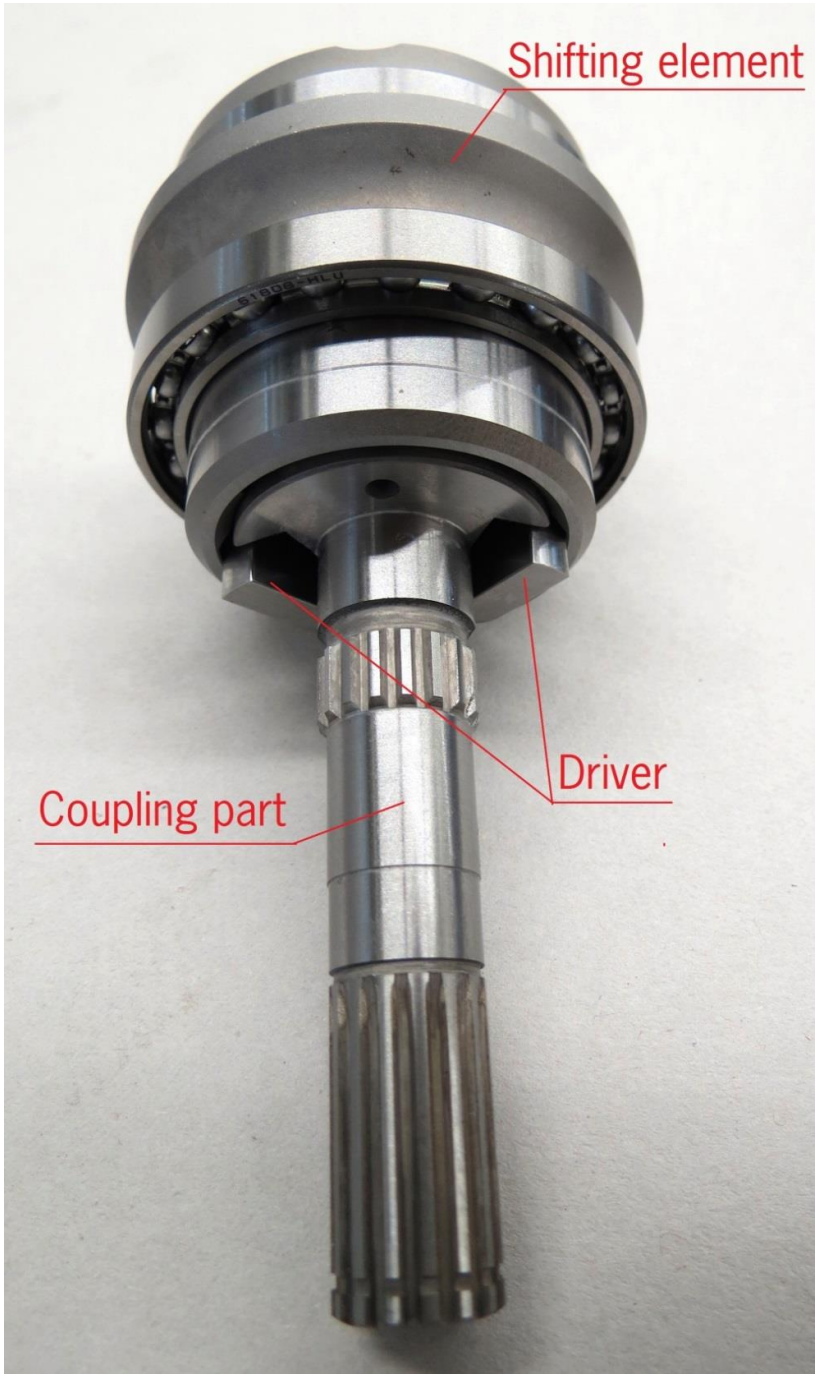


2.10.11

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- Put together the coupling part, the compression springs and the drivers and carefully guide the parts into the shifting element. Secure the coupling part immediately with the securing ring and check on free movement.

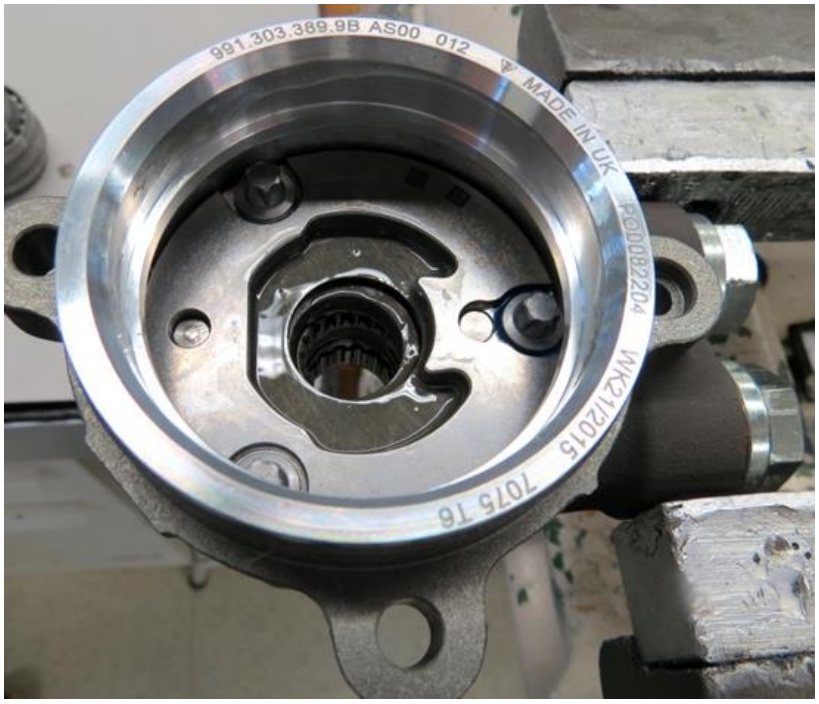
Important: Check the neutral position as shown in the picture!



2.10.13

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- The additional grooved ball bearing and all the moving parts in the housing have to be coated with oil and checked on free movement.



2.10.14

- The next step is, to put the potentiometer driver and the washer into the coupling part and subsequently into the shifting element.

Important: Pay attention to the O-Ring.

- Use the screws (M5x10) and Loctite 243 to secure and fix these parts.
- Important: Tighten the screws in several steps clockwise torque: **6 Nm** (4,4 ft-lb). After that insert all these components in the housing.



2.10.15

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- Turn over the rolex housing and make sure that the coupling parts don’ t fall out.
- Important: Check the neutral position as shown in the picture!

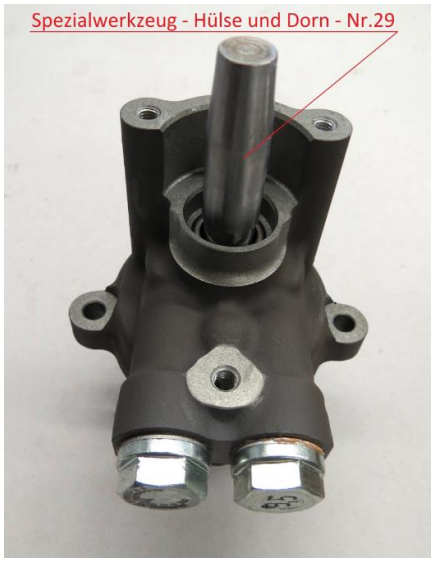


2.10.16

- Check the function and free movement. Rotate the coupling part once to the right and once to the left side. Important: Spring tension must be the same in both directions!

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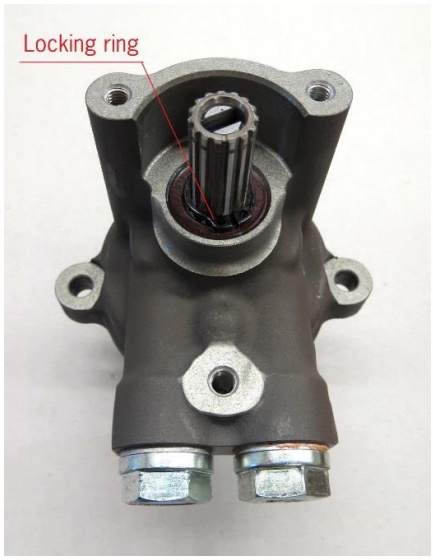
- Use the special tools (sleeve and mandrel no. 29) to mount the shaft sealing ring. Important: Use only the rubber hammer!



2.10.17

- Secure the coupling part and the shaft sealing ring with the locking ring as shown in the picture.

Important: Ensure that the locking ring is seated correctly!



2.10.18

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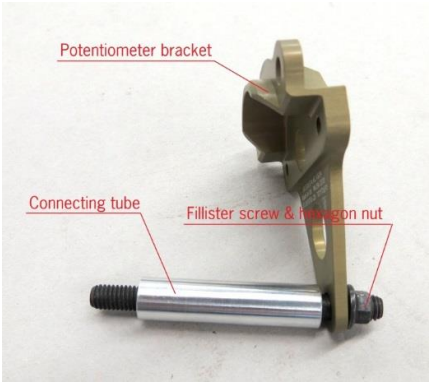
- Mount the paddle shift control lever as shown in the picture and secure it with the locking ring. Important: Ensure that the locking ring seats correctly!



2.10.19

- Perform a shifting test. Important: Shifting operations must be easy to carry out and the control lever has to return automatically to its neutral position.
- Assembly the hexagon nut, the fillister screw, the bracket and the connecting tube and mount it with Loctite 2701 into the rolex housing. **10 Nm** (7,4 ft-lb).

Important: The long thread has to be mounted into the rolex housing.



2.10.20

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- Mount the bracket fillister screws (M5x15) and the spring lock washers with Loctite 243 into the rolex housing. Torque: **6 Nm** (4,4 ft-lb).
- Potentiometer fillister screws (M4x10) and the related spring lock washers also has to be mounted as shown in the picture below. Torque: **4 Nm** (3 ft-lb).



2.10.21

- Mount the O-Ring on the rolex housing and coat it with Optimol-MP3 grease.

Important: Ensure that the O-Ring is seated correctly!

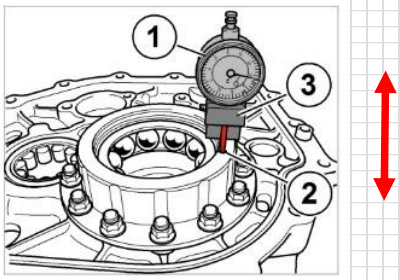


2.10.22

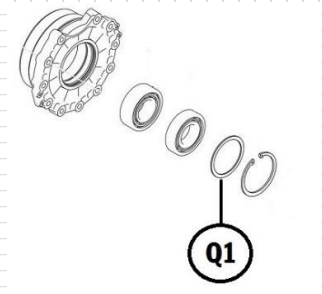
- For the Rolex assembly into the gearbox, the shifting element and all the moving parts in the housing have to be coated with oil and checked on free movement.
- Finally the pneumatic cylinder has to be mounted.

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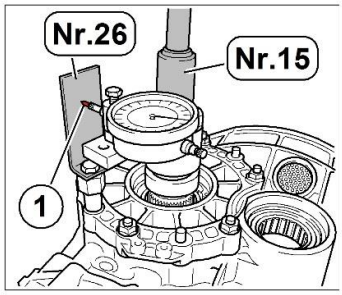
2.11 Overview gearbox settings



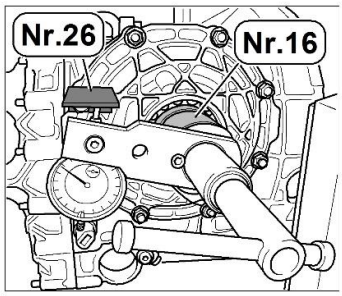
2.11.1



2.11.3



2.11.4



2.11.5

Pinion shaft

Preload 4-point-bearing

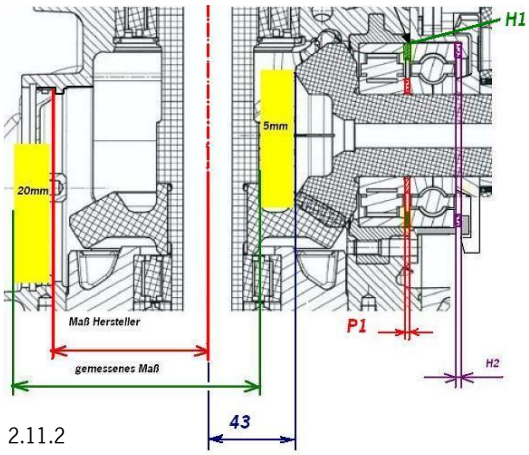
Set valve: 0.03 – 0.05 mm (Figure 2.11.1) via adjustment disk H1

Axial backlash 4-point-bearing

Set valve: 0.02 – 0.05 mm via adjustment disk H2

Pinion shaft position

Offset: 0.00 - 0.02 mm via adjustment disk P1



2.11.2

Cross shaft

Preload 4-point-bearing

Set valve (Pressung): 0.15mm via adjustment disk Q1 (Figure 2.11.3)

Backlash pinion/crownwheel “drive”

Set valve: 0.15 – 0.19 mm via adjustment disk P2 (Figure 2.11.4)

Backlash pinion/crownwheel “coast”

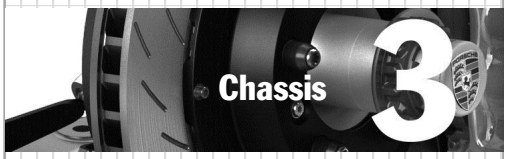
Set value: 0.10 – 0.14 mm (Figure 2.11.4)

Differential

Backlash shift cross shaft/diff

Set valve: 0.10 – 0.20 mm (not adjustable) (Figure 2.11.5)

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3 Chassis

3.1 General

The front and rear axles have been overhauled to suit the requirements of competition and to allow for easy and accurate setting of camber, toe, and vehicle height. Compared to the previous model, the shock absorber and spring characteristics have been unchanged. This adjustment results in a more neutral handling.

The front axle design is a MacPherson strut-type axle with aluminum transverse control arms. The rear axle is a multi-link axle.

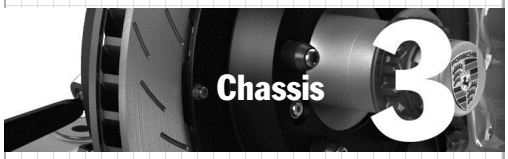


3.1.1

Based on the previous model, the following major development objectives were set and implemented in the chassis for the 911 GT3 Cup (991 II):

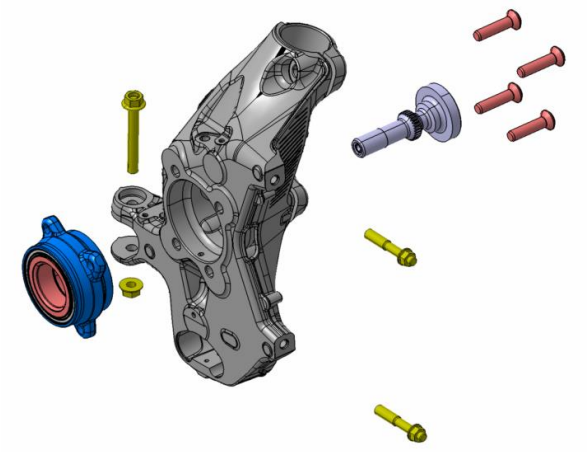
- Improved drive shaft cooling
- Improved rang support
- Improved space between rim and front axle

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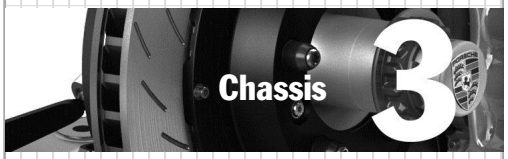
3.1.1 Wheel bearing

The wheel bearing is attached separately on the wheel mount using four bolts. Compared to the pressed-in variant, this advanced bearing integration has the advantage that the bearing can be replaced faster and easier on the vehicle. Moreover, the wheel bearing is insensitive to temperature changes.



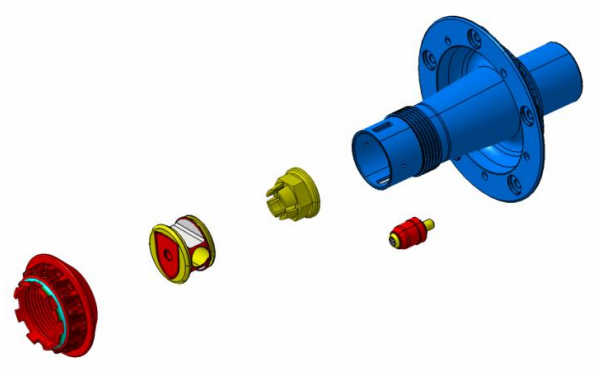
3.1.1.1

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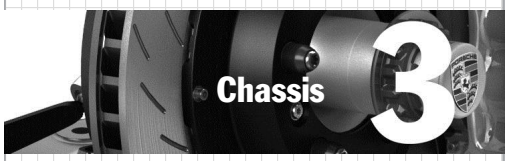
3.1.2 Wheel hub

The wheel hub is a reinforced racing wheel hub with central lock. The central lock nut is protected by a locking mechanism integrated in the hub to prevent it from accidental loosening. The correct functioning of the retaining keys has to be checked regularly.



3.1.2.1

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3.1.3 Wheel nut

The left aluminum wheel nuts are different to the right wheel nuts and can be distinguished as follows:

Right vehicle side = left-hand thread, blue color

Left vehicle side = right-hand thread, red color

⚠ WARNING

Wheel nuts/wheel bolts

Loss of wheels
Loss of control over the vehicle

- The wheel nuts must be replaced following 6 hours of use.
- The wheel bolts must be checked and regenerated after 6 hours of use.

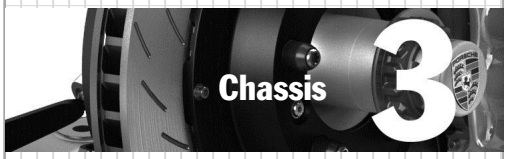
Porsche Motorsport recommends also replacing the wheel nuts during a long-distance race (after approx. 6 hours running time) to verify and regenerate them. Clean the threads, judge them by visual inspection.
To ensure the correct wheel nut tightening torque and corresponding clamping load is achieved the wheel nut or wheel cone MUST be lubricated with Optimol TA grease EVERY time the wheels are changed.

Also, if wheel guns are used, the manometer on the compressed air bottles should be calibrated to ensure that the tightening torque of **500-520 Nm** (368.8 – 383.5 lb-ft) is correct.

Proceed as follows in order to prevent the wheel nuts from settling:

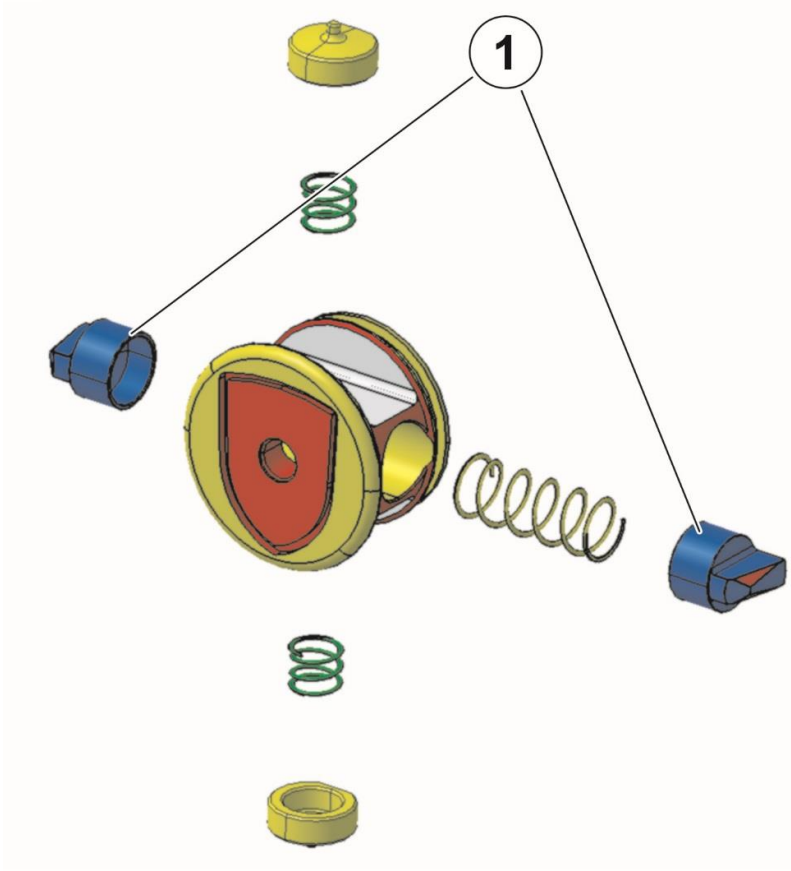
Tighten the new part 3 to 4 times using an impact wrench (**500** – **520 Nm**) (369-384 ft-lb), then loosen and re-grease it.

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3.1.4 Locking piece

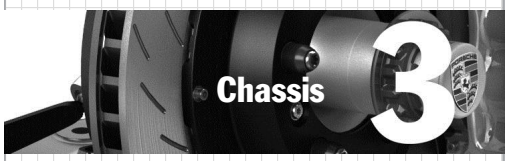
The locking pieces are used as wheel nut locking mechanism and to prevent the wheel from loosening.



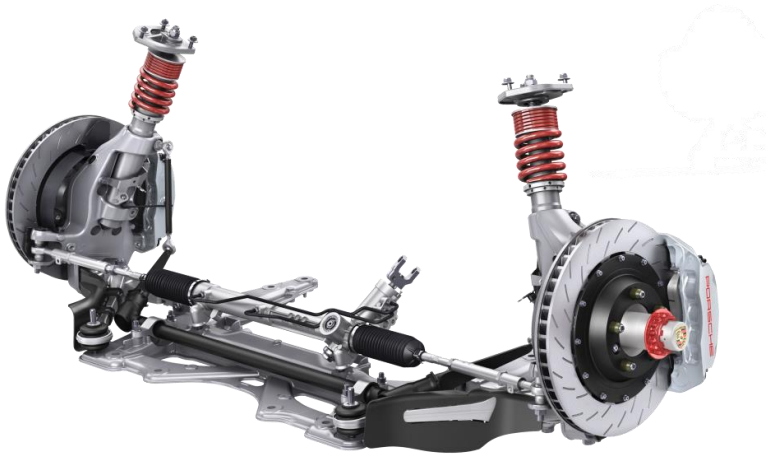
3.1.4.1

1 Locking Piece

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3.2 Front axle



3.2.1

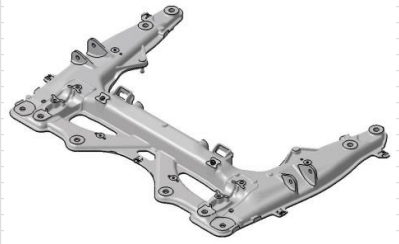
A MacPherson strut with gas pressure shock absorbers is installed on the front axle and attached to the body by a Uniball joint in the strut bearing. A blade-type anti-roll bar that is adjustable on both ends has a controlled impact on the vehicle's rolling behavior. The double shear connection of the control arm and tie rod to the wheel mount as well as a stiffer shock absorber clamp increase the wheel mount's overall stiffness. The use of high performance joint bearings in all control arms minimizes play, and unwanted elastokinematic effects are greatly reduced.

The spring assembly, arranged concentrically on the MacPherson strut, consists of a main spring and a helper spring. The vehicle height can be adjusted continuously using the thread adjustment of the lower spring seat.

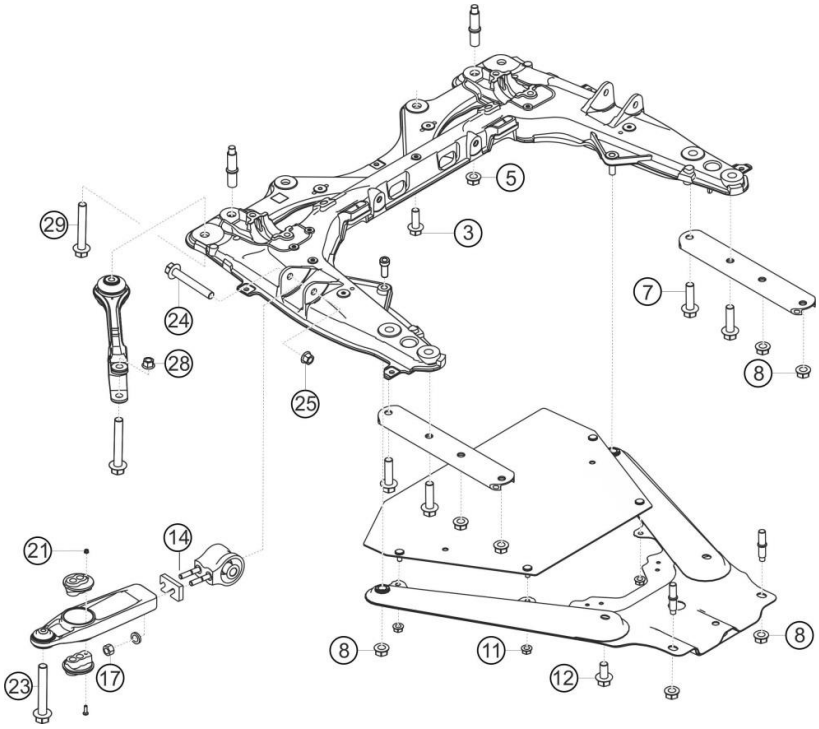
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3.2.1 Front axle cross member

The cross member made of cast aluminum is used as connecting element between the transverse control arms and the body. Transverse control arm, anti-roll bar bearing, longitudinal control arm and steering unit are attached to the cross member.



3.2.1.1

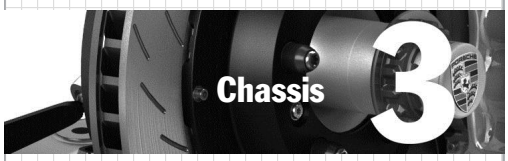


3.2.1.2

List of tightening torques for front axle cross member

Item	Dimensions	Tightening torque in Nm/Comments
3	M12 x 1,5 x 50	120 Nm (88.5 ft-lb)
5	M12 x 1,5	120 Nm (88.5 ft-lb)
7	M12 x 1,5 x 60	120 Nm (88.5 ft-lb)
8	M10	65 Nm (48 ft-lb)
11	M6	10 Nm (7.4 ft-lb)
14		Stud 10 Nm (7.4 ft-lb) + Loctite 276
17	M8	25 ± 2 Nm (18.4 ± 1.5 ft-lb)
21	M5	5 Nm (3.7 ft-lb)
23	M12 x 1,5 x 90	120 Nm (88,5 ft-lb)
25	M12 x 1,5	120 Nm (88.5 ft-lb)
28	M14 x 1,5	160 Nm (118 ft-lb)
29	M14 x 1,5 x 105	Initial installation: 140 Nm (103 ft-lb) then180 loosening then 140 Nm. Otherwise 140 Nm

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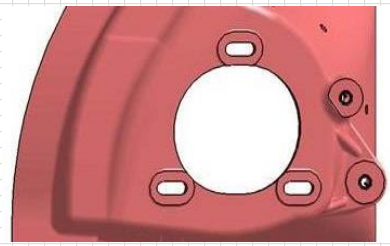
3.2.2 Front axle transverse control arm

The two-piece forged aluminum transverse control arm of the front axle allows for continuous camber adjustment.

Camber adjustment can be done in two different places: The rough initial adjustment is achieved with different spacers in the transverse control arm. For fine adjustment of the camber, slots in the front axle dome allow displacement of the strut mount.

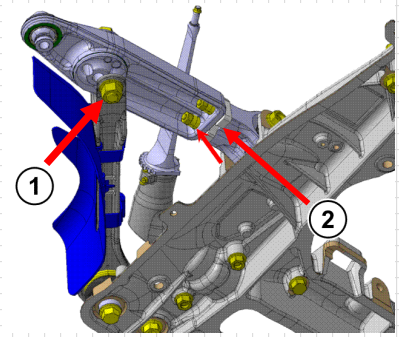
The following adjustment washers can be purchased at Porsche Motorsport:

0.30 mm	2.00 mm
0.60 mm	7.00 mm
0.80 mm	10.0 mm
1.00 mm	



3.2.2.1

The maximum permitted spacer width that can be achieved by combining individual spacers (2) is 18 mm on the front axle. The transverse control arm must be installed in such a way that the screw connection of the camber adjustment washer is accessible from below. The longitudinal control arm has to be screwed to the inner hole of the strut bearing. The mounting screw of the transverse control arm and longitudinal control arm has to be inserted from above (1).

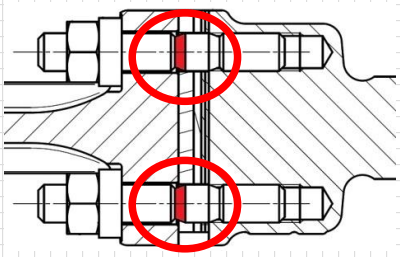


3.2.2.2

Information

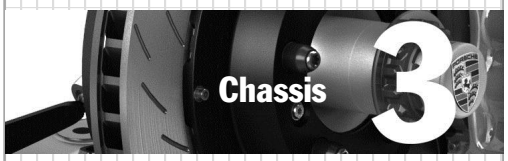
When inserting the spacers, it´s important to use as less spacers as possible to get to the desired length. This prevents potential clamping force loss caused by settling process.

Thinner shims have to be mounted on the inside of the wishbone (side of the fixed bearing). This will avoid a clamping of the shims on the tapered area of the stud (see red colour, picture 3.2.2.3). The picture shows a section of the left wishbone assembly.



3.2.2.3

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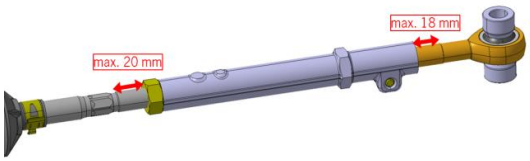
WARNING

Screw-in depth of tie rod thread

Tie rod breaks off
Loss of control over the vehicle

To ensure the tie rod thread is screwed in to a sufficient depth in the case of high camber values (>4.5 degrees), the supporting mount must be adjusted inwards.

The maximum tie rod length is 430 mm (16.9 inches).

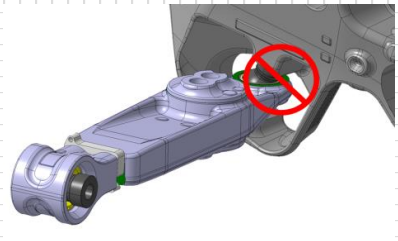


3.2.2.4

NOTE

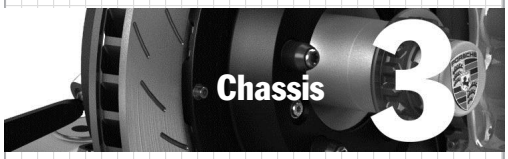
Damage to the joint

When working on the suspension, care must be taken to see that the wheel mount is not inclined when abutting the transverse control arm joint, as this might damage the joint.



3.2.2.5

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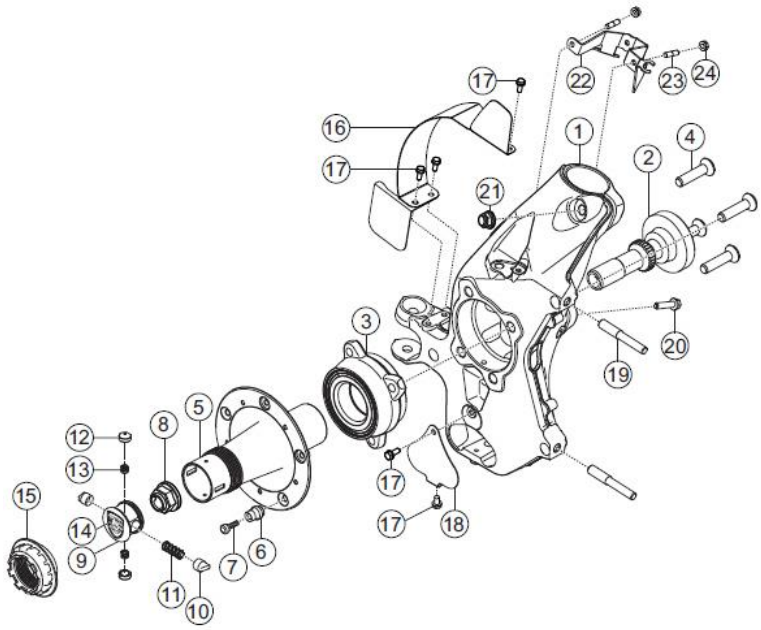
3.2.3 Longitudinal control arm

The longitudinal control arms are stiffness-optimized forged control arms.

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3.2.4 Front axle wheel mount

The aluminum wheel mount is still made of torsion-proof and bending-resistant hollow casting. To optimize the cooling air supply to the brake, the geometry in the area of the “steering arms” has been significantly improved.

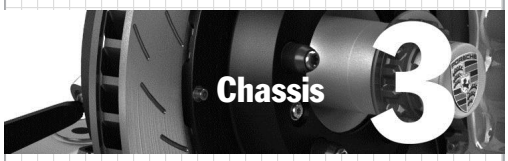


3.2.4.1

List of tightening torques front axle wheel mount

Item	Dimensions	Tightening torque in Nm/Comments
2		lubricate winding with Optimol HT-paste
4	M12 x 1,25 x 45	80 Nm (60 ft-lb) + 120°
7	M8 x 32	35 Nm (26 ft-lb)
8	M22 x 1,5	470 Nm (347 ft-lb) then free (ca.90°) then 470 Nm (347 ft-lb)
15		500-525 Nm (369/387 ft-lb) (lubricate with Alupaste)
17	M6 x 16	10 Nm (7 ft-lb)
19	M12 x 1,5 + M10 x 1,5	After demounting replace, microencapsulation! 21 Nm (15 ft-lb)
20	M8 x 35	23 Nm (17 ft-lb)
21	M12	85 Nm (63 ft-lb)
24	M6	10 Nm (7 ft_lb)

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WARNING

Incorrect handling of safety-relevant bolts

Injuries

Loss of torque

- Always use new fastening bolts and nuts following removal.
- Observe specified tightening torques.
- Carry out a visual inspection of all re-used parts.

WARNING

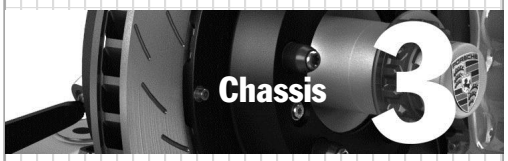
Mechanical, hydraulic or pneumatic press

Risk of crush injuries

- Read specific safety information for the press.
- Check that the press is working perfectly before use, particularly the safety components.

The air blade of the side radiator exhaust air duct as well as the brake air deflectors fitted on the longitudinal control arm ensure that the radiator air is transported almost without any flow losses to the brake disc.

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3.2.5 Front axle shock absorber

WARNING

Preloaded or pressurized components

Risk of crush injuries or contusions

- Do not reach into the danger area.
- Relieve the tension on components before starting work.
- Secure components to prevent them from loosening suddenly.

WARNING

Installation of incorrect or damaged coil springs

Changed vehicle handling

Fracture of coil springs

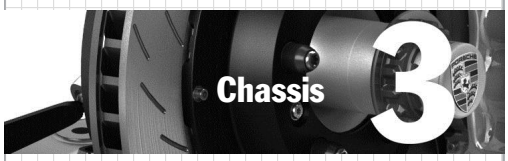
Examine the components visually before installation.

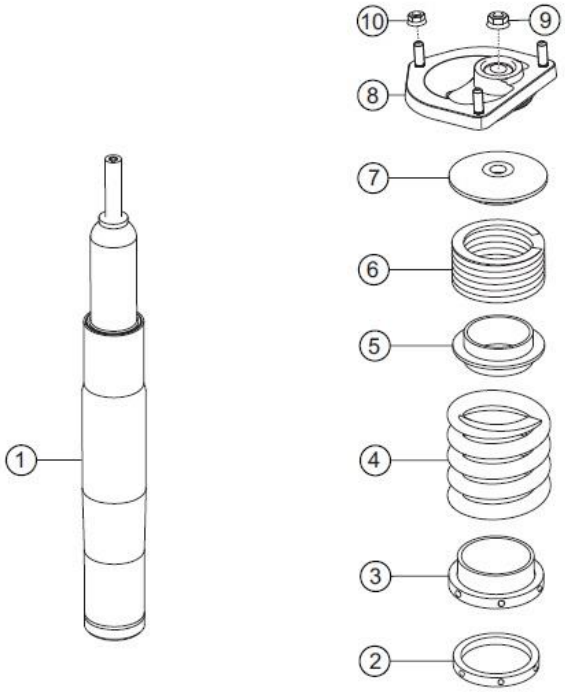
- When installing new coil springs/spring struts, make sure they are assigned correctly.
- Only use a suitable tool for removing and installing coil springs.
- Do not weld or grind, or use a hammer close to the spring struts.
- Do not apply color identification to the coil springs.

The lightweight strut consists of a high performance gas pressure racing shock absorber in two-tube design. Compared to the previous model, it is provided with an additional bottom valve.

A coil spring assembly consisting of a main and a helper spring is arranged concentrically on the shock absorber. For stroke limitation and protection of the shock absorber, the latter is equipped with an integrated bump stop.

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3.2.5.1

NOTE

Damage to the intermediate ring (item 5)

The ends of main springs and helper springs should not lie opposite one another.

- Arrange so they are offset

List of tightening torques for front axle shock absorber

Item	Dimensions	Tightening torque in Nm/Comments
9	M14 x 1,5	75 Nm (55 ft-lb)
10	M8	33 Nm (24 ft-lb)

Spring characteristic values (spring rate/diameter/length):

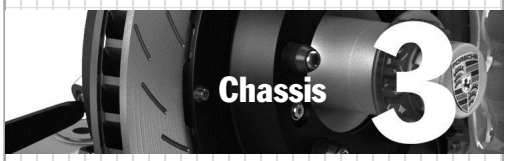
Helper spring 75/60/43

Main spring 240/60/120

Information

If the coil spring is replaced: always replace coil springs in pairs only.

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3.2.6 Front axle anti-roll bar

WARNING

Warning about components falling down when the vehicle is raised

Risk of personal injury, particularly head injuries, if the front-axle cross member or steering gear falls down.

- Never loosen the front-axle cross member completely and also support it with a hydraulic lift.
- Secure the loose steering gear to prevent it from falling down and always get another mechanic to help you to remove it.

WARNING

Adjusting the anti-roll bar

Changed vehicle handling

- The anti-roll bar must only be adjusted symmetrically.

Caution

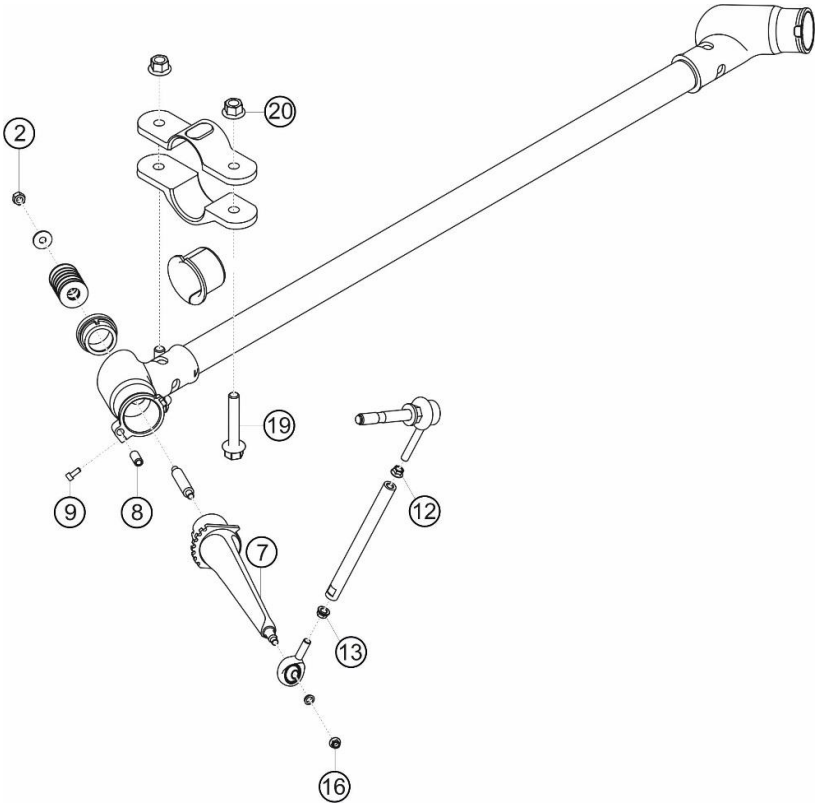
Hot coolant hoses/coolant pipes in the power-steering gear area

Risk of injury from burns as a result of touching hot coolant hoses/pipes

- Let the vehicle cool down before carrying out repairs.

The adjustable double blade-type anti-roll bar on the front axle can be adjusted in seven positions each on both ends, any position resulting in a 15° change of the bending lever. Maximum stiffness is achieved when the bending lever is arranged parallel to the anti-roll bar link. Minimum stiffness is achieved when the bending lever is at a 90° angle to the anti-roll bar link.

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3.2.6.1

NOTE

Damage to the bending lever (item 7)

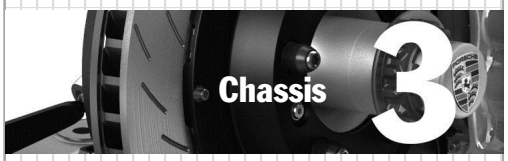
Fracture of the bending lever

- Do not cause notches or other damage.
- Use a suitable tool only.

List of tightening torques front axle anti roll bar

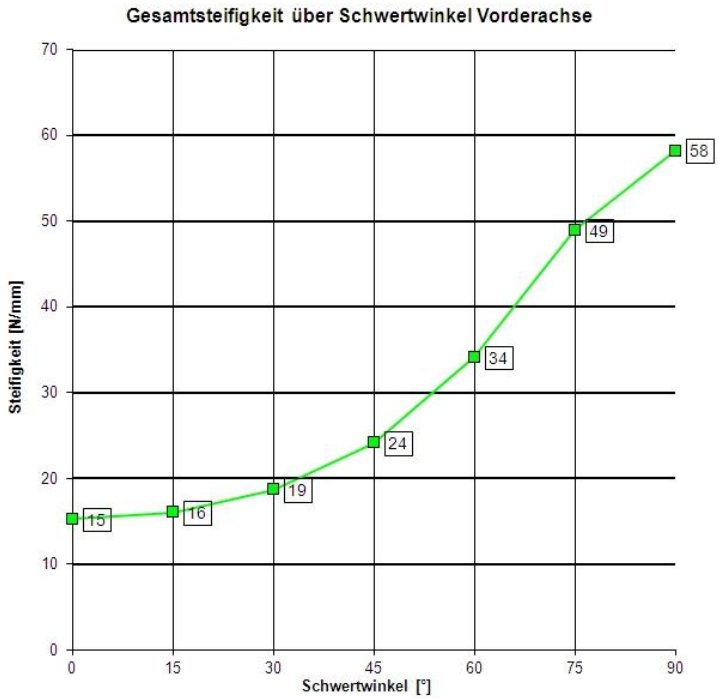
Item	Dimensions	Tightening torque in Nm/Comments
2	M6	10 Nm (7 ft-lb)
8	M8 x 18	Set 0.25mm (0.0098 inch) gap
9	M4 x 10	3 Nm (2,2 ft-lb)
12	M8	10 Nm (7 ft-lb)
13	M8	10 Nm (7 ft-lb)
16	M6	20 Nm (14.8 ft-lb)
20	M10	65 Nm (48 ft-lb)

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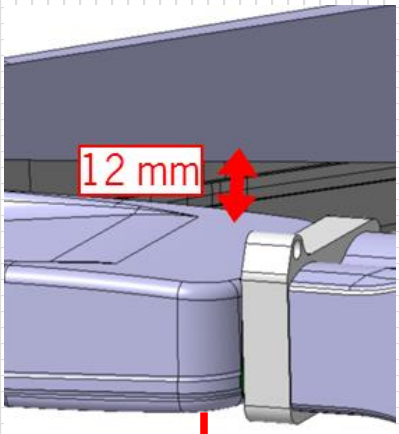
The following chart shows the wheel-related stiffness of the anti-roll bar depending on the blade position. The left and the right blade are always in the same position:

Overall stiffness related to blade angle, front axle



3.2.6.3

Coupling rod setting



3.2.6.2

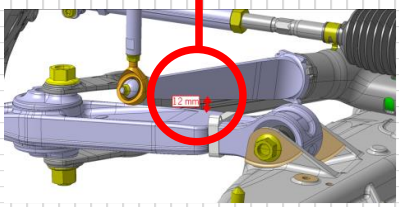
NOTE

Adjusting the coupling rod

Collision with wishbone

Collision with tie rod

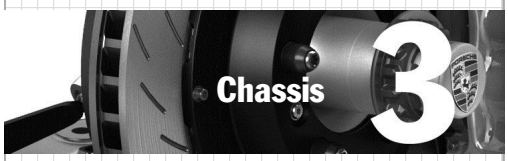
- Observe a distance of at least 12 mm (0.47 inches) to the control arm in decompressed condition.



3.2.6.4

When adjusting the coupling rods, make sure to exclude any collision between the anti-roll bar and other components over the entire suspension travel. On the front axle, there is a risk of collision with the transverse control arm or the tie rod if the setting is incorrect. A distance of 12 mm (0.47 inches) towards the control arm is recommended when the axle is decompressed (figure 3.2.6.2).

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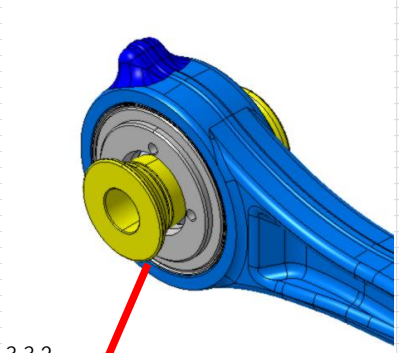


3.3 Rear axle

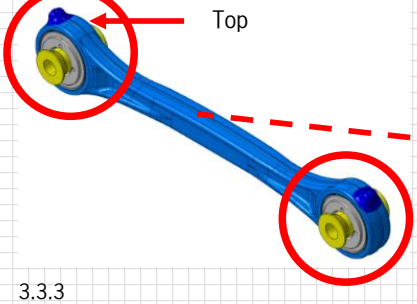


3.3.1

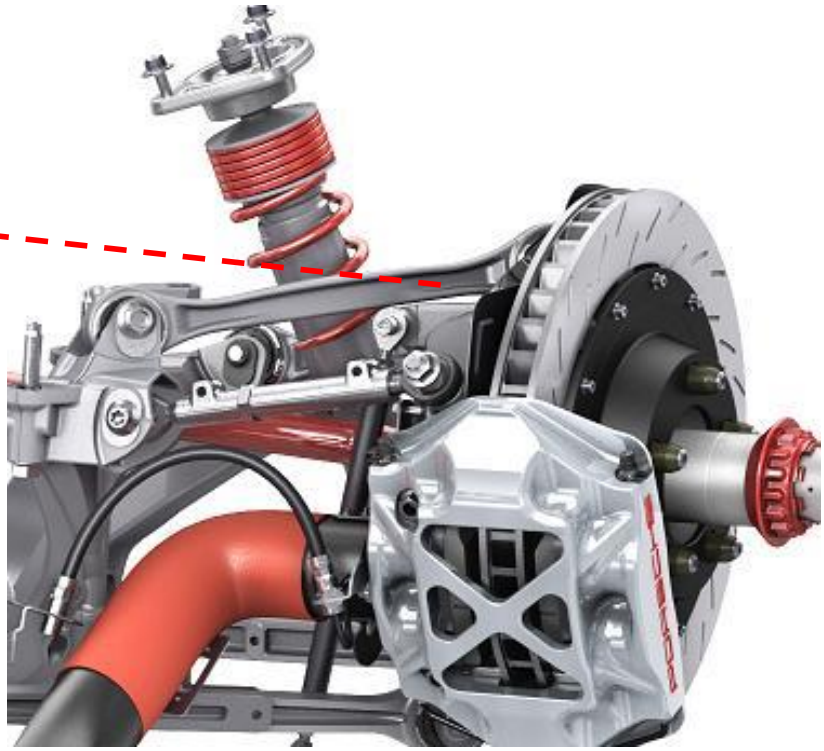
The longitudinal and transverse control arms of the multi-link rear axle are attached separately to the wheel mount. The beads attached to the mounting points of the upper transverse control arm identify the correct mounting position. When installed, they should be facing upwards. The upper and lower transverse control arm are screwed to the body by means of the side part. The lower longitudinal control arm is connected to the body by means of a forged bracket. A blade-type anti-roll bar that is adjustable on both sides has a controlled impact on the vehicle's rolling behavior. Separate cooling air channels, which are supplied with air through a NACA duct in the underbody, are provided on the left and on the right for cooling the inner drive shaft.



3.3.2



3.3.3

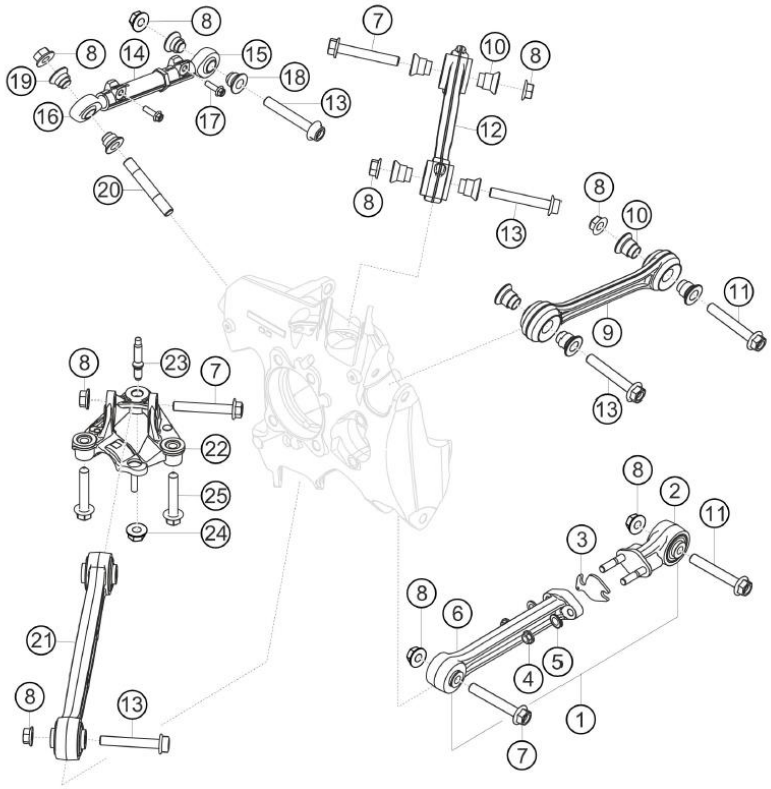


3.3.4

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3.3.1 Rear axle control arm and tie rod

The use of high-performance joint bearings in all control arms minimizes play and greatly reduces unwanted elastokinematic effects.

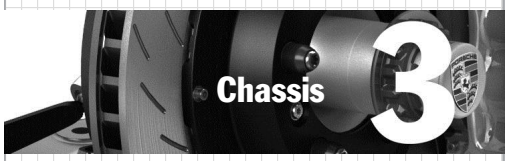


3.3.1.1

List of tightening torques and tie rod

Item	Dimensions	Tightening torque in Nm/Comments
2		Stud: 10 Nm + Loctite 276
4	M10	65 Nm (48 ft-lb)
8 (7)	M12	120 Nm (88.5 ft-lb)
13	M12x1,5x72	120 Nm (88,5 ft-lb)
17	M6 x 20	13 Nm (9.6 ft-lb)
20	M12x1,5x75	16 Nm (11.8 ft-lb)
24	M10	65 Nm (48 ft-lb)
25	M10 x 58	65 Nm (48 ft-lb)

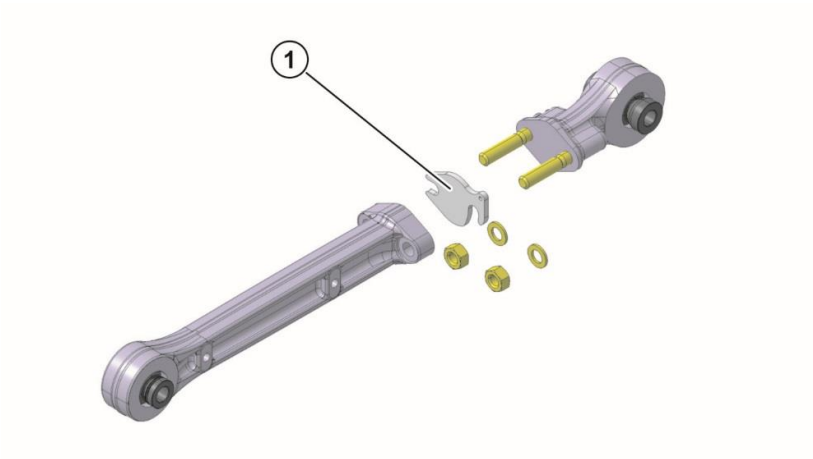
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3.3.2 Rear axle transverse control arm

The two-piece, forged aluminum rear axle transverse control arm allows for camber adjustment.

The camber is adjusted on the transverse control arm (1) using spacers. The maximum permitted spacer width is 15 mm (0.59 inches) on the rear axle.



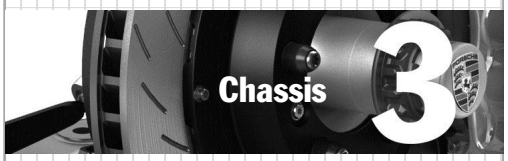
3.3.2.1

The following adjustment washers can be purchased at Porsche Motorsport:

0.50 mm
1.00 mm
2.00 mm
4.00 mm
8.00 mm

The maximum permissible adjustment washer width to be achieved by combining the individual washers (1) is 15 mm on the rear axle.

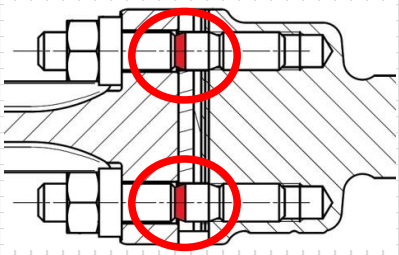
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NOTE

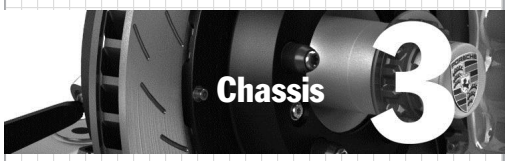
When inserting the spacers, it´s important to use as less spacers as possible to get to the desired length. This prevents potential clamping force loss caused by settling process.

Thinner shims have to be mounted on the inside of the wishbone (side of the fixed bearing). This will avoid a clamping of the shims on the tapered area of the stud (see red colour, picture 3.3.2.2). The picture shows a section of the left wishbone assembly.



3.3.2.2

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3.3.3 Rear axle wheel mount

WARNING

Incorrect handling of safety-relevant bolts

Injuries

Loss of torque

- Always use new fastening bolts and nuts following removal.
- Observe specified tightening torques.
- Carry out a visual inspection of all re-used parts.

WARNING

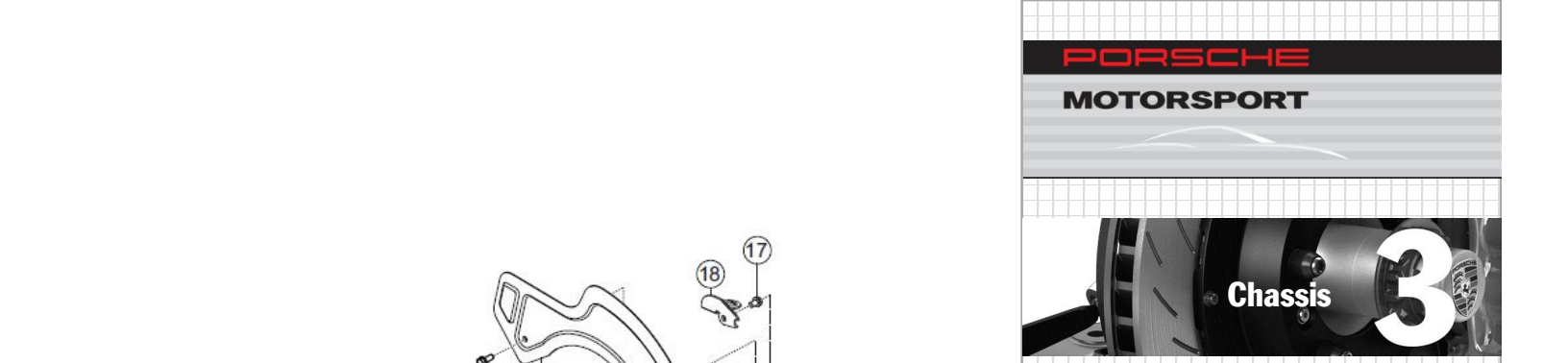
Mechanical, hydraulic or pneumatic press

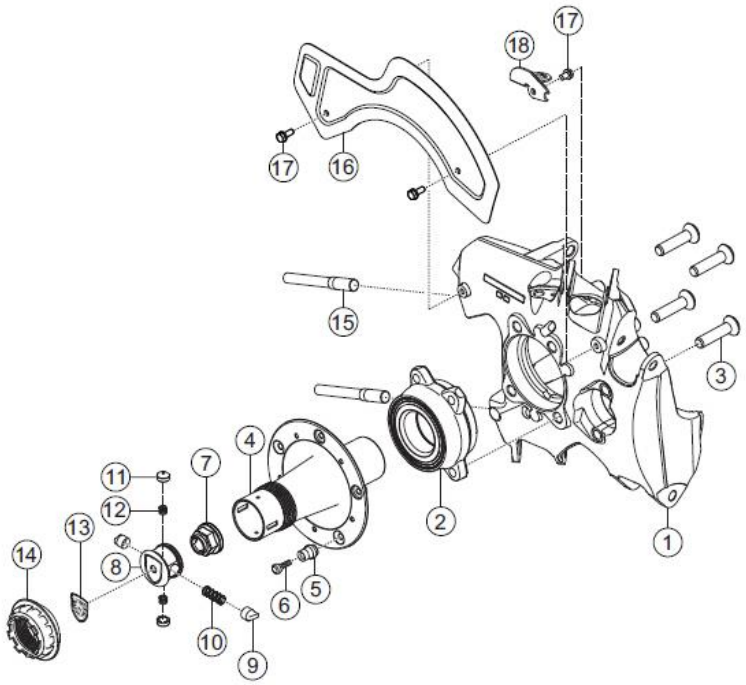
Risk of crush injuries

- Read specific safety information for the press.
- Check that the press is working perfectly before use, particularly the safety components.

The aluminum rear axle wheel mount is still made as a torsion-proof and bending-resistant hollow casting part.

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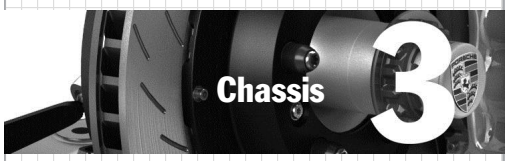


3.3.3.1

List of tightening torques rear axle wheel mount

Item	Dimensions	Tightening torque in Nm/Comments
3	M12 x 1,25 x 45	80 Nm (60 ft-lb) + 120°
6	M8 x 32	35 Nm (26 ft-lb)
7	M22 x 1,5	470 Nm (347 ft-lb) then free (ca.90°) then 470 Nm (347 ft-lb)
14		500-525 Nm (369/387 ft-lb ft-lb) (lubricate with Alupaste)
17	M6 x 16	10 Nm (7 ft-lb)
15	M10 x 1,5	After demounting replace, microencapsulation! 21 Nm (15 ft-lb)

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3.3.4 Rear axle shock absorber

WARNING

Preloaded or pressurized components

Risk of crush injuries or contusions

- Do not reach into the danger area.
- Relieve the tension on components before starting work.
- Secure components to prevent them from loosening suddenly.

WARNING

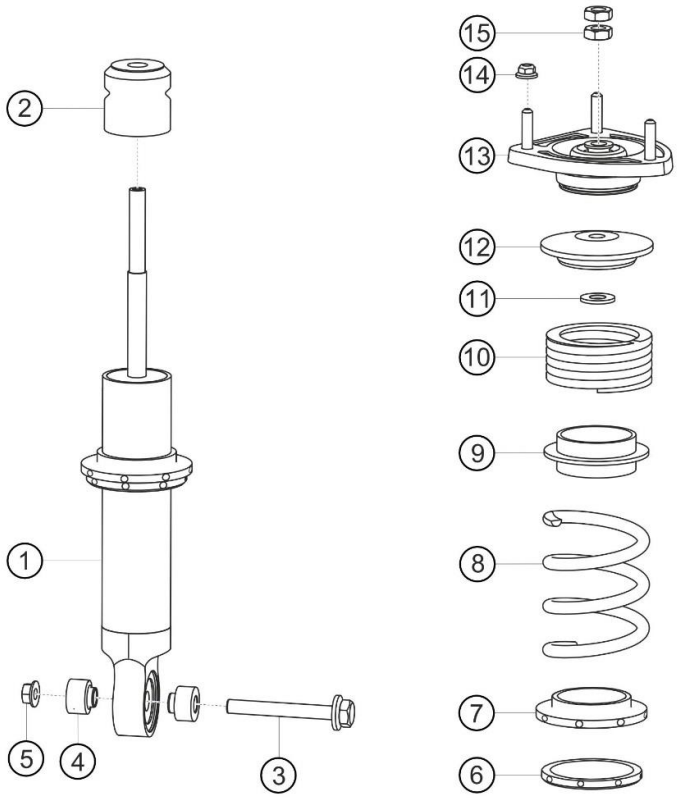
Installation of incorrect or damaged coil springs

Changed vehicle handling
Fracture of coil springs

- Examine the components visually before installation.
- When installing new coil springs/spring struts, make sure they are assigned correctly.
- Only use a suitable tool for removing and installing coil springs.
- Do not weld or grind, or use a hammer close to the spring struts.
- Do not apply color identification to the coil springs.

The rear axle shock absorber is a high performance gas pressure racing shock absorber in two-tube design that is provided with an additional bottom valve. A coil spring assembly consisting of a main and a helper spring is arranged concentrically on the damper. For stroke limitation and protection of the shock absorber, the latter is equipped with an integrated bump stop.

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3.3.4.1

NOTE

Damage to the intermediate ring (item 9)

The ends of main springs and helper springs should not lie opposite one another.

- Arrange so they are offset

List of tightening torques for rear axle shock absorber

Item	Dimensions	Tightening torque in Nm/Comments
3	N12x1,5x80	120 Nm (88,5 ft-lb)
14	M8	33 Nm (24.3 ft-lb)
15	M12	Lower nut 40 Nm/upper nut 35 Nm (29.5/25.8 ft-lb)

When tightening the upper nut (15), the lower nut (15) should be locked.

Spring characteristic values (spring rate/diameter/length):

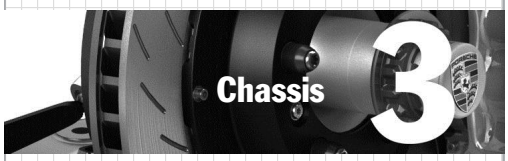
Helper spring 80/60/60

Main spring 260/60/130

Information

If the coil spring is replaced: always replace coil springs in pairs only.

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3.3.5 Rear axle anti-roll bar

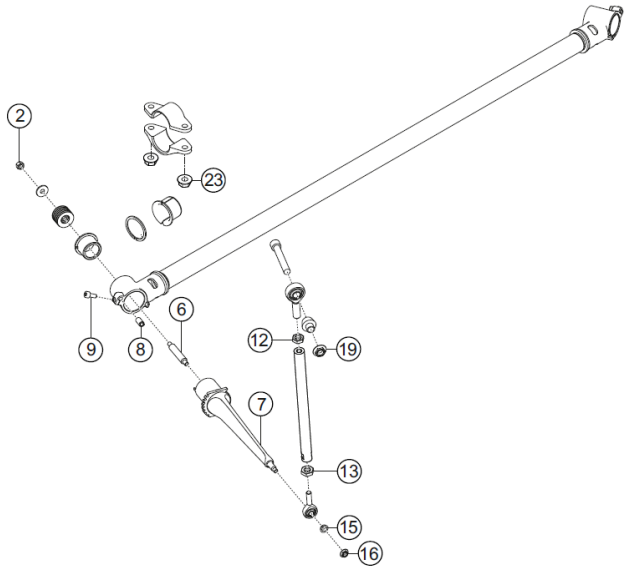
WARNING

Adjusting the anti-roll bar

Changed vehicle handling

- The anti-roll bar must only be adjusted symmetrically.

Like the front anti-roll bar, the rear anti-roll bar can be adjusted in seven positions, each position resulting in a 15° change of the bending lever. Maximum stiffness of the anti-roll bar is achieved when the bending lever is arranged parallel to the anti-roll bar link. Minimum stiffness is achieved when the bending lever is at a 90° angle to the anti-roll bar link.



3.3.5.1

List of tightening torques rear axle anti-roll bar

Item	Dimensions	Tightening torque in Nm / Comment
2	M6	10 Nm (7.4 ft-lb)
8	M8 x 18	Set 0.25mm (0.0098 inch) gap
9	M4 x 10	3 Nm (2.2 ft-lb)
12	M8	10 Nm (7.4 ft-lb)
13	M8	10 Nm (7.4 ft-lb)
16	M6	20 Nm (14.8 ft-lb)
19	M8	23 Nm (17 ft-lb)
23	M8	25 Nm (18.4 ft-lb)

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NOTE

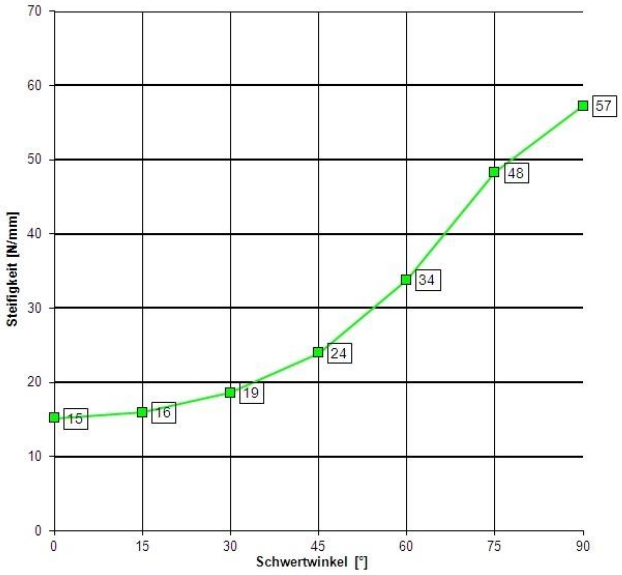
Damage to the bending lever (Figure 3.3.5.1, item 7)

Fracture of the bending lever

- Do not cause notches or other damage.
- Use a suitable tool only.

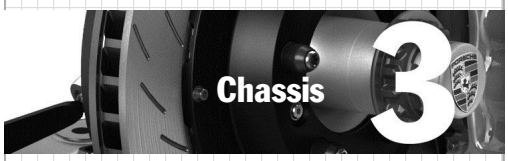
The following chart shows the wheel-related component stiffness of the anti-roll bar depending on the blade position. The left and the right blade are always in the same position:

Overall stiffness related to sword angle, rear axle



3.3.5.2

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Coupling rod setting

NOTE

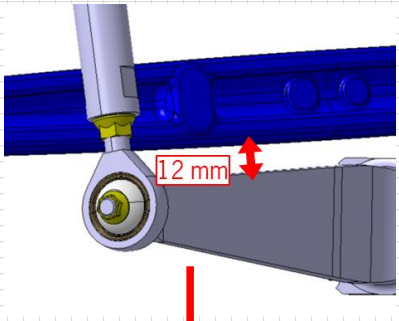
1 Adjusting the coupling rod

2 Collision with trailing link

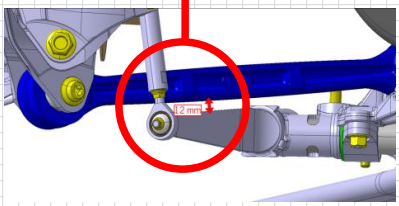
Collision with rim

- Observe a distance of at least 12 mm (0.47 inches) to the control arm in decompressed condition.

When adjusting the coupling rods, make sure to exclude any collision between the anti-roll bar and other components over the entire suspension travel. On the rear axle, there is a risk of collision with the longitudinal control arm or the rim if the setting is incorrect. A distance of 12 mm (0.47 inches) towards the control arm is recommended when the axle is decompressed (figure 3.3.5.4).



3.3.5.3



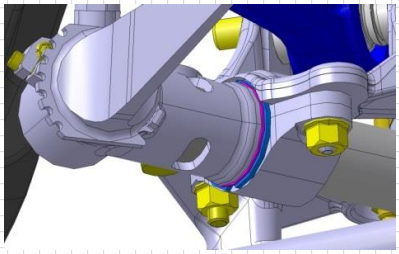
3.3.5.4

Axial clearance compensation

To counteract any possible axial play of the rear stabilizer, Porsche Motorsport offers two differently sized spacers (pink).

Spacer 1mm

Spacer 2 mm

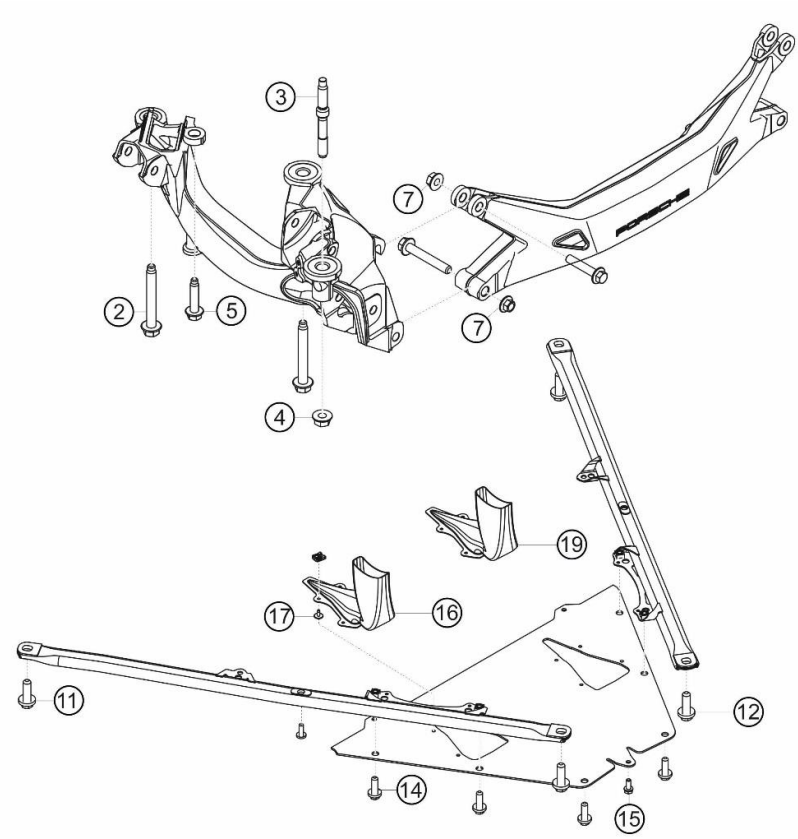


3.3.5.5

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3.3.6 Rear axle side part

The side parts made of cast aluminum are used as connecting elements between control arms and body.



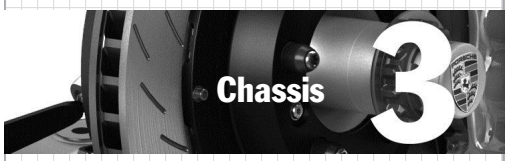
3.3.6.1

List of tightening torques for rear axle side part

Item	Dimensions	Tightening torque in Nm/Comments
2	M12 x 1.5 x 95	120 Nm (88.5 ft-lb)
4	M12	120 Nm (88.5 ft-lb)
5	M10 x 45	65 Nm (48 ft-lb)
7	M12 x 1.5	120 Nm (88.5 ft-lb)
11	M12 x 45	120 Nm (88.5 ft-lb
12	M12 x 45	120 Nm (88.5 ft-lb)
14	M8 x 25	23 Nm (17 ft-lb)
15	M6 x 16	10 Nm (7.4 ft-lb)
17	4.8 x 13	3 Nm (2.3 ft-lb)

Items 16 and 19 are cooling air ducts that lead to the drive shafts.

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3.4 Wheel alignment

WARNING

Modifying the chassis setup

Changed vehicle handling

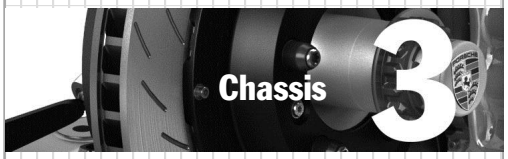
- Adjust the setting to the weather conditions
- Adjust the settings to the vehicle setup (See 3.10 Performance setup)

Precise wheel alignment is essential for achieving the optimum vehicle performance. Porsche Motorsport recommends proceeding as described below.

The conditions prevailing while driving have to be produced as far as possible under static conditions. Porsche Motorsport recommends using the set up wheels mentioned below for the 911 GT3 Cup (991).

Pos	*Part number*	*Description*	*Pcs per car*
1	997.450.230.91	*set up wheel (rolling wheel)*	2
2	997.450.229.91	*set up wheel (fixed wheel)*	2
3	997.450.335.9A	*adapter for set up wheel*	4

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3.4.1 Preparatory measures

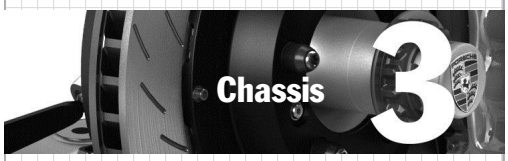
For this purpose, the following measures have proven to be extremely helpful:

- Place driver's compensation weight on the driver's seat
- Set air pressure to 2.0 bar (29 psi)
- Fill the tank with 50 % of the fuel quantity necessary for the race/practice

The following work order is recommended when performing a complete vehicle alignment:

1. Unhook the anti-roll bars
2. Preset vehicle height
3. Rear axle: set the camber first, then the toe
4. Front axle: set the camber first, then the toe
5. Set vehicle height and wheel loads
6. Wheel loads are set by changing the vehicle height; you should try to reach the lowest possible wheel load deviation per axle (left to right)
7. Hook up the anti-roll bars without tension

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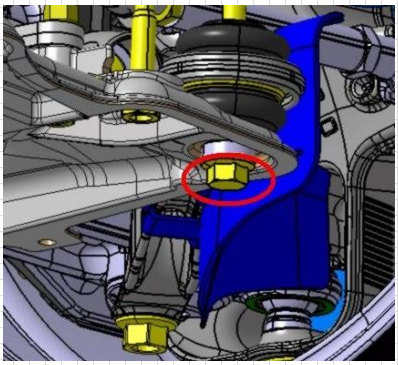


3.4.2 Vehicle ride height measuring points

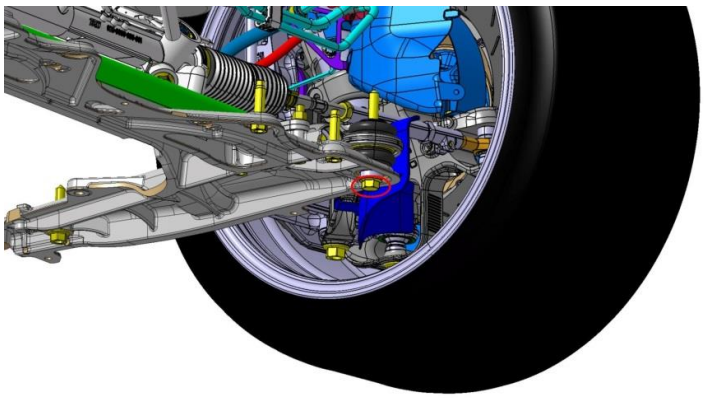
For ride height measuring, the vehicle should be on a flat surface (setup plate). Front and rear axle have to be compressed and decompressed several times.

Measuring point, front axle:

The vehicle front ride height is measured on the front mounting screw of the front axle cross member.



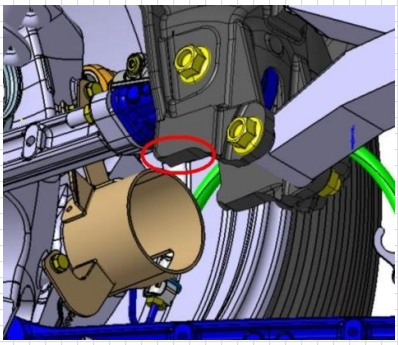
3.4.2.1



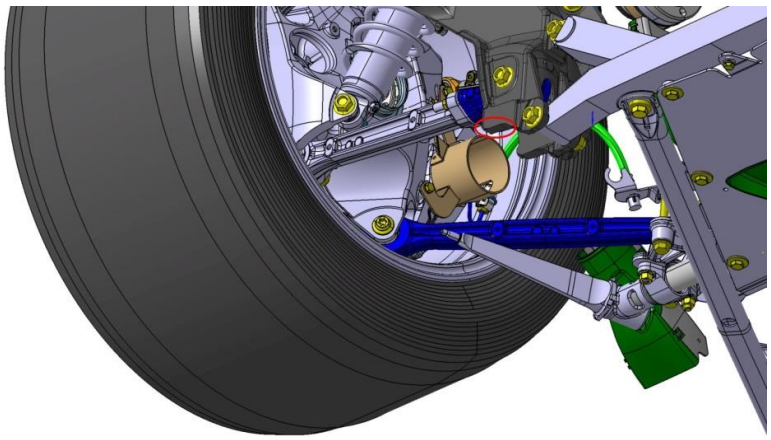
3.4.2.2

Measuring point, rear axle:

The vehicle rear ride hight is measured at a surface specially milled for this purpose on the rear axle side part.

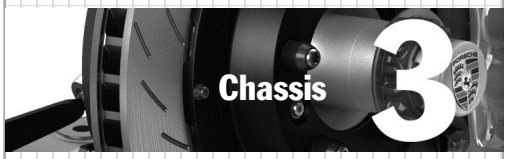


3.4.2.3



3.4.2.4

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3.5 Steering system

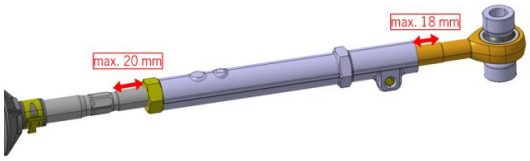
WARNING

Screw-in depth of tie rod thread

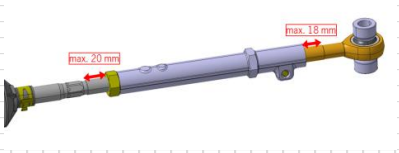
Tie rod breaks off

Loss of control over the vehicle

- To ensure the tie rod thread is screwed in to a sufficient depth in the case of high camber values (>4.5 degrees), the supporting mount must be adjusted inwards.
- The maximum tie rod length is 430 mm (16.9 inches).



3.5.2

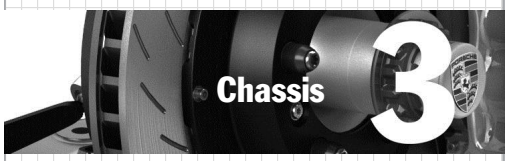


3.5.1

When adjusting the tie rod on the front axle, make sure to maintain a sufficient screwing depth. It is recommended to perform first a rough adjustment on the inner axial joint and then to set the precise value by means of the outer ball joint with fine threads. The maximum thread projection is 20 mm (0.79 inches) on the inside and 18 mm (0.71 inches) on the outside. Adjust the strut mount inwardly in order to ensure a sufficient screwing depth of the tie rod threads for high camber values (>4.5°).

Refer to illustration 3.5.2

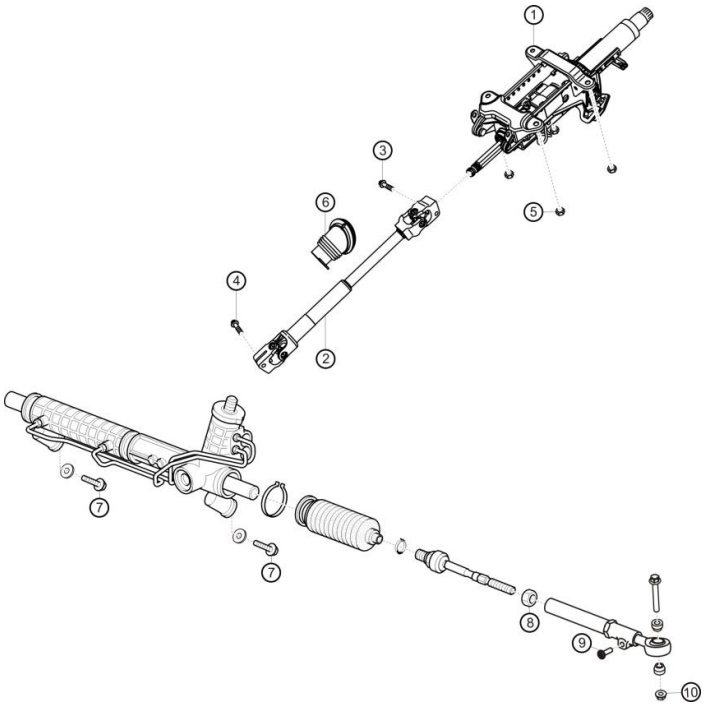
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The hydraulic power steering is derived from the 911 GT3 Cup (997 II) while the power steering pump has its origins in the 911 GT3 R (997 II). The power steering pump unit is located in the front-end and consists of an electrically driven pressure pump and an integrated hydraulic oil tank installed on top of it.

Hydraulic oil filling quantity: **0.65 liters (0.69 qts)**

System pressure: **96 bar (1,392 psi)**

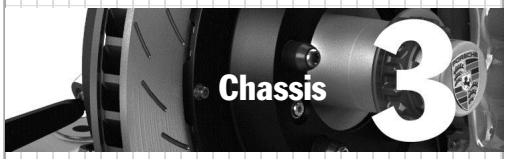


3.5.3

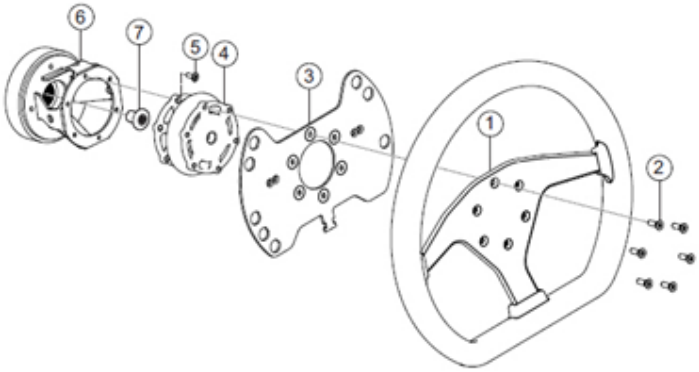
List of tightening torques for steering system

Item	Dimensions	Tightening torque in Nm/Comments
3	M8 x 30	20 Nm (14.75 ft-lb) + 90°
4	M8	23 Nm (17 ft-lb)
6	M8	23 Nm (17 ft-lb)
7	M10 x 65	70 Nm (51.6 ft-lb)
8	M14 x 1.5	50 Nm (37 ft-lb) (hold tie rod)
9	M6 x 20	13 Nm (9.6 ft-lb)
10	12 x 1,5	120 Nm (88.5 ft-lb)

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The components and the assembly sequence of the steering wheel quick release are shown in the illustration below.

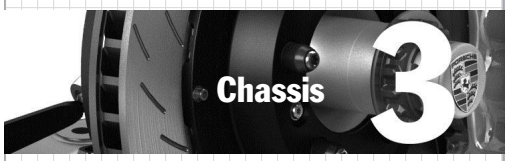


3.5.4

List of tightening torques

Item	Dimensions	Tightening torque in Nm/Comments
2	M5 x 16	6 Nm (4.4 ft-lb)
5	M5 x 35	6 Nm (4.4 ft-lb)
7	M18 x 26	50 ±5 Nm (37 ± 3.7 ft-lb)

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NOTE

Under no circumstances should the rack and pinion steering and the power steering pump be repaired or dismantled. Damage to the steering system can occur due to a lack of oil in the circuit of the hydraulic system. Even small oil leaks may cause damage to the power steering pump due to the high system pressure.

3.5.1 Bleeding the steering system

Bleeding should be performed by two persons.

For filling the entire system, e.g. after replacing the steering system or lines or after a high loss of fluid, the engine has to be started briefly and stopped again right afterwards. The fluid level in the container drops rapidly and it must be ensured that "Pentosin" is continuously replenished while the engine is running. During this procedure, the reservoir should never run dry.

The electric hydraulic pump operates only while the engine is running. The compensating tank must be filled before starting the engine to vent the system. The fluid level in the tank has to be checked immediately after starting the engine.

Turn the steering wheel quickly from one stop to the other, allowing the air in the cylinders to escape. Do not turn the steering wheel with increased force against the end stop to prevent unnecessary pressure peaks in the system.

The fluid level must be constantly monitored during venting. If the fluid level drops, "Pentosin" has to be replenished until the level no longer changes and no air bubbles are visible on the surface of the fluid when setting the steering.

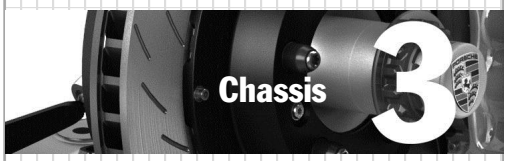
The fluid level is checked with the dipstick located in the container lid, while the pump is running.

By a short press (<0,75 seconds) of the mark button (ignition switched off) the power steering pump will be activated for 30 seconds. The function can be used to ease the maneuvering of the car around in the paddock.

Information

The function is only available with the battery voltage higher than 12,2 V

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3.6 Rims and tire

WARNING

Risk of accidents if the air pressure in the tires falls below the minimum, if the tread depth is insufficient or if there are foreign bodies, cuts, cracks, and bulges in the sidewall (ply breakage).

Modified handling behavior can cause accidents and major material damage.

- The air pressure must never fall below the values specified (these are minimum pressures).
- The tread depth must never fall below the minimum value.
- A visual inspection of the tires (for cracks, cuts, bulges in the sidewall and/or foreign bodies) must be carried out.

WARNING

Incorrect wheel size fitted

Incorrect braking and engine interventions

Changed vehicle handling

- Fit wheels of permissible size/circumference

WARNING

High tire seating pressure

Risk of crush injuries or contusions

- Use a tire filling cage.

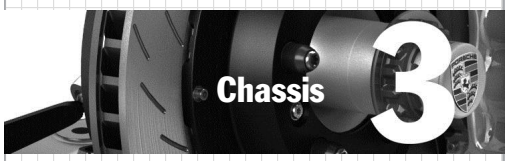
NOTE

Removing/fitting wheels

- Damage to the brake discs

Carefully guide the wheel towards the wheel hub, thereby preventing any heavy impacts to the brake disc

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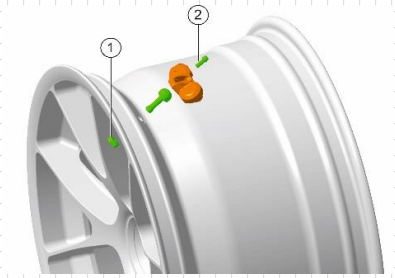
3.6.1 Rim

Dimensions of the stiffness-optimized, one-piece forged aluminum rim in Porsche design:

Front axle: 10.5''x18'' (one piece) Tire size: 27/65-18

Rear axle: 12''x18'' (one piece) Tire size: 31/71-18

Tightening torque for TPM valve (1) and bolting sensor (2): **4 Nm** (3 ft-lb)



3.6.1.2



3.6.1.1

3.6.2 Tires

The new 911 GT3 Cup (991 II) is delivered by Porsche Motorsport only with rain tires. A sticker provided on the windshield (figure 3.6.2.1) will indicate this restriction in use of the tires upon delivery of the vehicle. Furthermore the transport tires are marked by the manufacturer.

Caution
The tyres mounted at the time of the delivery of this car are meant for car transportation purpose **only**. They **must not** be used for testing or racing.

Achtung
Die bei Auslieferung montierten Reifen sind **ausschließlich** für den Fahrzeugtransport zu nutzen. Sie sind **nicht** im Test- oder Rennbetrieb einzusetzen.

3.6.2.1

Tire dimensions:

Tire dimensions on the front axle: 27/65-18

Tire dimensions on the rear axle: 31/71-18

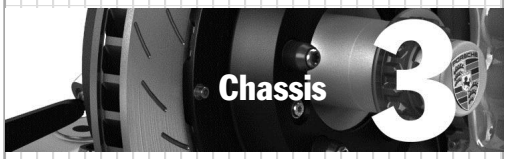
WARNING

Tires used for transport

Loss of control over the vehicle

- The transport tires fitted on delivery must not be used for test runs or racing.

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3.7 Brake system

WARNING

Brake system not at operating temperature

Changed vehicle handling
Increased braking distance

- The brake system must have been brought to normal operating temperature

3.7.1 General information



3.7.1.1

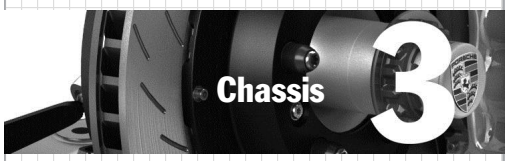
The 911 GT3 Cup (991 II) is equipped with a dual-circuit brake system with two separate master cylinders. Brake balance between front and rear axle can be adjusted with the help of a balance beam using a knob in the vehicle's interior.

The brake is a racing brake by "Performance Friction Brakes" (caliper, internally vented discs and pad) which is suitable for long-distance driving and was developed by Porsche Motorsport. Six piston fixed calipers are provided on the front axle, four piston fixed calipers in monoblock design on the rear axle. Brake pistons of different sizes are in use on the brake caliper, which prevent diagonal wear of the brake pads. The brake discs are vented and slotted steel brake discs.

Dimensions

Front axle: 380x32 mm (14.96 x 1.26 inches)
Rear axle: 380x30 mm (14.96 x 1.18 inches)

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Repair instructions

NOTE

Cleaning Brake system

Damage of piston seal and brake fluid reservoir

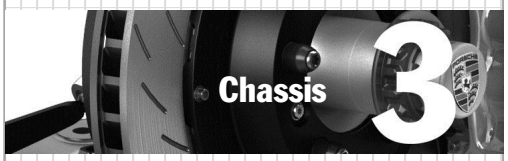
Do not use brake cleaner, cleaning benzene, cleaning solvents, all spray oils (e.g. WD 40).

- Use isopropanol or ethanol for cleaning

A repair kit with seals and pistons is available, as well as a repair kit containing only seals. Pistons have to be replaced only if they are mechanically damaged. The service life of the seals is 60 hours before they have to be replaced. Under extreme temperature load, they may have to be replaced even earlier. This is indicated by sluggishly moving wheels or stuck pistons. Repair kits can be purchased at Porsche Motorsport.

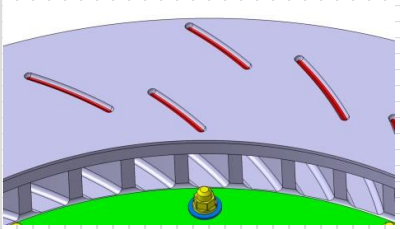
Refer to the maintenance section, chapter 7.4.7 „Replacing the piston seal rings"

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Brake disc wear limit:

The wear limit is reached when the disc has been worn down to the bottom of the slot (figure 3.7.1.2). The disc should also be replaced if there are cracks up to the edge of the disc that are caused by increased thermal stress.



3.7.1.2

Brake pad wear limit

WARNING

Installation of brake pads with the wrong brake pad quality

Increased braking distance
Increased wear of brake pads

- Only use the type-specific brake pads listed in the Porsche spare parts catalog.
- Replace the brake discs on each axle upon reaching the wear limits.

WARNING

Old mounting parts fitted on the brake caliper

Reduced braking effect
Damage to the brake caliper

- Fit new pad retaining springs.
- Fit new fastening screws.

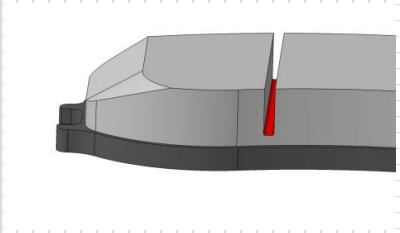
NOTE

Removing brake piston

Damage of piston seal

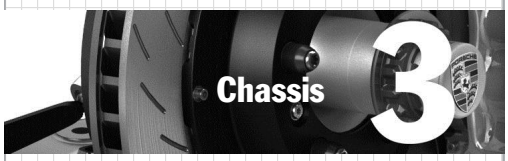
- Clean the piston before they move back

The wear limit is reached when the brake pad has been worn down to the bottom of the slot (figure 3.7.1.3). In addition, the pads should also be replaced if excessive diagonal wear is detected. In this case, the brake pistons of the caliper have to be checked immediately to find out the cause.

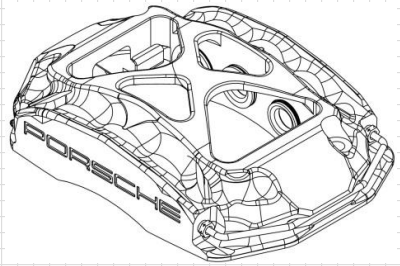


3.7.1.3

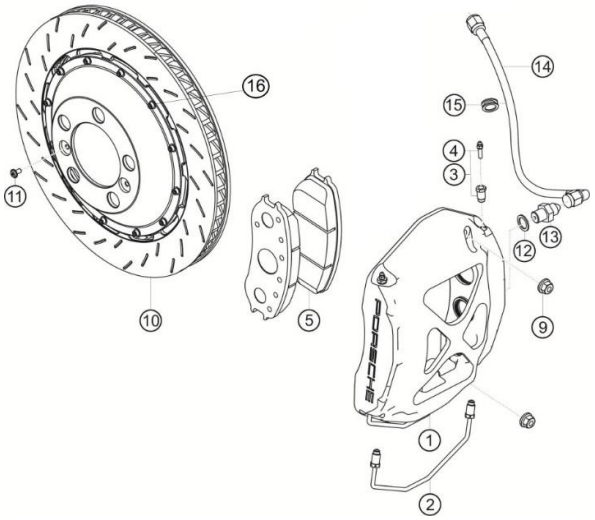
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3.7.2 Front axle brake



3.7.2.1



3.7.2.2

List of tightening torques for front axle brake

Item	Dimensions	Tightening torque in Nm/Comments
2		16 Nm (11.8 ft-lb) / Connecting line
3		16 Nm (11.8 ft-lb)
4		5 Nm (3.7 ft-lb) / Bleeder valve
14		16 Nm (11.8 ft-lb) / Brake line
9	M10	65 Nm (48 ft-lb)
11	M6X12	10 Nm (7.4ft-lb) + Loctite 243
16		6 Nm (4.4 ft-lb)

⚠ WARNING

Installation of brake pads with the wrong brake pad quality

Longer braking distance

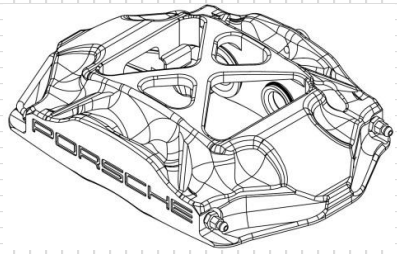
More wear on brake pads

Only use the type-specific brake pads listed in the Porsche spare parts catalog.

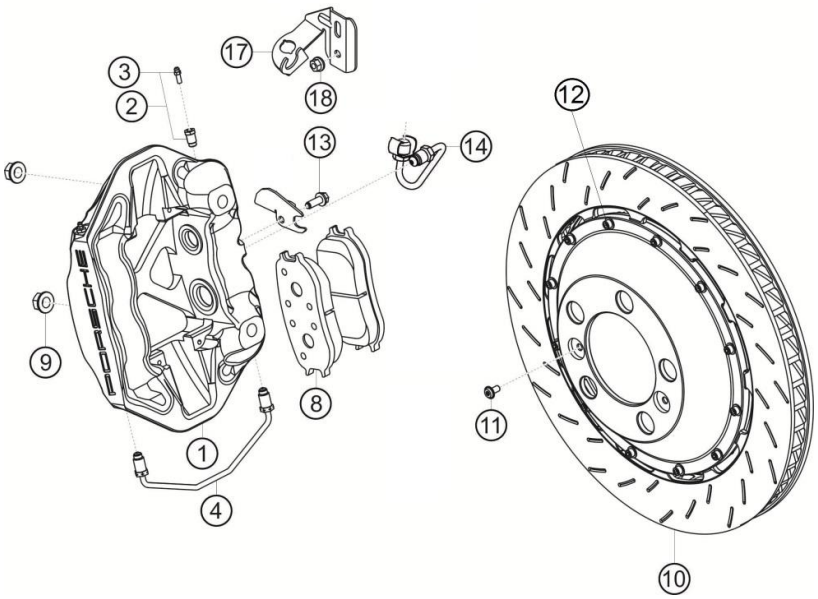
- Replace the brake pads on each axle upon reaching the wear limits.

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3.7.3 Rear axle brake



3.7.3.1



3.7.3.2

List of tightening torques for rear axle brake

Item	Dimensions	Tightening torque in Nm/Comments
4		16 Nm (11.8 ft-lb) / Connecting line
2		16 Nm (11.8 ft-lb)
3		5 Nm (3.7 ft-lb) / Bleeder valve
14		16 Nm (11.8 ft-lb) /Connecting line
9	M10	65 Nm (48 ft-lb)
11	M6 x 12	10 Nm (7.4 ft-lb) + Loctite 243
12		6 Nm (4.4 ft-lb)

⚠ WARNING

Installation of brake pads with the wrong brake pad quality

Increased braking distance
Increased wear of brake pads

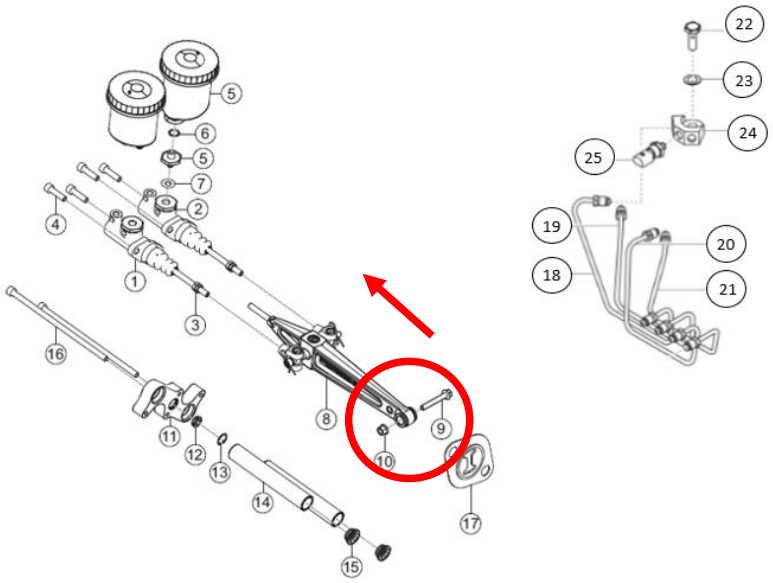
- Only use the type-specific brake pads listed in the Porsche spare parts catalog.
- Replace the brake pads on each axle upon reaching the wear limits.

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3.7.4 Master cylinders

Both master cylinders supplied by AP Racing have a diameter of 17.8 mm (0.7 inches). An AP Racing ID-Number on the master cylinder can be used to designate the cylinder.

Lifetime master cylinder: 5000 km (3106 mi) or 30 hours



3.7.4.1

List of tightening torques for master cylinders

Item	Dimensions	Tightening torque in Nm/Comments
4	M8 x 30	23 Nm (17 ft-lb)
9		Insert the bolt from the right!
10	M8	23 Nm (17 ft-lb)
16	M8 x 200	23 Nm (17 ft-lb)
18-21		16 Nm (11,8 ft-lb) / Brake lines on distributor
22		22 Nm (16,2 ft-lb) / Banjo bolt
25		16 Nm (11,8 ft-lb) / Sensor

WARNING

Insertion direction of bolt (item 9)

Failure of brakes

Loss of control over the vehicle

- The bolt shown as item 9 must be inserted from the right, as otherwise there is a risk of collision. The arrow shows the direction of travel.

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3.7.5 Changing the brake fluid

WARNING

Corrosive fluids

Danger of chemical burns

- Wear personal protective equipment.
- Ensure good ventilation.
- Avoid contact with corrosive fluid.
- If you do come into contact, wash off immediately with plenty of warm water and contact a doctor if necessary.

Racing Brake Fluid-325° (DOT 4) supplied by Performance Friction Brakes should be used. Proceed as follows when changing the brake fluid.

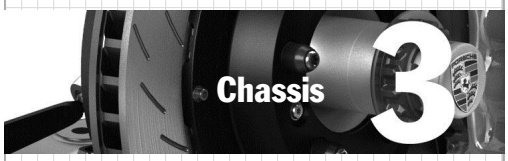
- Remove the brake fluid from the brake fluid reservoir of the two master cylinders using a syringe.
- Replenish new brake fluid.

Flushing/Bleeding

1. Build up pressure with the brake pedal
2. Open the front axle and rear axle brake bleeder valves simultaneously and close them again
3. Only release the brake pedal when the bleeder valves have been closed. Build up new pressure with the brake pedal.
4. Repeat the process and make sure that there is enough fluid in the reservoir.
5. Perform flushing operation on both valves of a caliper (Order: inside then outside and inside again)

It is recommended to bleed the system after every session and to change the brake fluid after every race.

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3.8 Brake pressure distribution

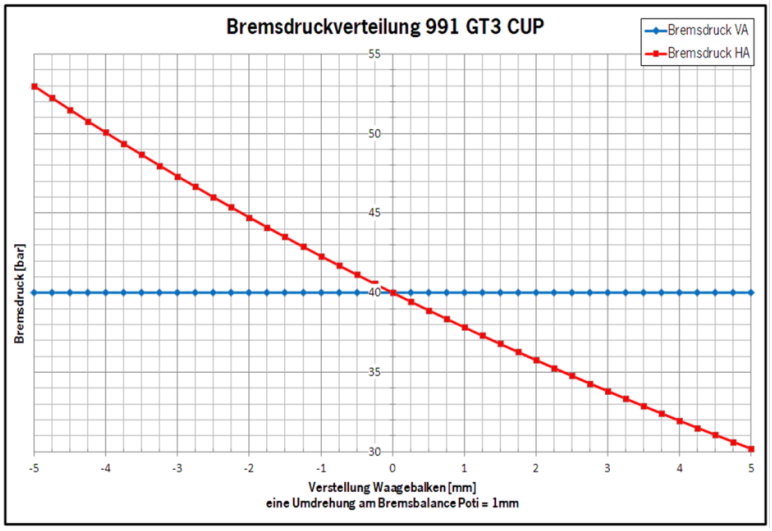
The brake pressure distribution between front and rear axle is set by means of a balance beam adjustment. Turning the dial below the dashboard changes the balance beam lever ratio. The rotations of the knob are recorded using a potentiometer and stored in the display.



3.8.1

Turning the brake power adjustment dial in the “R“ direction increases the rear axle brake pressure in relation to the front axle. In the “F” direction, the situation is correspondingly reversed.

Brake Pressure Distribution 911 GT3 CUP (991)



3.8.2

Bremsdruckverteilung = brake pressure distribution

Bremsdruck = brake pressure

Bremsdruck VA = brake pressure front axle

Bremsdruck HA = brake pressure rear axle

Balance beam adjustment [mm] one turn on brake balance potentiometer = 1 mm =

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3.8.1 Balance beam basic setting

WARNING

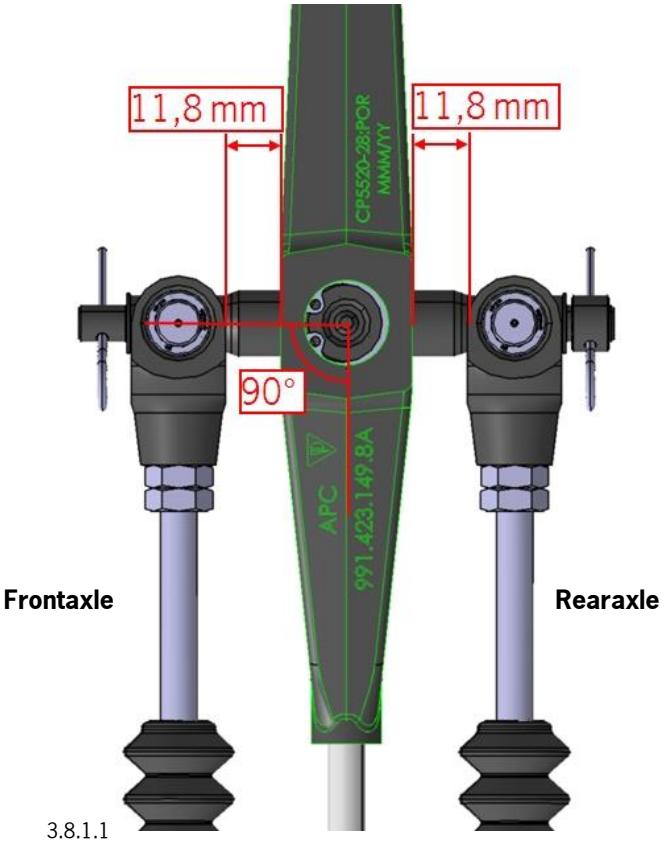
Changing the setting of the balance bar

Changed braking behaviour
Loss of control over the vehicle

- Adjusting the weather condition
- Adjust settings to vehicle setup
- Test new setting carefully

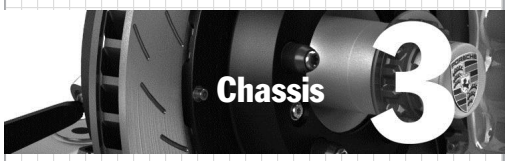
In the basic position, the potentiometer should be in position “zero”. The distance between the push rod and master cylinders is symmetrical and amounts to 11.8 mm (0.465 inches). In the default setting, the balance beam should be perpendicular to the push rod at a **pedal load of 40 bar (580 psi)**.

If the adjusting wheel potentiometer is in "zero" position, a voltage of 2.5 V can be measured. When setting the balance beam, a calibration should also be carried out in the display; i.e. with the balance beam in “zero” position, the display should also be calibrated so that “zero” appears in the display.

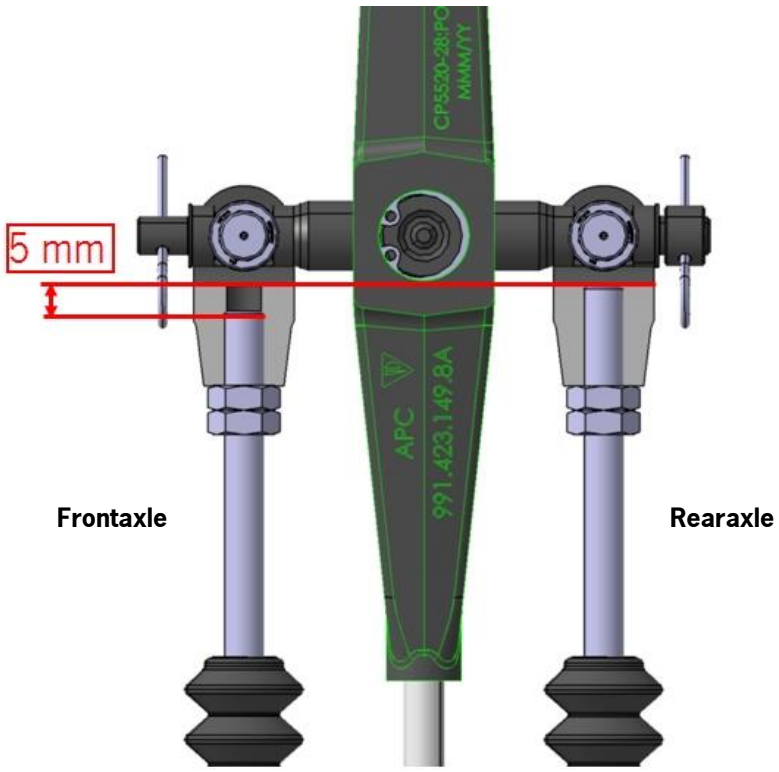


3.8.1.1

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Set a clearance of approx. 5 mm between joint thread base and master cylinder threaded rod at the connection of the balance beam to the front axle master cylinder. This ensures that the balance beam is perpendicular to the push rod under load. The thread length to the lock nut can be between 56 mm and 64 mm.

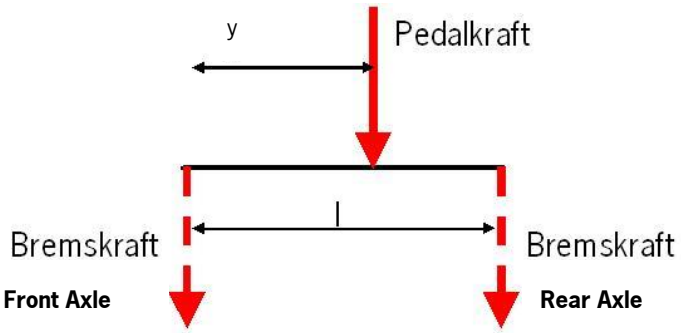


3.8.1.1

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3.8.2 Calculating the brake power

The braking power of the front axle brake and the rear axle brake can be calculated as follows:

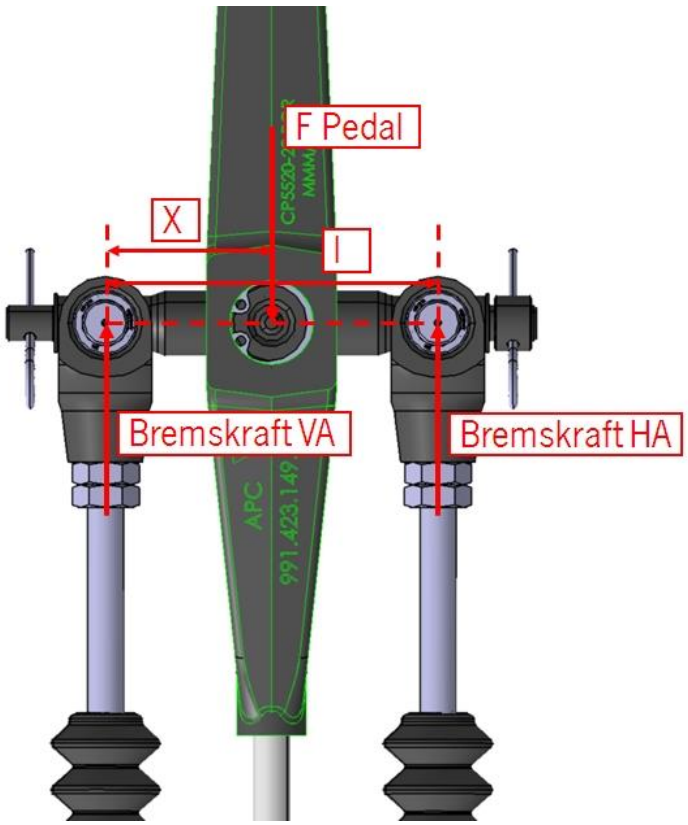


3.8.2.1

$$Bremskraft\_HA = \frac{Pedalkraft \bullet y}{l}$$

$$Bremskraft\_VA = Pedalkraft - Bremskraft\_HA$$

3.8.2.2



3.8.2.3

Key:

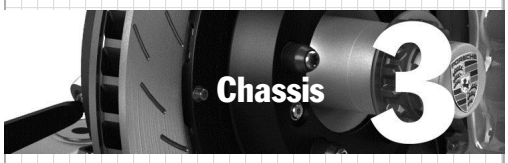
Pedalkraft = pedal force,

Bremskraft = brake power

HA = rear axle

VA = front axle

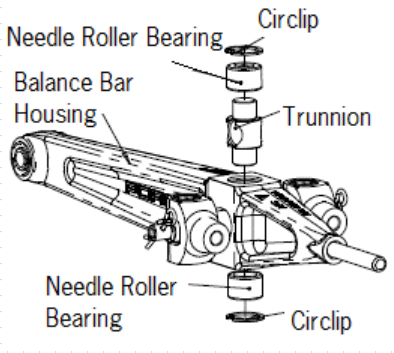
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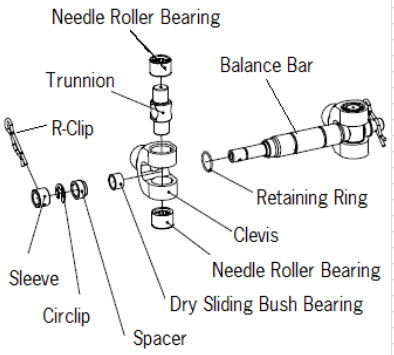
3.9 Balance bar replacement kit

3.9.1 Replacing the trunnion

- Remove balance bar see chapter 3.9.2
- Remove both circlipses from either end
- Remove the trunnion and both bearings by using a light press
- Clean the bore of any dirt
- Replace the lower circlip
- Push the lower bearing down the bore
- Drop the trunnion into the bearing
- Push the bearing and the circlip down until the circlip pops into the groove, the trunnions should have axial clearance and should not be tight

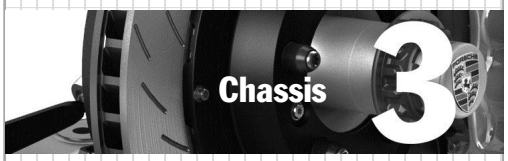


3.9.1.1



3.9.2.1

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3.9.2 Replacing the balance bar

- Remove the R-clips, spacers, circlips and clevises from the balance bar
- Remove the balance bar

DANGER

Retaining rings and snap rings

Snap ring or retaining ring drops out
Failure of brake system
Loss of control over the vehicle

- Always replace the snap rings or retaining rings with new ones after removal.

- Screw the new balance bar fully into the trunnion in the housing
- Push a new retaining ring on the balance bar

NOTE

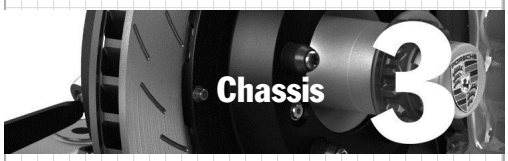
Do not over stress the retaining ring, if it deforms it will not perform correctly

- Set the balance bar back to center (see chapter “balance bar setup” 3.8.1)
- The installation is carried out in reverse order

NOTE

Following each use of the vehicle, the needle roller bearings must be coated with tenacious grease to protect them against dirt.

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NOTE

After each race or training to prevent from dirt the needle bearing should be covered with a doughy fat

3.10 Performance setup

Fuel	50 liters (13.2 gal)			
Tires	Slick			
Air pressure	Front axle left	1.85 bar (26.8 psi)	Front axle right	1.85 bar
	Rear axle left	1.9 bar (27.6 psi)	Rear axle right	1.9 bar
Lip	GT3			
Height in	Front axle left	78 mm (3,07“)	Front axle right	78 mm
	Rear axle left	100 mm (3.93“)	Rear axle right	100 mm
Anti-roll bar pos.	Front axle	3		
	Rear axle	6		
Camber	Front axle left	4°50	Front axle right	4°50
	Rear axle left	4°	Rear axle right	4°
Toe	Front axle left	-5‘	Front axle right	-5‘
	Rear axle left	17‘	Rear axle right	17‘
Brake balance	Cyl. front axle	17.8 mm	Cyl. Rear axle	17.8 mm
	Balance beam			
	Display	50/55		
Spring	Front axle main	240-60-120	Front axle help	75/60-43
	Rear axle main	260-60-130	Rear axle help	80/60-60
Wheel base	Left	2,463 mm (8’1“)	Right	2,463 mm (8’1“)
Overhang	Front	1,043 mm (3’5“)	Rear	1,045 mm (3’5“)
Vehicle width	Front	1,848 mm (6’1“)	Rear	1,862 mm (6’1“)
Wing	Depth	296 mm (11.65“)	Width	1,802 mm (5’11“)
	Height	1,228 mm (4’)	Position	P9
Tires (Slick)	Front axle	27/65-18	S8H	
	Rear axle	31/71-18	S8G	

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4 Bodywork

4.1 General

The exterior of the 911 GT3 Cup (991 II) is characterized by a clear distinction from the previous models, taking into account the typical 911 design. As its predecessor to reduce weight, the 911 GT3 Cup (991 II) is provided with a reduced sealing and sound insulation package.

The fundamental changes compared to the 997 based racecar are:

- New front- rear bumper design
- New LED front lights
- Doorhandle in new design
- Narrow tinted LED tail lights
- Fully integrated rain light



4.1.1

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4.2 Front and side view

Front bumper

The lateral air intakes of the front bumper have been redesigned. The newly developed daytime running lights are integrated and include LED direction indicators. The front bumper is made of PUR CF3/GK 10 (polyurethane).



4.2.1

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Side view



4.2.2

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4.3 Rear view

The rear end cover has been redesigned, taking into account the aerodynamic and thermodynamic requirements:

- The tail lights are completely designed in LED technology
- The narrower shape integrates perfectly in the rear panel

The rear end cover is made of PUR CF3/GK 10 (polyurethane).



4.3.1

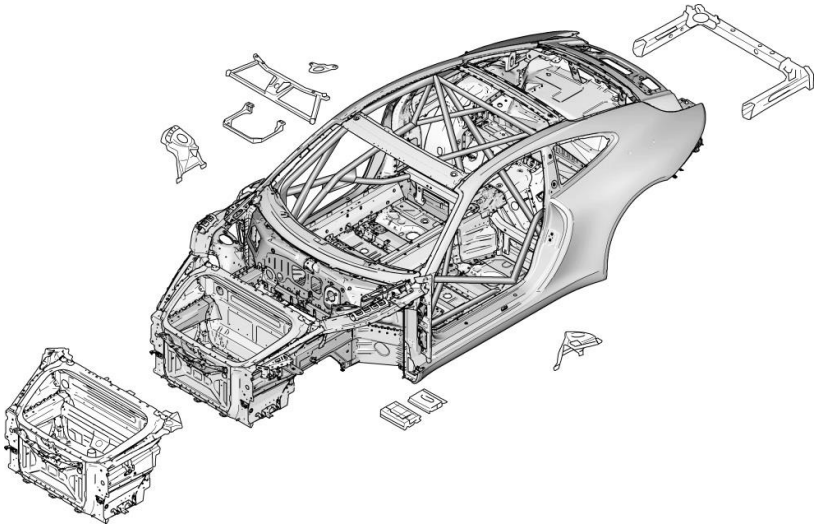
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4.4 Body shell

4.4.1 General

In the development of the body of the new 911 GT3 Cup (991 II), the following objectives were pursued, in order to further enhance the safety and performance:

- Weight retention combined with improved strength/stiffness
- Intelligent multi-material selection
- State-of-the-art joining technologies
- Aluminum–steel hybrid construction
- Further improvements to safety equipment

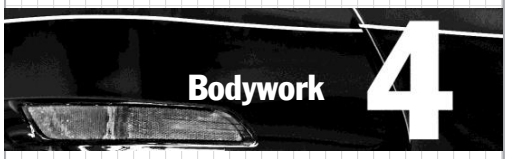


4.4.1.1

The new 911 GT3 Cup (991 II) has a body in aluminum-steel hybrid construction. The idea behind this concept of intelligent lightweight construction is to use the “right material in the right place”. This means:

- Large-scale use of aluminum to reduce the vehicle weight
- Use of ultra-high strength steel to increase body stiffness and to optimize occupant safety
- Improved weight distribution
- Well-adjusted balance
-

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When looking in detail at the body of the 911 GT3 Cup (991 II), the following material mix can be found:

Material	Scope
Aluminum	Trunk lid and fender, roof, front section, floor assembly, rear section
Steel	Rear side panels and side wall structure Front and rear roof cross members Reinforced dash panel cross member Reinforcements in the side skirts High-strength A-/B-pillars Reinforcements on front and rear section Roll cage
CFRP (carbon fiber reinforced plastic)	Doors Trunk lid Rescue opening in the roof
PC (polycarbonate)	Door windows Rear side windows Rear window

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4.4.2 Weight distribution

The body shell is divided into the body-in-white and the attachment parts. The following chart illustrate the respective percentages of weight of the individual components.

4.4.3 Weight percentage of the Body -in-White

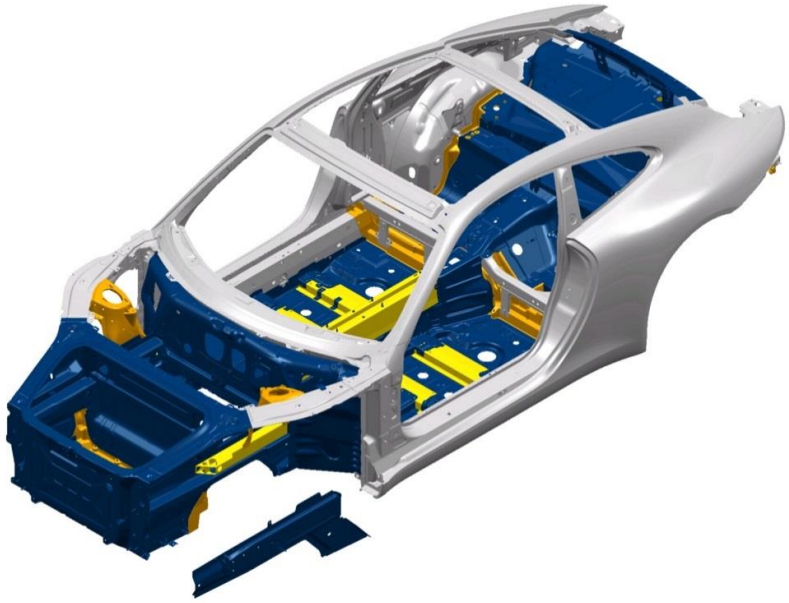


4.4.3.1

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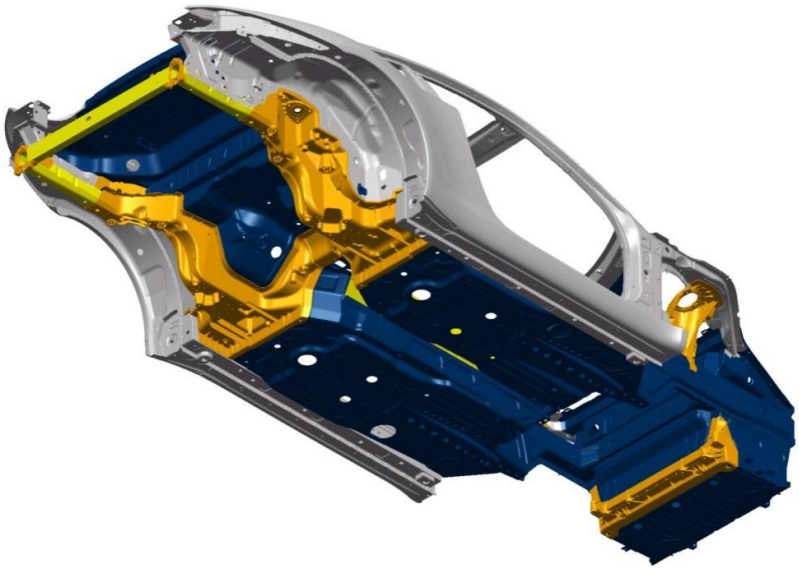
4.4.4 Body aluminum parts

In addition to the extensive use of aluminum sheet parts in the assemblies of the platform (front section, floor center, rear section), more cast aluminum parts and extruded sections are specifically used.



4.4.4.1

- Sheet aluminum
- Cast aluminum
- Aluminum extruded section
- Sheet steel



4.4.4.2

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4.4.5 Body features

In addition to a very good power to weight ratio, the body stiffness also contributes significantly to the driving performance. Increased stiffness usually means more weight and is consequently in conflict with the goal of reducing weight. The intelligent lightweight construction in multi-material design is the solution to this problem:

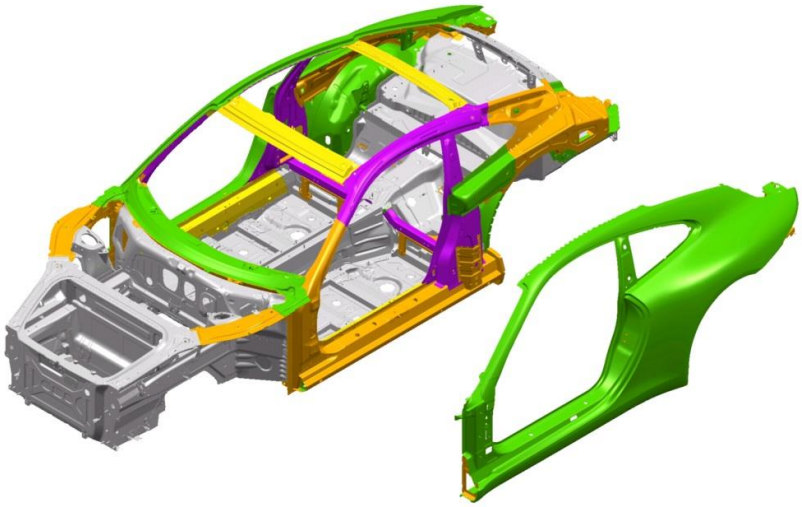
- Increased torsional stiffness
- Increased torsional and bending natural frequencies
- Additional body stiffness due to the welded roll cage

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4.4.6 Body steel parts

A further challenge in the body development of the new 911 GT3 Cup (991) consisted in connecting the floor assembly largely made up of aluminum parts to the steel assemblies of the body. Bonded joints are used in addition to pierce-riveted, clinch and flow drill connections. The benefit of bonded joints is the force transmission over the entire surface, increasing the strength of the joint.

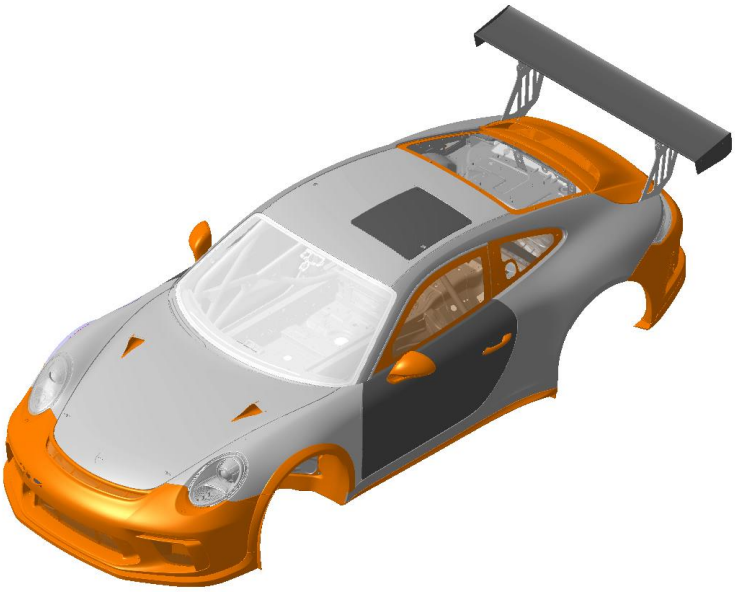
Further developments in steel processing allow using ultra-high strength and extremely thin-walled steels that are tailored to the individual field of application of the body. They provide very high stiffness values and safety while reducing material usage to the maximum.



4.4.6.1

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4.4.7 Materials overview



4.4.7.1



4.4.7.2

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4.4.8 Roll cage

WARNING

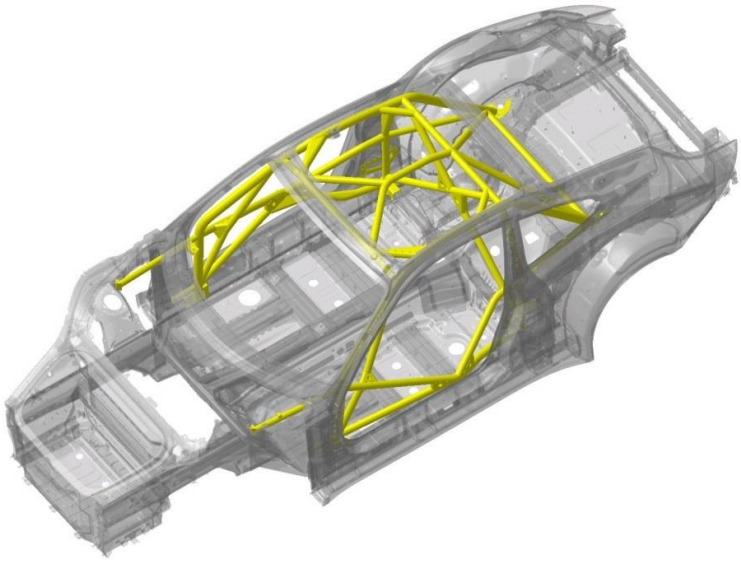
Damaged safety cell

Reduced occupant protection

- After an accident, the safety cell must be inspected by an independent expert.

Information

The roll cage is permanently welded in the body. Any modifications to the roll cage will result in non-approval or disqualification of the vehicle. Inspection of the roll cage and approval by a Technical Scrutineer (TS) are mandatory in the event of an accident.



4.4.8.1

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4.4.9 Recovery device

WARNING

Floating load

Injury due falling parts

- Use oley intact recovery bar/ ball locking bolts
- Ball locking pin must audibly engage, make sure he is locked

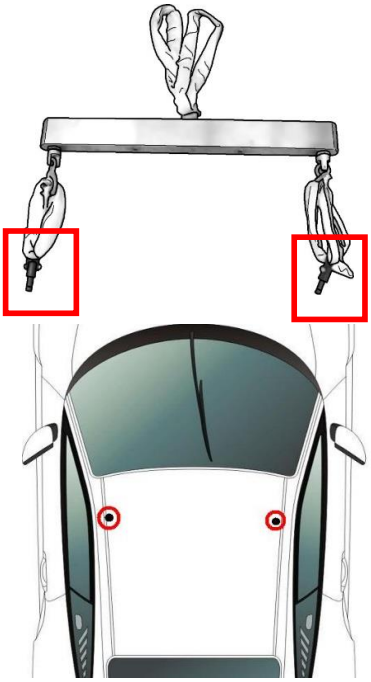
NOTE

Towing using a towing hook (Figures 4.4.9.1 and 4.4.9.2)

Damage to the body

- Always avoid jerky movements when towing your vehicle.

Two connections for attaching recovery eyebolts (4.4.9.3) are provided on the top of the rollcage. The vehicle may then be lifted using a special frame (recovery bar). The recovery eyebolts are clipped into the connections by pushing the red button on top. Four lock balls in the shaft securing the connection as soon as the eyebolt are complete engaged. Press the red push-buttons to remove the eyebolts. To do so, the eyebolts are not allowed to be under tension.



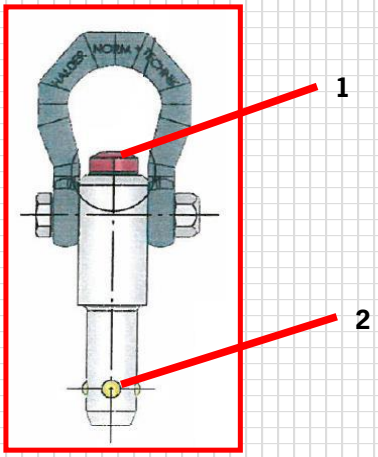
4.4.9.4



4.4.9.1



4.4.9.2



4.4.9.3

1. Push-button
2. Lock ball

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4.5 Aerodynamics

4.5.1 General

Compared to the previous models, the new 911 GT3 Cup (991 II) use the same significantly improved in terms of its aerodynamic performance. The aerodynamic of the front cover were further improved.

4.5.2 Rear wing

WARNING

Damaged, worn or missing aerodynamic components.

Changed vehicle handling

- Check components for damage regularly.

WARNING

Rear wing position changed

Changed vehicle handling

The rear wing is 1,800 mm (5'11") wide and adjustable in nine steps; its support brackets are directly attached to the body.

4.5.3 Additional aerodynamic improvements

Further aerodynamic improvements were made by implementing the following measures:

- Improved cooling air circulation by optimizing air intake and outlet cross sections
- Improved brake cooling due to optimized brake air spoiler
- Aerodynamically optimized exterior mirrors
- Optimized underbody paneling (fully closed)
- Improved flow performance at the front wheels due to optimized inflow frames

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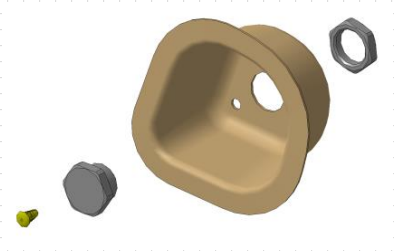
4.6 Exterior mirrors

The streamlined design of the exterior mirrors benefit the aerodynamics. Electric mirror adjustment and mirror heating are not installed.

4.7 Roof

The roof skin is made of aluminum sheet and connected to the body via a bonded joint. A rescue opening made of CFRP that may be released by camlock bolts is provided above the driver's seat. It is much easier to insert the KED system for stabilizing the driver using the rescue opening as well as the removal of the driver's helmet. In addition, the roof hatch facilitates access to the driver by rescue workers.

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4.8.1

4.8 Air jack system

The air jack system is made by Krontec. The vehicle has three lifting jacks, one in the middle of the front section and two in the area of the B-pillars, firmly attached to the body. The lifting jacks are not adjustable for height and must not be adjusted to a ride height change. The compressed air supply valve is installed in the area of the passenger's B-pillar (rear side window). The position of the compressed-air connection can be changed from the right to the left depending on the track layout. The handle liner is secured using a plug on the opposite side (Figure 4.8.1)
Torque: **20 Nm** (14.8 ft-lb)

The maximum working pressure is about 35-38 bar (508-551 psi).

Important notes

WARNING



Vehicle raised using air jack

Pinching or crushing

- Secure vehicle against unintentional lowering.
- Never work under an unsecured vehicle.

WARNING



Pressurized air jack

Risk of eye injuries
Risk of injuries

- Never open the air jack. The system is pressurized even when retracted.

NOTE

Use of the air jack

Damage to the end stops of the lifting cylinders

- Never extend the air jack when unloaded (i.e. no vehicle load).

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Further notes

- While driving, the drain valve (4.8.1) should be open (pulled out) to ensure that the air jacks are completely retracted.
- A separate vent is accessible via a tappet in the drain valve for slowly lowering a lifted vehicle. By pressing this tappet, the pneumatic system can be vented in a controlled manner.
- Never use mineral oil-based cleaning agents.
- Porsche Motorsport recommends having an overhaul carried out by Krontec after two years or 2,000 lifts.
- Check the tightening torque of the grooved nut (air jack tightness) during normal vehicle checks.

Tightening torque grooved nut, rear **45 ± 5 Nm** (33 ± 3.7 ft-lb)

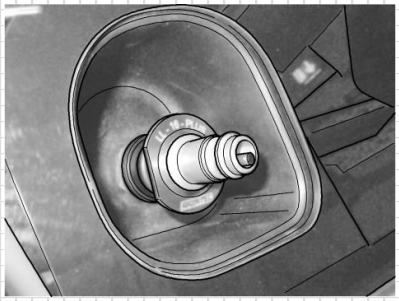
Tightening torque grooved nut, front **45 ± 5 Nm** (33 ± 3.7 ft-lb)

Position of the rear air jack in the mounting tube (4.8.2)

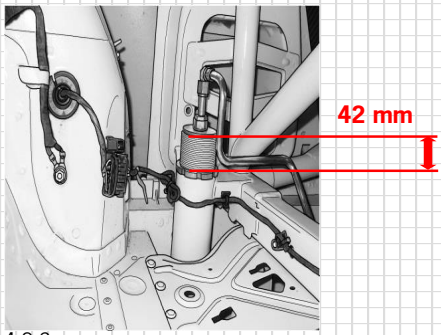
If a loose or improperly mounted air jack is detected, it must be replaced immediately as internal damage cannot be excluded.

For further safety regulations, please refer to the manufacturer's product description (Krontec) addition 6.

KRONTEC
Maschinenbau GmbH
Pommernstraße 33
93073 Neutraubling
www.krontec.de



4.8.2



4.8.3

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4.9 Doors

To further reduce vehicle weight, the doors are made of CFRP.

4.10 Trunk and engine lid

WARNING

Trunk or hood lid opening while driving

Trunk lid bangs against the windshield

Visual obstruction for the driver

- Push lid pins fully through and carefully close quick-connecting locks (Figure 4.10.2.1).

Gas pressure springs are mounted on trunk and engine lids.

4.10.1 Trunk lid

WARNING

Fogged windshield

visual impairment

- Never cover the right Naca (driving direction) he supplies the heating box with fresh air

The trunk lid is made of aluminum sheet and optimized for the special motorsport requirements. It is provided with NACA intakes on the left and right providing air supply to the interior. The lid is closed by two lid pins.



4.10.2.1

4.10.2 Engine lid

The engine lid is made of carbon fiber reinforced plastic (CFRP) and is connected by two hinges to the body. Opening is supported by a gas pressure spring so that work can be carried out with the lid open without requiring additional support. As with the front trunk lid, two lid pins are used as a lock.

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4.11 Windows

The front window is made of laminated safety glass and glued to the body; the rear side windows and rear windows are made of PC (polycarbonate). The rear side windows are removable and are clipped into the frame by means of ball heads. The rear window is glued and screwed. When replacing the rear window, the new part's adhesive surface should be roughened.

4.11.1 Installing and removing the windshield

Tools

Designation	Item No.
Electric special cutter – Fein	ASE 481 202 00 000
Suction lifter – Stahlwille	ASE 481 161 00 000
Double cartridge gun VAS 5237	ASE 416 161 00 000
Cut system for glued panes - VAS 6452	ASE 481 261 01 000

The tools can be ordered at your Porsche Center. As an alternative for the cut system VAS 6452 (4.11.1.1), KSA Toolsystems offer a cutting device "Single Cut System" (4.11.1.2). The two systems differ. VAS 5237 uses a wire for cutting, the Single Cut System a polyethylene cord. The manual describes cutting with the VAS 6452, but the procedure with the KSA system is identical.



4.11.1.1



4.11.1.2

Consumables

Designation	Item No.
Gluing set	000 043 303 19
Cord	000 043 300 96
Wire for (VAS)	000 043 303 32

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Preparation

1. Remove the windshield wiper arm
2. Remove the interior rear-view mirror

WARNING

Removal and installation of vehicle windows

Risk of eye injuries

Risk of cuts

- Wear personal protective equipment.
- Cutting blades must only be changed with the power supply turned off.

Information

Wetting the suction cup increases the fixing force.

3. Install the Stahlwille WE1140 suction lifter on the outside of the windshield
4. Unwind the cutting wire and cut it with a side cutter, length 6 m (19.7')

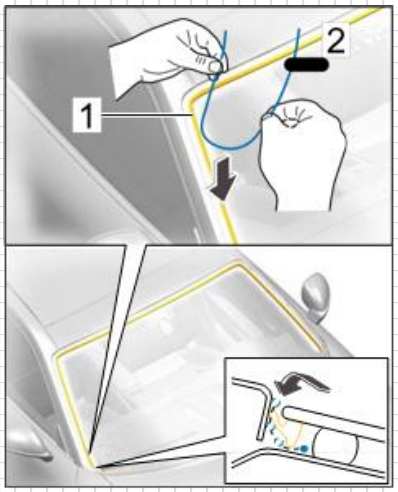
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NOTE

The cutting cord has to be below the window edge, as otherwise the seal will be damaged.

5. Insert the cutting wire into the window gap, WE1480 cutting system for glued windows - VAS 6452.

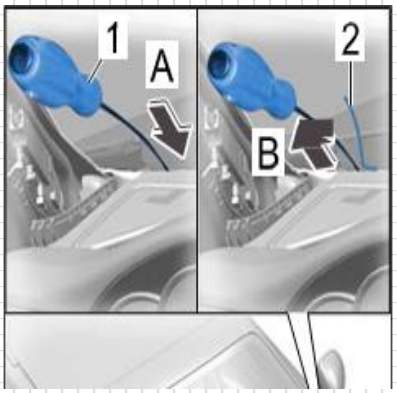
   - Wet the windshield sealing (1) with soapy water on the entire circumference.
   - Pull the cutting wire (2) into the gap between windshield and body (note the arrows) on the entire circumference.
   - Clamp the free end of the cutting wire to the wiper mechanics. Introduce the cutting wire.
   -



4.11.1.3

6. Pull the cutting wire through to the inside.

   - Cut adhesive bead from the inside to the outside using piercing awl (1) arrow A.
   - Insert cutting wire (2) into the piercing awl and pull it into the interior arrow B.
   - Pull the cutting wire through to the inside. Length: Insert 1 m (3'3.4") cutting wire.

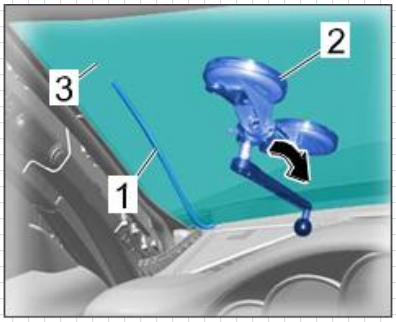


4.11.1.4

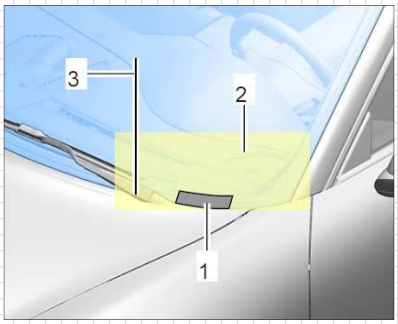
Information

It is recommended to clean the windshield before installation in order to ensure optimum adhesion of the suction cups.

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4.11.1.5



4.11.1.6

7. Cut out the windshield.
   - Introduce the cutting wire (1) in the hole of the rewinding device (2).
   - Align the rewinding device (2) in the window center and press the suction lifter firmly against the windshield (3).
   - Fix the suction lifter on the windshield by moving the operating lever.

NOTE

To avoid damage, insert the protective film (2) supplied with the cutting system between windshield and vehicle ID-number (1).

When cutting, lead the cutting wire (3) over the protective film.

Removing the windshield

8. Cut out the windshield by winding up the cutting wire on the rewinding device in the direction of the arrow.

Move the rewinding device to reduce the cutting wire traction force during glass removal.

9. Remove the windshield.

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4.11.2 Preparing the window cutout for installation

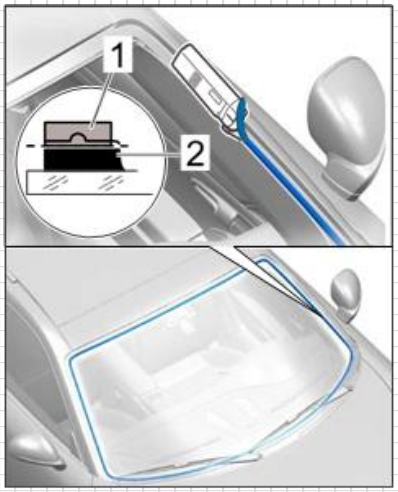
1. Remove glue on the body.

   - Remove residual glue (1) with (electric special cutter) WE1137 electric special cutter Fein and scraper (U shape 639.031.130.22) on the body so that a glue residue remains on the entire area (2).
   -

Information The area-wide glue residue serves as primer for the new glue material. Keep cut surfaces clean and free of grease and do not clean with cleaning solution.

   -

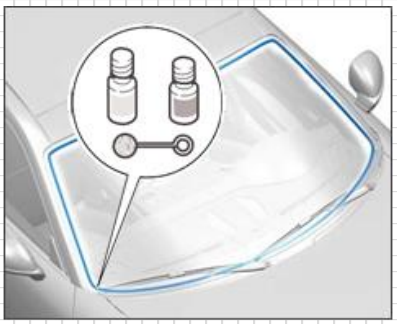
2. Clean and prime paint damages resp. newly built-up paint surfaces in the window cutout of the body.



4.11.2.1

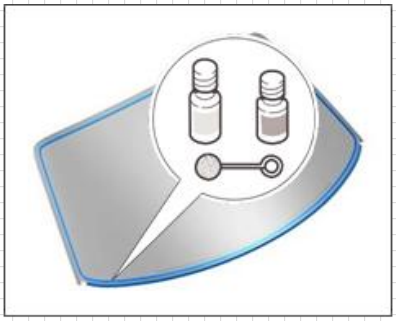
Information A flash-off time of at least 10 minutes should be observed between cleaning of the gluing surface and application of the primer! The body must be free of any cleaning solution residues.

   - Clean and activate the gluing surface of the window cutout.



4.11.2.2

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4.11.3.1

4.11.3 Preparing the windshield for installation

(new windshield)

WARNING

Toxic substances

Poisoning or suffocation

Burns to the eyes and skin

- Ventilate the work area well.
- Never ingest or inhale.
- Read specific information on the Hazard Sheet.
- Do not smoke, eat, or drink in the work area.

3. Clean and prime the gluing surface.

   - Clean the window with cleaning solution.
   - Apply primer on the window flange around the marking.

Information

A flash-off time of at least 10 minutes should be observed between cleaning the window and application of the primer! The window must be free of any cleaning solution residues.

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4.11.4 Installing the windshield

NOTE

Application of adhesive

Poor adhesive bond

Window becomes detached

- Fixing time: Approx. 1 hour.
- The vehicle must not be used until a curing time of 2 hours has elapsed.
- Processing temperature at least 10°C (50°F).

Information

The glue material has an open time of 15 minutes. This means that the glue should be applied and the part be joined within this time.

To ensure complete mixing, squeeze an approx. 30 mm (1.2") long adhesive bead of fresh material on a piece of cardboard.



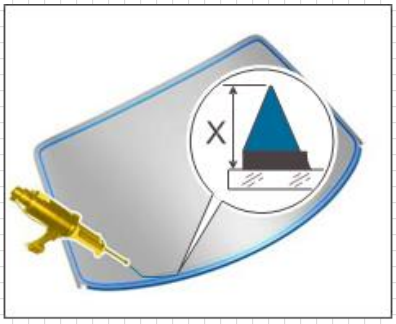
4.11.4.1

Information

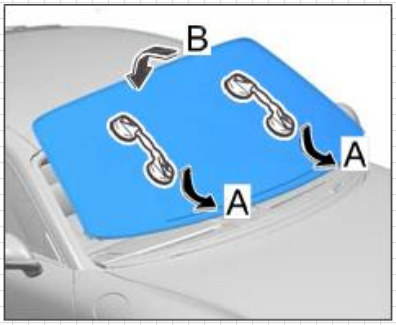
- Check the depth stops.
- Replace damaged or missing depth stops.

4. Prepare two-component glue for processing.

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4.11.4.2



4.11.4.3

Information When applying the glue material, make sure that the adhesive bead overlaps by approx. 30 mm (1.2") at the beginning and end.

5. Apply glue on the windshield using the double cartridge gun VAS 5237.

   - Use the glue gun and apply two-component glue on the windshield along the pre-coating or on the primer in form of a triangular adhesive bead with dimension (X) application height: 15 mm (0.6").

Information Two persons are required to insert position and fix the windshield!

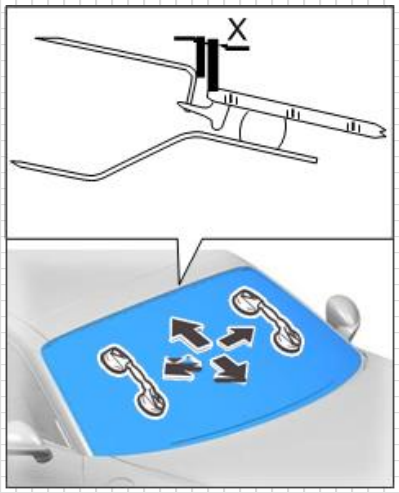
6. Install the windshield in the body.

   - Place the suction lifter on the windshield.
   - Insert the windshield into the window cutout.
   - Position the windshield at the bottom edge (arrows A) and tilt it down into the frame (arrow B)

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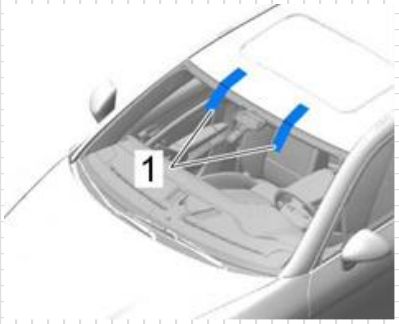
7. Set the windshield gap dimension.

   - Move the windshield to set gap dimension (X). Gap dimension: **3.0 mm** (0.12“) on the entire circumference.
   - Remove the suction lifter.



4.11.4.4

   - Secure the windshield with adhesive tape (1) to prevent it from slipping.



4.11.4.5

8. Clean the vision areas.

   - Immediately remove the glue that has oozed out and clean the respective vision areas with cleaning solution.

9. Mount the interior rear-view mirror.

4.12 Fenders

The fenders are made of aluminum sheet and screwed on with bolted connections to the body. The wheel arch liner integrates a stone guard, protecting the side radiators against possible damage by stones and rubber abrasions. Removable separation edges are mounted at the wheel arch.

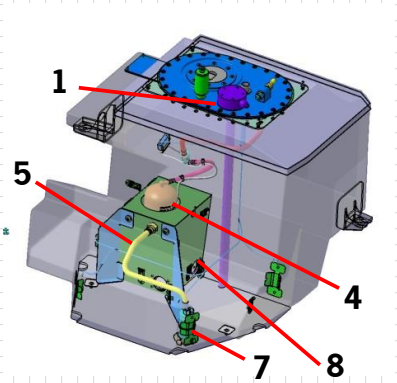
4.13 Wheel cover

The wheel covers are made of PU (polyurethane). They are bolted and glued to the body and can be replaced.

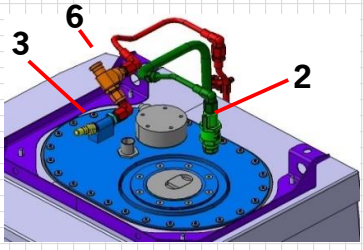
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4.14.1



4.14.2



4.14.3

4.14 Fuel system

A FT3 safety fuel tank (100 liters (26.4 gal) with return-free fuel system is used in the 911 GT3 Cup (991 II). The tank consists of a fuel cell which provides maximum safety and meets the current FIA standard, and a protective shell made of carbon. The tank integrates two fuel pumps. The main pump is surrounded by fuel baffles with one-way valves, witch collect the fuel around the main pump. The pumps supply the fuel via a pressure regulator (5 bar/72.5 psi) to the fuel gallery on the engine side. From there, the fuel is delivered via the main pump to the high press pump. The high pressure pump is driven by an additional cam on the camshaft. The high pressure pump injects the fuel via the fuel gallery and the fuel injectors directly into the combustion chamber. Defueling takes place via a defueling coupling. Optionally, the fuel cell may be equipped with two Stäubli dry couplings, which allow the fueling and defueling procedure within an enclosed system. Underneath the tank, there is an underride guard that protects the tank against impacts from the bottom. The fueling system (4.14.1) can be obtained at the company Sobek. Contact address, see chapter 7.9.

The following components are installed:

1 Level indicator
2 Roll-over valve
3 Defueling coupling
4 Fuel pressure regulator
5 Fuel pump
6 Fuel cut off valve
7 Pre fuel pump
8 Catch tank

Function of the FIA Roll Over Valve

The valve is allocated in the breather line. It fulfills three functions:

Closing of the breather line in case of a roll-over.

Over pressure safety function; in case of a roll over, the valve opens at a over pressure of 200 mbar (E.g. by heating and expansion) compared to ambient pressure to prevent the fuel cell from damage caused by too high over pressure.

Float valve to close the valve when gasoline exits through the breather line.

Function of the fuel cut off valve

The fuel cut off valve is a safety valve to protect from gasoline leakage with damaged gasoline lines. The valve closes the gasoline support line in case of a leakage.

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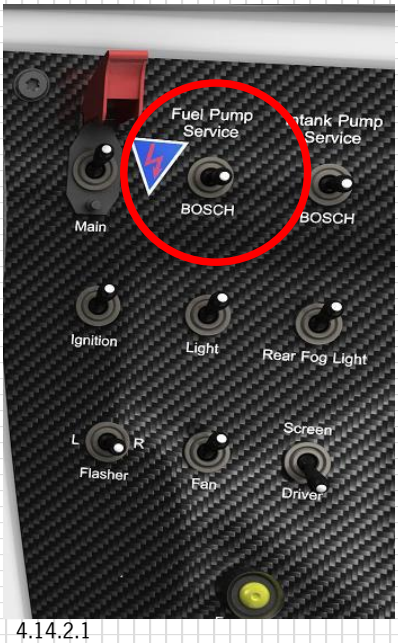
4.14.1 Fuel

Superplus unleaded (at least 98 ROZ)

The ethanol content in the fuel may not exceed 26 % (E26).

4.14.2 Defueling

A defueling valve is installed to empty the fuel tank. To start the procedure, the fuel pump switch located in the central console must be in position "Intank Pump Service". The fuel pump is then activated for 120 seconds. If this time is not sufficient to completely drain the fuel tank, the switch has to be set again from the center position (fuel pump off) to "Service". Keep the fuel only in suitable containers!



4.14.2.1

WARNING

Flammable or explosive materials

Fire or explosion

- Avoid contact with hot parts or sources of ignition.
- Use extractor to remove ignitable vapors.
- Attach warning sign in a clearly visible position.

Switching logic of the fuel pump switches (center console):

Switch position	up	Defueling mode
Switch position	center	Off
Switch position	down	Normal mode

NOTE

Fuel pumps running dry during drainage

Damage to the fuel pumps

- The fuel pumps must not be allowed to run dry.

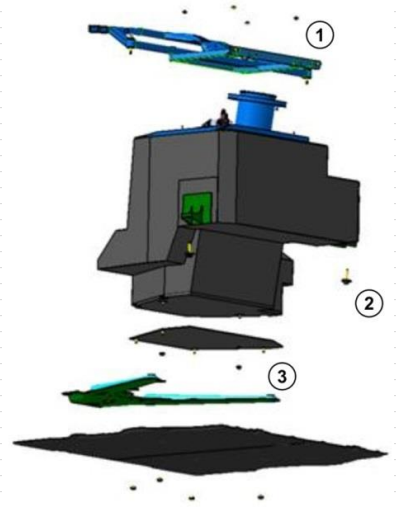
The optional dry couplings allow a fueling and defueling without using the vehicles own fuel pumps (exemption: fuel volume of the catch tank).

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4.14.3 Tank installation

A steel underride protection is provided beneath the tank, protecting it against external impacts.

Part	Item	Dimensions	Tightening torque in Nm
Hexagon nut	1	M6	6 Nm (4.4 ft-lb)
Combi SHR	2	M8X40	23 Nm (17 ft-lb)
Hexagon nut	3	M6	6 Nm (4.4 ft-lb)



4.14.3.1

4.15 Repairing the body

Because of its hybrid design, it is absolutely essential to check the body in case of an accident. The body of the 911 GT3 Cup (991 II) is an aluminum steel hybrid construction. This design allows extensive repair work within a defined amount of time. For this purpose, a special tool kit, suitable body spare parts as well as tools and consumables are available.

Note

Risk of damage to the bodyshell structure as a result of reshaping during accident repairs.

- Reshaping can cause irreparable damage to the joints in the bodyshell structure.
- Reshaping can change the crash properties of the bodyshell structure.

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Note

Removing stoppers

Risk of corrosion
Uncontrolled water leakage

- Body apertures that are sealed with stoppers at the factory must be re-sealed with the stoppers provided following disassembly or repair work.

4.15.1 Repairing the front section

Safety measures

The protective equipment listed must always be worn to prevent injuries caused by heat or flying parts.

- Safety glasses
- Safety shoes
- Protective gloves
- Ear protectors



4.15.1.1

WARNING

Airborne foreign bodies during grinding, drilling, and milling

Risk of eye injuries

- Wear safety glasses.

WARNING

Grinding and welding work

Fire or explosion

Avoid working in an area with flammable or explosive materials.
Cover flammable or explosive areas.
Remove flammable or explosive parts.

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Caution

Pointed or sharp objects

Risk of lacerations, puncture wounds, or cuts

Wear personal protective equipment.

Caution

Hot components

Danger of burns

Let hot components cool down.

Wear personal protective equipment.

NOTE

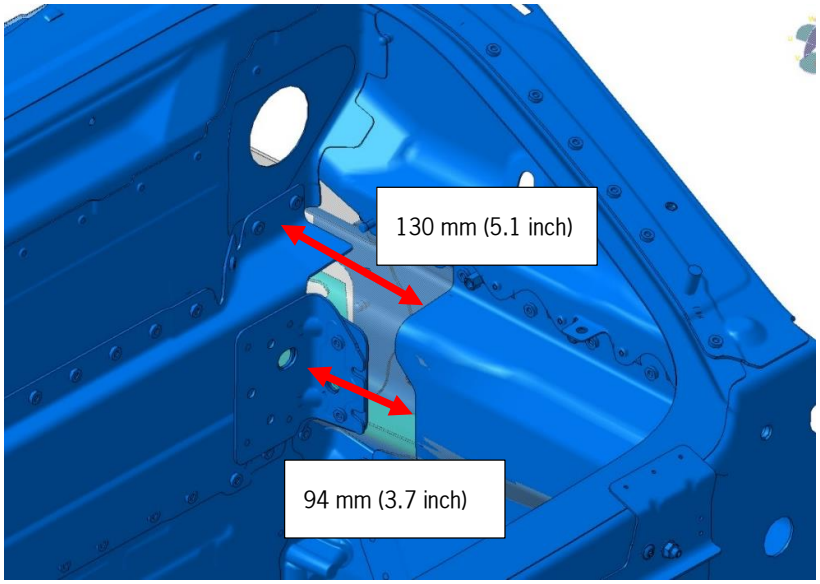
Voltage peaks

Damage to the control unit

- The control unit must be disconnected from the wiring harness before welding work is carried out.
- The battery must be disconnected before the control unit is removed.

Damage assessment

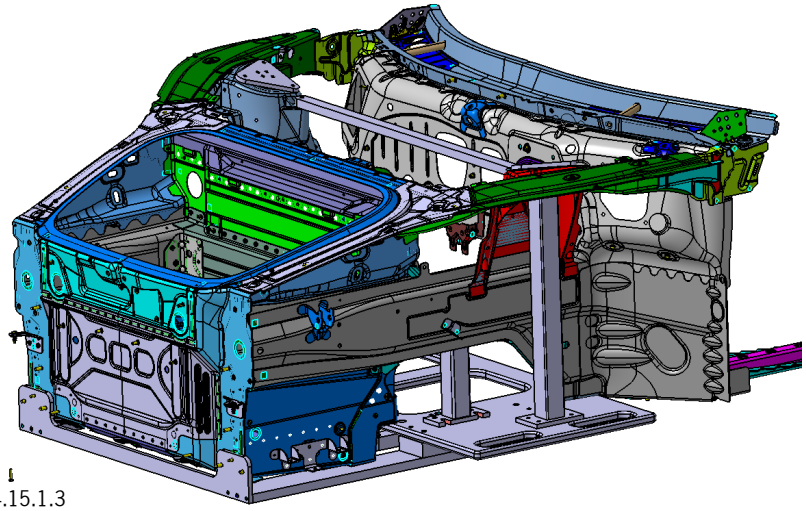
A specialist assessor or body repair expert must decide whether a repair can be made to the body front section. The area (Figure 4.15.1.2) of the support must not be damaged, otherwise a repair is not possible.



4.15.1.2

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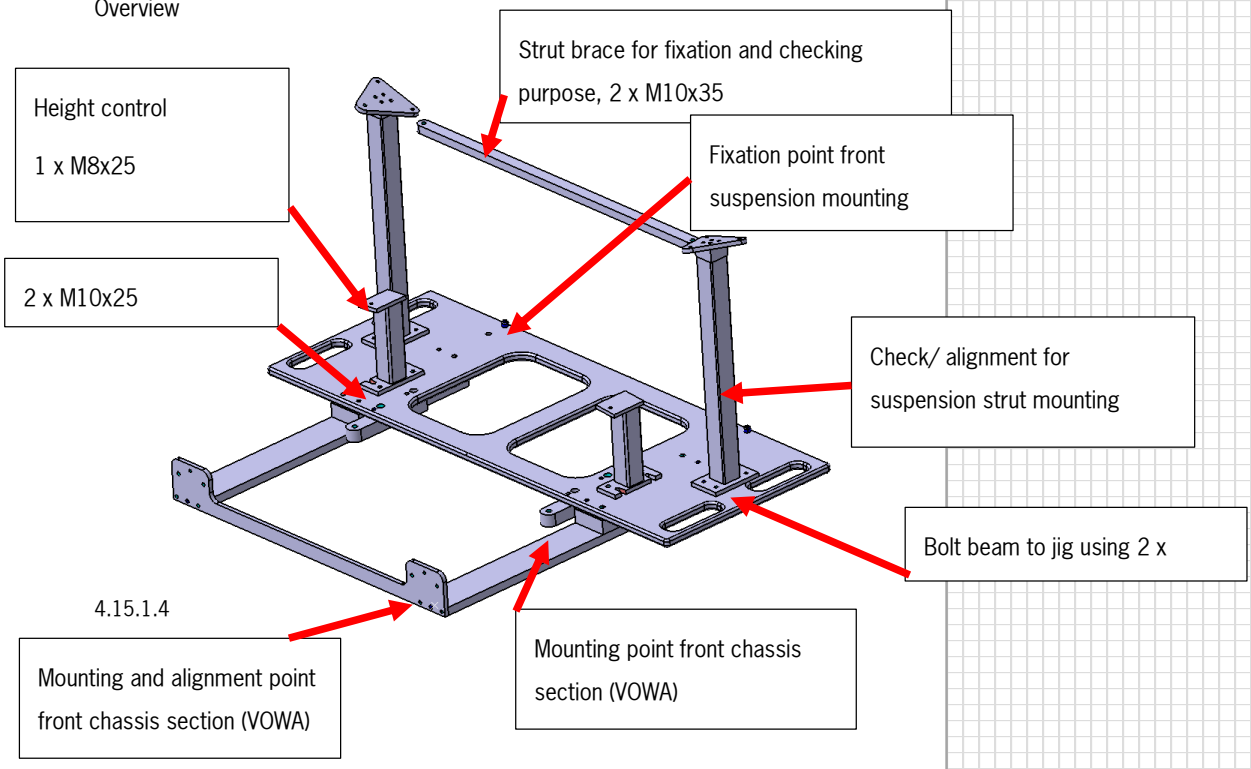
Chassis jig



4.15.1.3

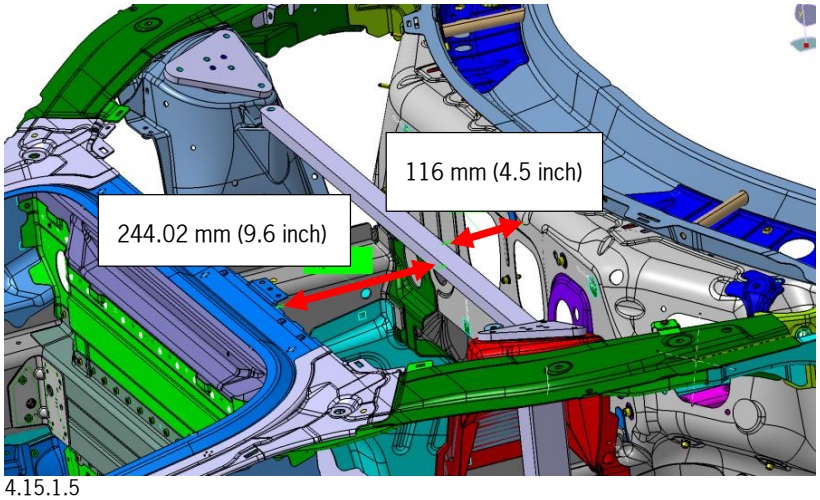
The chassis jig is required to check the mounting points for dimensional accuracy and tolerance. This jig is also required to adjust and fix in position a new front chassis section before all the rivets are inserted and seated.

Overview

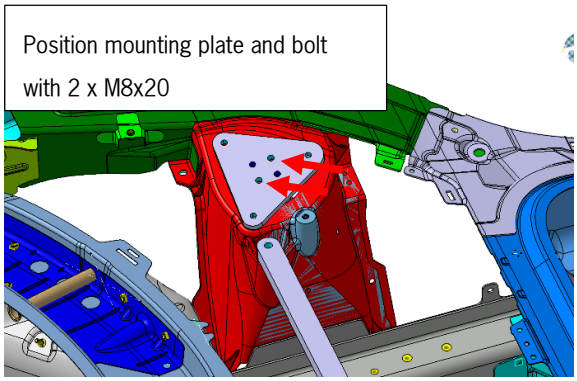


4.15.1.4

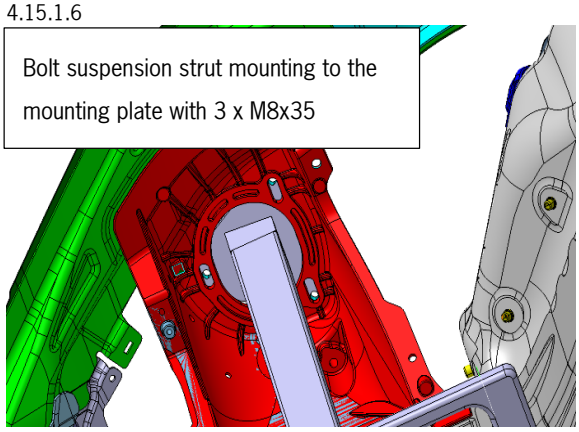
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4.15.1.5



4.15.1.6



4.15.1.7

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This tool kit has been assembled specially for repair work on aluminum components.

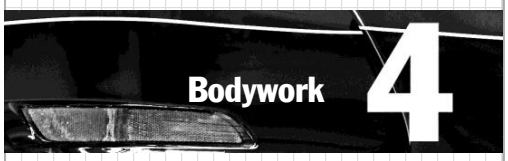
The tool kit must only be used on aluminum components.

Required tools by Wieländer+Schill

Description	Item No.	Qty
Body saw WPS 2010 230V	120020	1
W+S special central punch F2 (for self-pierce rivets)	628006	2
Slide hammer with hook 5 kg	511300	1
Dead blow bumping hammer	511029	1
Separating chisel incl. handle, body	512001	1
Anvil dolly, half-round	511113	1
File with grip, medium cut 1	521201	1
Manual deburrer	541030	1
Spare blade for manual deburrer	547030	1
Teroson spatula	541010	1
Circular brush, stainless steel ø 75 mm knotted	541202	2
Wire brush, V-shape INOX	541212	1
Mity-Bite clip, large	511312	1
Grip pliers 145 U-format 12"	561151	2
Grip pliers 144	561152	2
Fastener ø 6.35mm 20 pcs	577107	1
Cartridge gun 3M EPX for 50 ml.	831101	1
Blind riveting tool Taurus 4	571110	1
Pressure reduction valve PLF80/90/PS1/Taurus4	194000	1
Reduction nipple long: G 1/8" axG 1/4" i	194001	1

Wieländer + Schill
Siederstr. 50
78054 Villingen-Schwenningen
Tel.: +49 (0)7720-83 17 0
E-Mail:

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Consumables	Item No.	Qty
Solid carbide drill ø 6.7 mm	627010	
3M 2K glue DP 490 (Porsche)	99991532340	2
Blind rivet (long) 5.0-8.5 (Porsche)	99919023001	20
Blind rivet (short) 3.0-6.5 (Porsche)	99907354901	60
Counter sunk screw 8x16	99907354901	15

HAZET

Designation	Item No.	Qty
Tool trolley	179-6-RAL 4000896148851	1
Door RAL 9006	179-21 4000896146246	1
Can holder	179-35 4000896141074	2
Attachable box	179-28 400089141234	1
Paper roll holder	180-34 4000896120840	1
Set of separating plates	173-31/5 4000896090150	2
Set of separating plates	173-32/5 400089120796	2
Cable drum	161-3D 4000896048878	1
Anti-slip mat	180-38 400089120819	6
Flat scraper	824 4000896033881	1
Heat gun	1990-2/6 4000896141586	1
Wire brush	2130-1 4000896012527	2
Ball-peen hammer	2140-5 4000896012695	1
Magnetic finder	1976-1 4000896009749	1
Replacement heads	1953-050 4000896008612	1
Drill	9030-1 4000896109470	1
Angle drill	9030-5 4000896132379	1
Keyhole saw	9034-1 4000896132362	1
Grinder, straight	9032-1 4000896117055	1
Grinder, bent	9032-5 4000896117062	1

HAZET-WERK
Postfach 100461
42804 Remscheid
Tel.: +49 (0)2191-79 23 75
E-Mail: info@hazet.de

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Preparation for repairing the front section

These instructions describe how to repair the front section. Individual operations are shown on one side and have to be carried out inversely on the other side. In case of deviations, the steps are described separately. The estimated time for the described repair is approximately five hours.

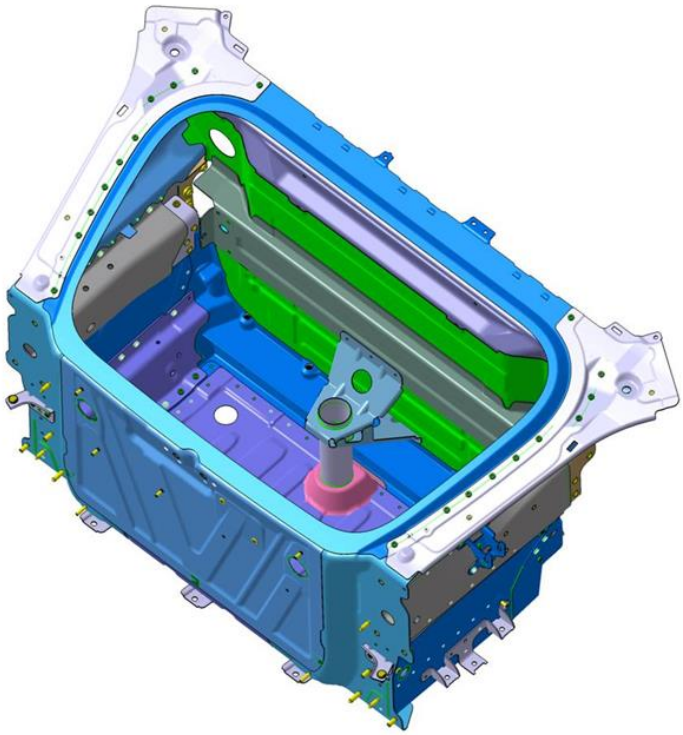
Remove the following parts:

- Fender left/right
- Headlights left/right
- Wheel arch liners left/right
- Underbody, front
- Chassis left/right
- Front apron
- Front bumper
- Fuel tank
- Brake lines left
- Draining the coolant, front
- Water cooler and cooling hoses left/right
- Steering gear
- Air jack, front and cross member
- Master cylinder, remove if required

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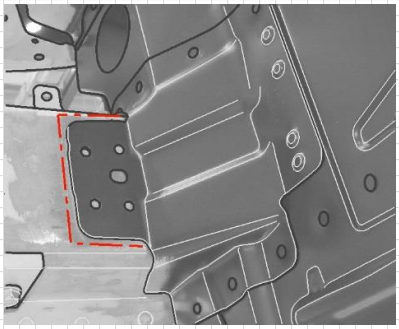
Removing the front section

The front section (Z front section Cup) is available as spare part.



4.15.1.8

Together with the front section are consumables such as glue and blind rivets.

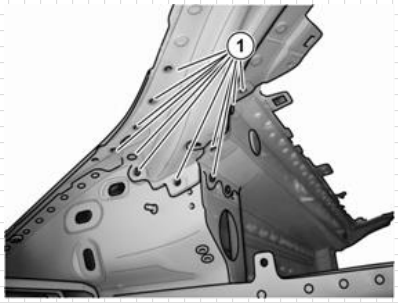


4.15.1.9

Mark the carrier (Picture 4.15.1.9 red dot line) this reference point is required for the later alignment of the new part.

NOTE

Do not damage metal sheets that are not replaced

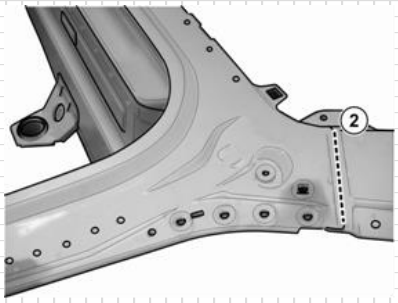


4.15.1.10

Deep-punch the punch rivets (1) and spot drill with a solid carbide drill (dia. 6.7 mm (0.26 inch) from the rear (if accessible) until they can be knocked out with a drift punch (dia. 6.0 mm (0.24 inch)).

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Heat the bonded joint (2) with the hot air gun and lever the plate apart in an upwards direction using a cutting chisel.



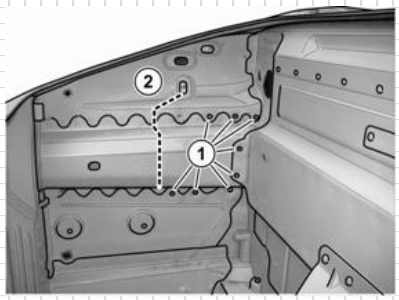
4.15.1.11

Support the body front section in order to avoid stresses due to bending down of the front section upon sawing.

Only drill the marked rivets (1) through the first plate. The support frame contains extruded aluminum profiles. The aluminum profile is located behind the saw line (2), Figure 4.15.1.12. The cut is made in order to remove the body front section. A more precise cut is made later.

Do not drill through the support frame. The support frame is not replaced in this area.

If the support behind the cutting line (2) is damaged, the repair work cannot be performed.

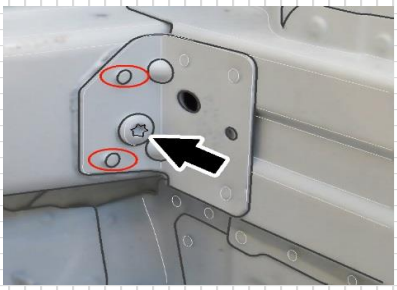


4.15.1.12

Grind off and drill out rivets, Figure 4.15.1.13

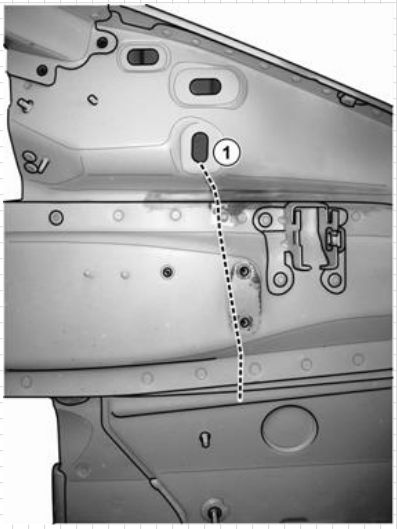
Remove Torx screw connection, arrow, Figure 4.15.1.13

Separate bonded connection of bracket/support



4.15.1.13

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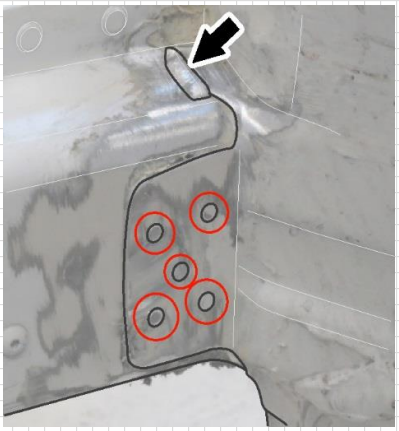


4.15.1.14

The figure shows the saw line on the outer right side.

Cut the support frame using the power saw (saw blade 14) along the line (1). Starting from the center of the oval cut-out, the cut must be made immediately behind the two threads shown.

Use a hot air gun to heat up the bonding points that run along the areas where the rivets have been drilled through.



4.15.1.15

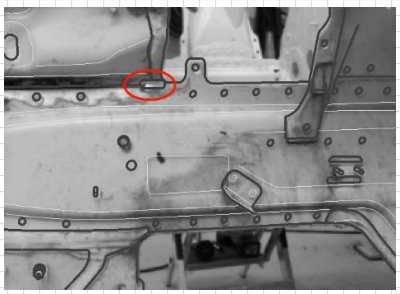
The left side is shown in the figure, rear side of front section/support.

Drill out the five rivets (Figure 4.15.1.15).

Do not drill into the support.

Remove weld seam of support/front section (arrow).

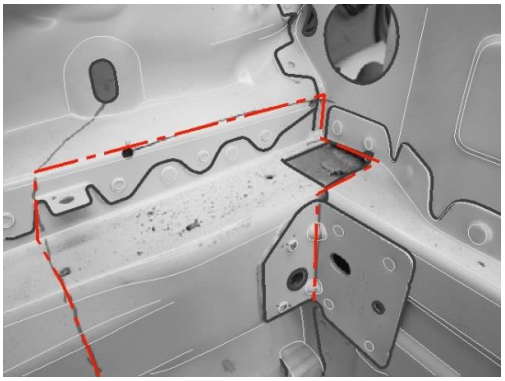
Use a cutting chisel to separate the bonded joints of the sheets. If necessary, heat up the bonded areas with a hot-air gun.



4.15.1.16

Remove weld seam of support/front section (Figure 4.15.1.16).

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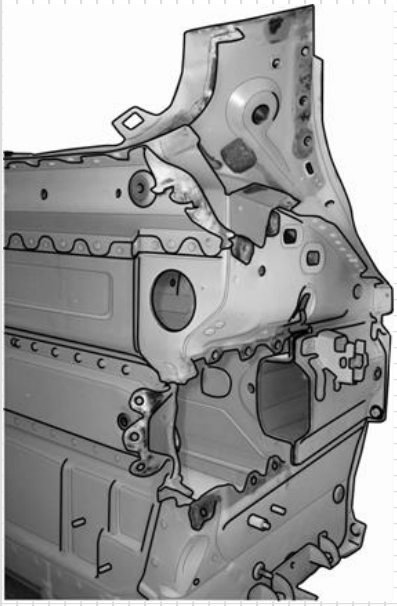


4.15.1.17
Cut of body front section, red dashed line, do not damage support in rear area.

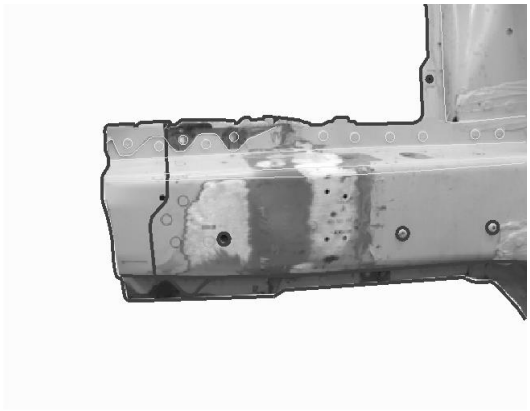
Remove the body front section forwards with the help of another person. Use the sliding hammer with hook if necessary.

Figure 4.15.1.18 shows the separated body front section from the right-hand side.

Remove any unevenness, adhesive residue or weld seam residue of the support, remove remaining piece (angle plate).



4.15.1.18



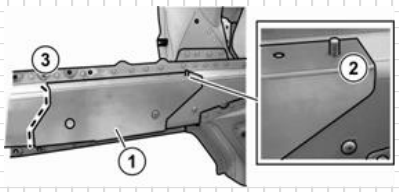
4.15.1.19

Adapting the support frame new part

Carry out grinding work using a stainless steel wire brush. Always use special grinding discs when grinding aluminum. Use grinding discs with P80 to P200 grain. Corrosion protection measures must be observed.

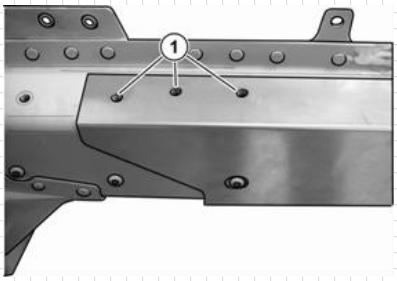
Saw template for right side

Place the saw template (1) on the support frame. The threaded bolt (2) is used to fix it in position. Transfer the saw line (3) at the front end of the template onto the support from the top to the bottom.



4.15.1.20

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4.15.1.21

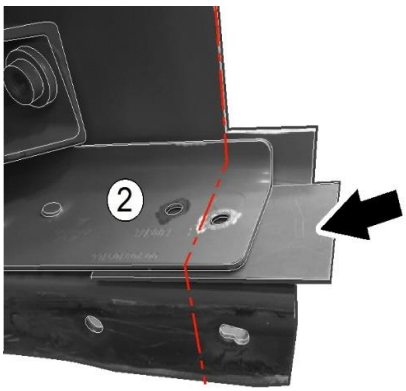
Saw template for left side

The three threaded bores (1) are used as a fixing point.



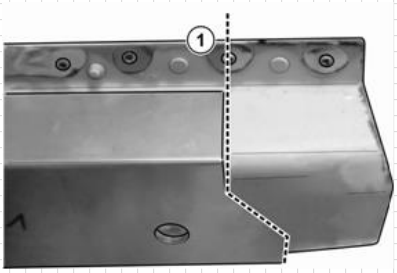
4.15.1.22

The inner reinforcement plate (2) must not be damaged when cutting.



4.15.1.23

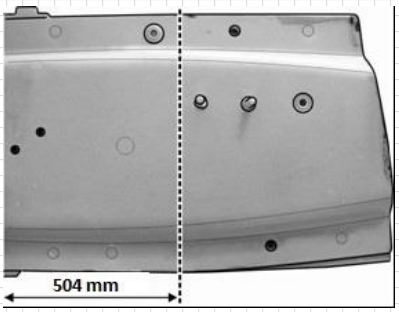
Clamp a plate (arrow) between the support and reinforcement plate to protect the reinforcement plate (2). Transfer the saw line (1 Figure 4.15.1.24) at the front end of the template onto the support from the top to the bottom and align it centrally to the rivet bore.



4.15.1.24

The saw cut for the right support frame is shown.

The distance from the rear end to the saw line is 504 mm (19.84 inch) (measured from the inside of the support).

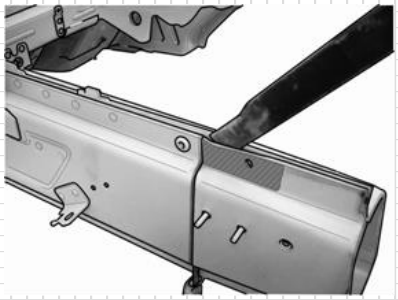


4.15.1.25

Information The outer saw cut only goes through the outer panel.

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Heat the upper section (hatched) of the two carrier sheets and open with the separating chisel.

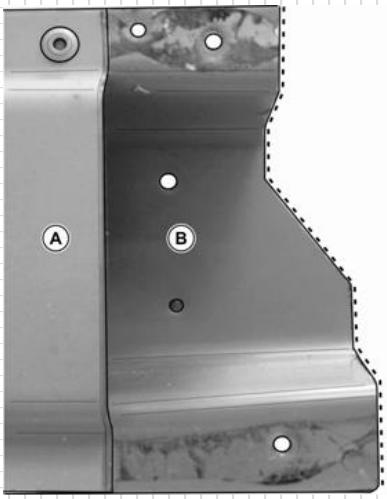


4.15.1.26

Carry out the inner saw cut (hatched)

A = outer sheet

B = inner sheet

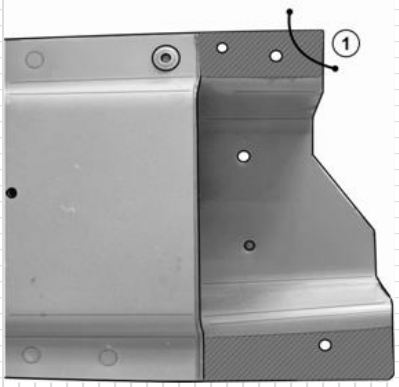


4.15.1.27

Saw the carrier upper section (1).

Remove glue residues in the hatched area.

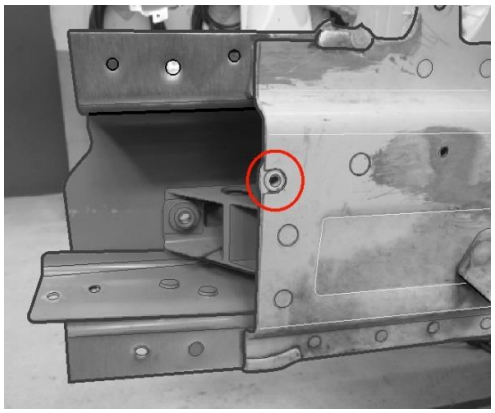
Remove the burr on the saw line.



4.15.1.28

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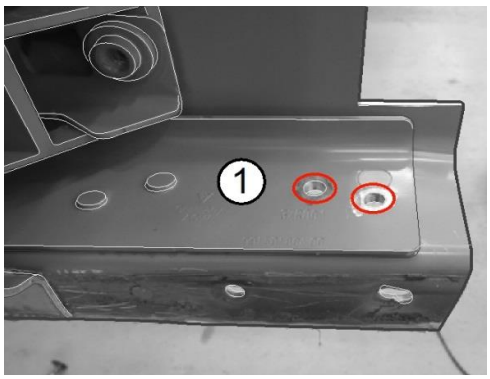
Drill out and remove rivet nut, Figure 4.15.1.29



4.15.1.29

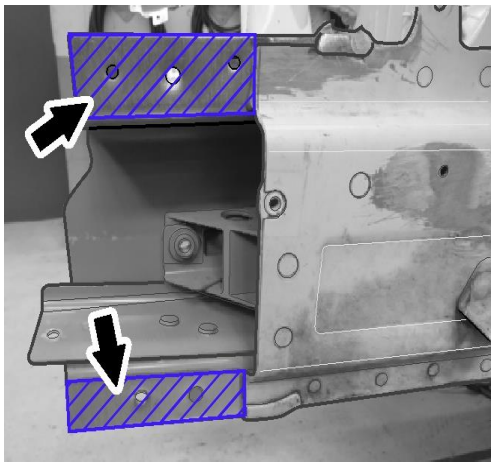
Grind off and drill through rivet points

The reinforcement plate (1) must not be damaged



4.15.1.30

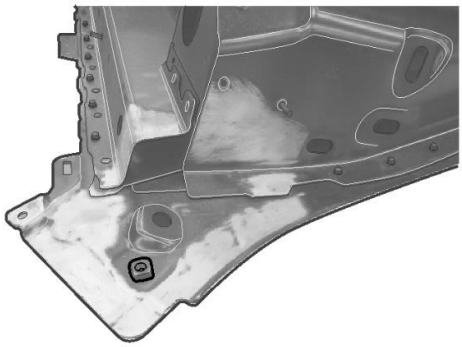
Remove adhesive residue from support (blue hatched area)



4.15.1.31

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Remove paint at the bonding points on body front section new part



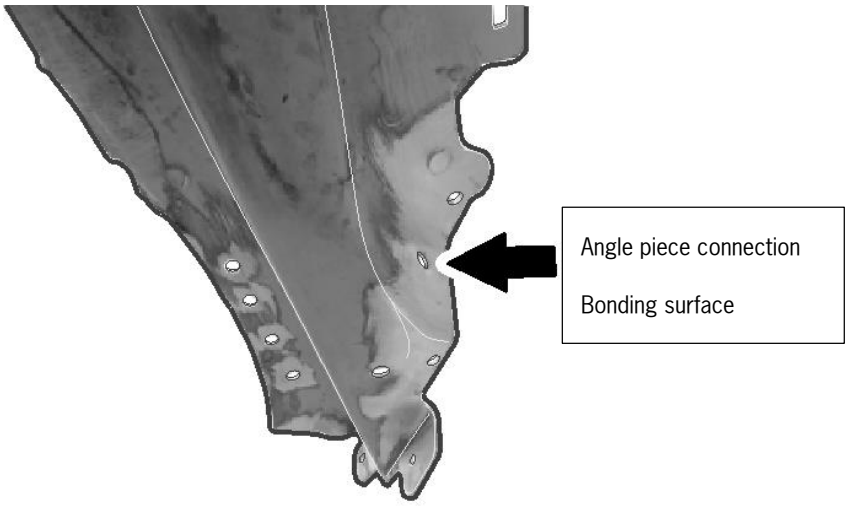
4.15.1.32

Body front section outer side connection to support



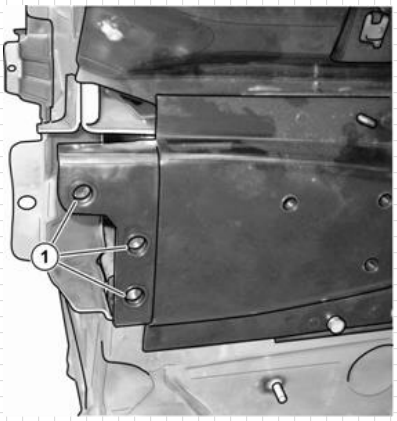
4.15.1.33

Filler plate in the area of the spring-strut dome/body front section

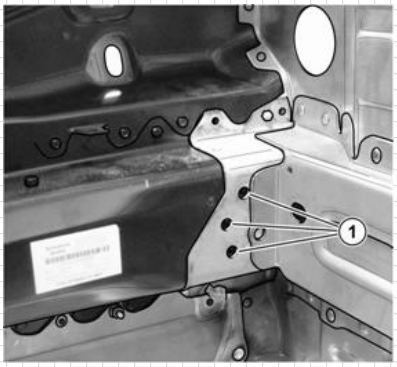


4.15.1.34

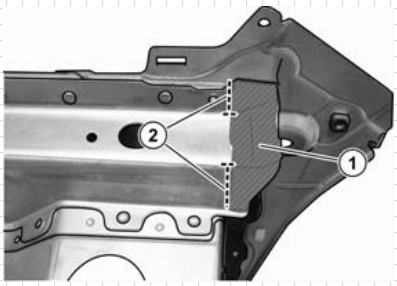
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4.15.1.36

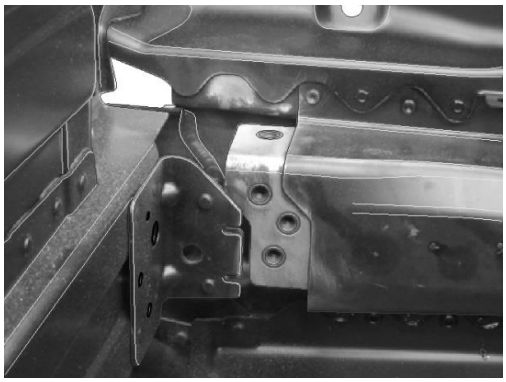


4.15.1.37



4.15.1.38

Body front section inner side



4.15.1.35

Figure 4.15.1.36 shows the outer right side of the new part.

The new part is riveted to the old support frame. Position (1) shows where the bores for the rivets should be made.

The figure shows the right support from the inside.

Transfer the three bores onto the old support stub (1). Diameter **6.7 mm** (0.26 inch).

The figure shows the right side.

Saw into the upper section (1) of the new body front section (hatched) on the left and right (2).

This makes it easier to insert it into the body.

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Fitting the new part

Information The required blind rivets and fixing screws can be obtained from the parts catalogue.

The lower cross member and the rivet points at the upper end near the spring-strut domes are used for positioning.

All surfaces that are riveted or bolted must also be bonded using two-component adhesive.

Position and rivet the blind rivets that connect the new part to the body.

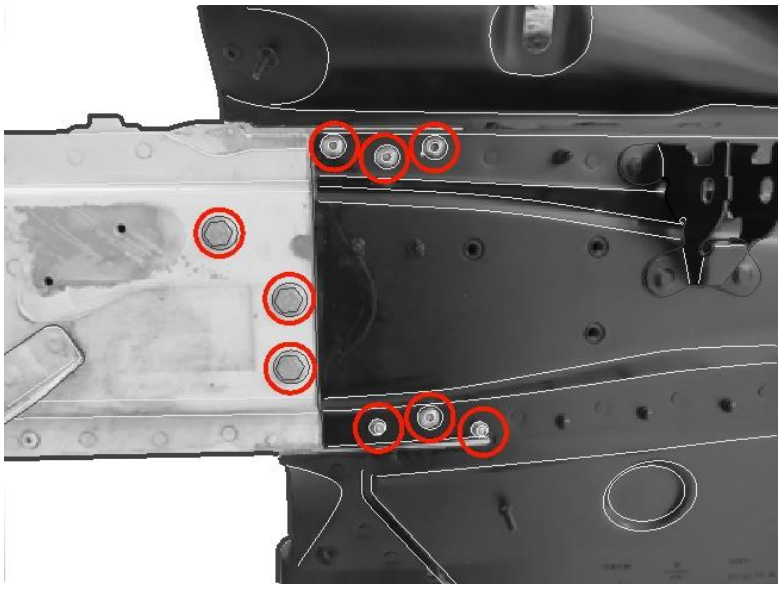
Information Please note that there are two different rivet lengths.

Riveted joints through two plates:
short rivets 3.0–6.5 mm (0.12–0.26 inch)

Riveted joints through three plates:
long rivets 5.0–8.5 mm (0.2–0.33 inch)

The rivet points and screw joints are shown below

The figure (4.15.1.39) shows the new body front section and the old support stub

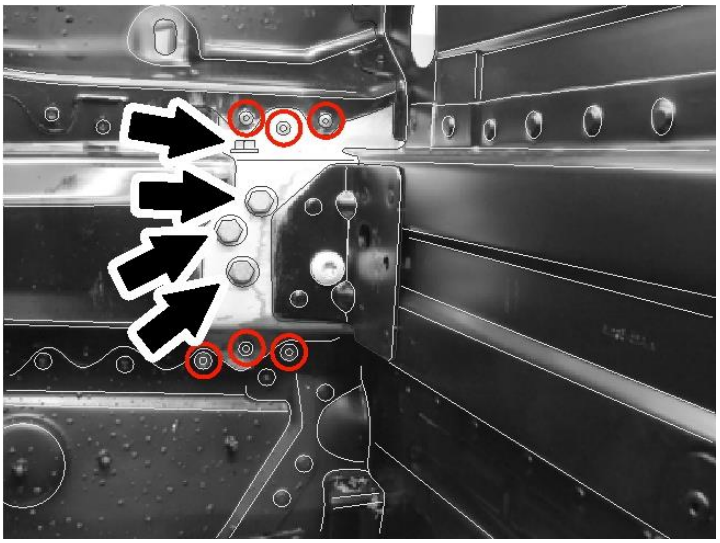


4.15.1.39

- 3 screws: FL-KPF-SHR M8x16 torque: **15 Nm** (11 ft-lb)
- 6 long blind rivets (5,0-8,5 mm)

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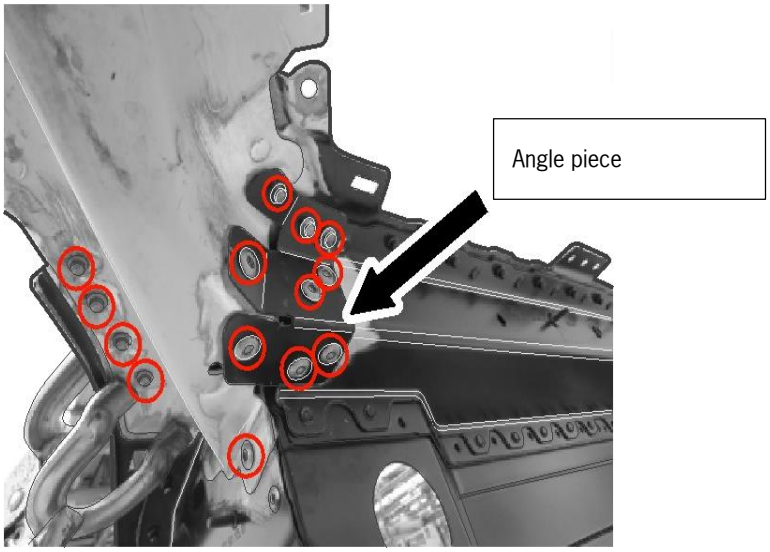
The figure (4.15.1.40) shows the right inner body front section



4.15.1.40

- 4 screws: FL-KPF-SHR M8x16 torque: **15 Nm** (11 ft-lb) (arrow, Figure 4.15.1.40)

The figure shows the body front section on the left side



4.15.1.41

- 14 short blind rivets (3,0-6,5 mm)

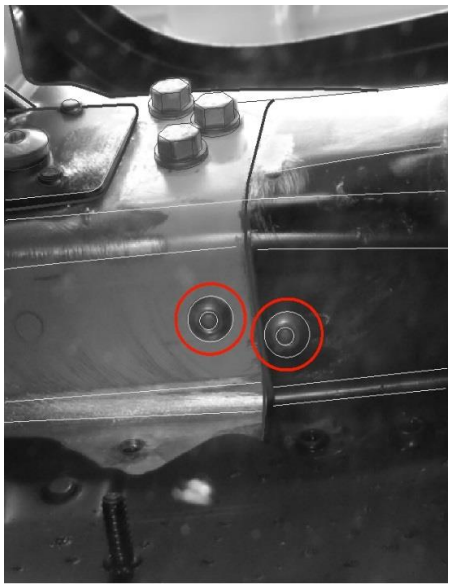
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The figure (4.15.1.43) shows the upward view of left inner side of body front section, underside of support

An angle attachment must be used for the riveting tool in order to set the bottom rivets (Figure 4.15.1.42)



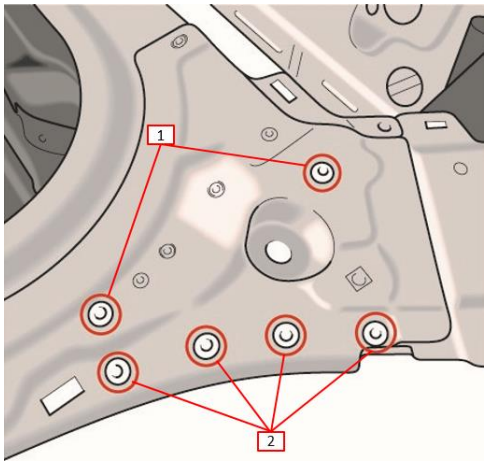
4.15.1.42



4.15.1.43

- 2 short blind rivets (3,0-6,5 mm)

The figure (4.15.1.44) shows the left body front section from above, near the spring-strut dome



4.15.1.44

1. 2 long blind rivets (5,0-8,5 mm)
2. 4 short blind rivets (3,0-6,5 mm)

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The figure shows the rear panel of the body front section from below



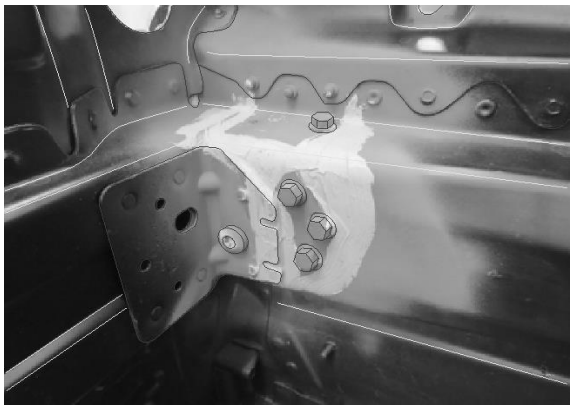
4.15.1.45

- 4 long blind rivets (5,0-8,5 mm)

Sealing measures:

Coat unpainted surfaces with primer, apply sealing compound along the plate ends.

Body front section inner pan (Figure 4.15.1.46)



4.15.1.46

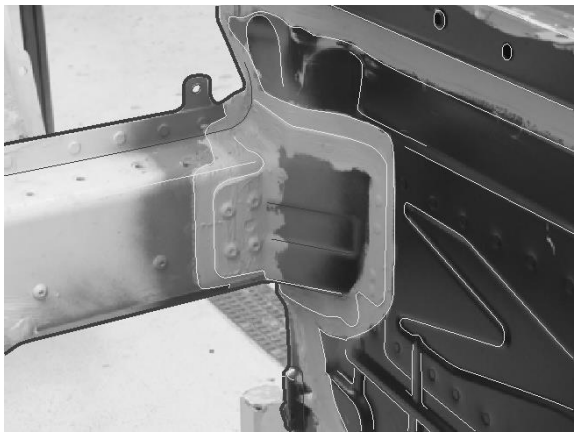
Front side (Figure 4.15.1.47)



4.15.1.47

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Body front section rear side (Figure 4.15.1.48 and 4.15.1.49)



4.15.1.48



4.15.1.49

Side view (Figure 4.15.1.50)



4.15.1.50

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4.15.2.1

4.15.2 Replacing the front strut mount

Safety measures

Always wear the indicated protective equipment to prevent injuries caused by heat or flying debris.

- Goggles
- Safety shoes
- Protective gloves
- Hearing protection

WARNING

Airborne foreign bodies during grinding, drilling and milling

Risk of eye injuries

- Wear safety glasses.

WARNING

Grinding and welding work

Fire or explosion

- Avoid working in an area with flammable or explosive materials.
- Cover flammable or explosive areas.
- Remove flammable or explosive parts.

Caution

Pointed or sharp objects

Risk of lacerations, puncture wounds, or cuts

- Wear personal protective equipment.

Caution

Hot components

Danger of burns

- Let hot components cool down.
- Wear personal protective equipment.

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Required tools by Wieländer+Schill

Designation	Item No.	Qty
Body saw WPS 2010 230 V	120020	1
W+S special central punch F2 (for self-pierce rivets)	628006	2
Slide hammer with hook 5 kg	511300	1
Dead blow bumping hammer	511029	1
Separating chisel incl. handle, body	512001	1
Anvil dolly, half-round	511113	1
File with grip, medium cut 1	521201	1
Manual deburrer	541030	1
Spare blade for manual deburrer	547030	1
Teroson spatula	541010	1
Circular brush, stainless steel ø 75 mm knotted	541202	2
Wire brush, V-shape INOX	541212	1
Mity-Bite clip, large	511312	1
Grip pliers 145 U-format 12"	561151	2
Grip pliers 144	561152	2
Fastener ø 6.35 mm 20 pcs	577107	1
Cartridge gun 3M EPX for 50 ml.	831101	1
Blind riveting tool Taurus 4	571110	1
Pressure reduction valve PLF80/90/PS1/Taurus4	194000	1
Reduction nipple long: G 1/8" axG 1/4" i	194001	1

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Consumables	Item No.	Qty
Solid carbide drill ø 6.7 mm	627010	
3M 2K glue DP 490 (Porsche)		
Blind rivet (long) 5.0-8.5 (Porsche)		20

HAZET

Designation	Item No.	Qty
Tool trolley	179-6-RAL 4000896148851	1
Door RAL 9006	179-21 4000896146246	1
Can holder	179-35 4000896141074	2
Attachable box	179-28 400089141234	1
Paper roll holder	180-34 4000896120840	1
Set of separating plates	173-31/5 4000896090150	2
Set of separating plates	173-32/5 400089120796	2
Cable drum	161-3D 4000896048878	1
Anti-slip mat	180-38 400089120819	6
Flat scraper	824 4000896033881	1
Heat gun	1990-2/6 4000896141586	1
Wire brush	2130-1 4000896012527	2
Ball-peen hammer	2140-5 4000896012695	1
Magnetic finder	1976-1 4000896009749	1
Replacement heads	1953-050 4000896008612	1
Drill	9030-1 4000896109470	1
Angle drill	9030-5 4000896132379	1
Keyhole saw	9034-1 4000896132362	1
Grinder, straight	9032-1 4000896117055	1
Grinder, bent	9032-5 4000896117062	1

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Preparation for replacing the strut dome

These instructions describe how to remove the left front strut dome. Perform the operations on the right side inversely. The estimated time for the described repair is approximately three hours.

Remove the following parts:

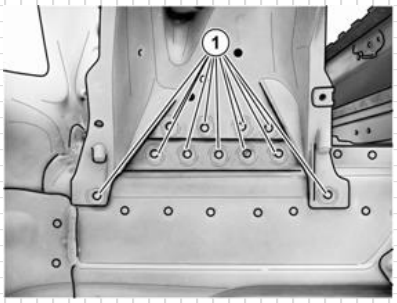
- Fender left
- Headlight left
- Wheel arch liners left
- Underbody, front
- Chassis left
- Front bumper
- Fuel tank
- Brake lines left
- Draining the coolant, front
- Water cooler and cooling hoses left
- Steering gear
- Air jack, front and cross member
- Master cylinder, remove if required

Removing/drilling out the strut dome

Drill the rivets using a solid carbide drill (Ø 6.7 mm (0.26 inches)) from behind (if accessible) until they can be knocked out using a drift punch (Ø 6.0 mm (0.24 inches)).

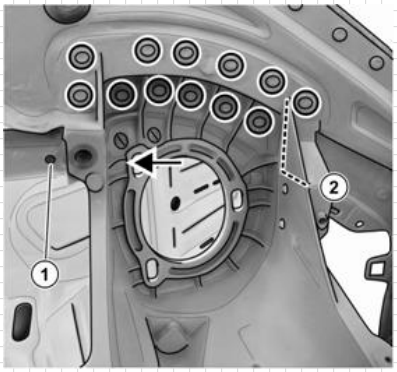
The service life of a drill is about 14 to 20 rivets.

Use drilling fluid to prolong the drill's service life.



4.15.2.2

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4.15.2.3



4.15.2.4



4.15.2.5

Drill the marked rivets using a solid carbide drill (Ø 6.7 mm (0.26 inches)) from behind (if accessible) until they can be knocked out using a drift punch (Ø 6.0 mm (0.24 inches)).

- Saw the defective dome using an air saw (2)
- Pierce the rivet in the direction of the arrow
- Heat the glued joints between dome and body using a hot air blower

Remove the damaged dome.

Preparation for the installation

Carry out grinding operations using a stainless steel wire brush. Always use special grinding wheels for grinding aluminum. Use grinding wheels with grain size P80 to P200. Observe corrosion protection measures.

Thoroughly remove paint from the glued joints (hatched) using an angle grinder.

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Do not remove the beads on the carrier inside; they are part of the body!

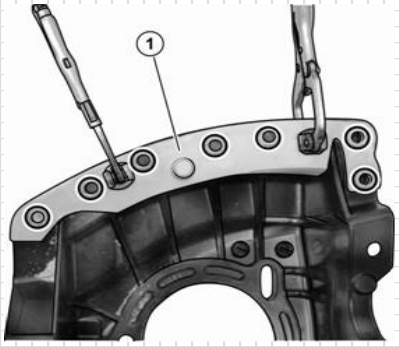
Debur the bore holes on both sides of the body.

Creating a drilling template

Only a drilling template ensures exact positioning of the holes.

Make a drilling template from the defective strut mount. A body air saw is suitable for sawing. Align the drilling template exactly and drill the 7 marked rivet holes.

Then deburr the holes.



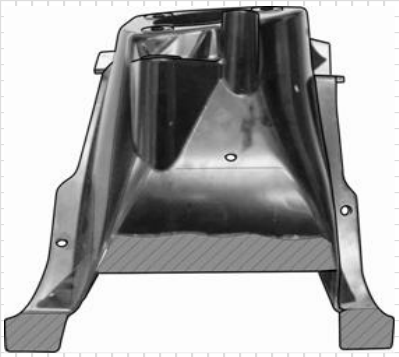
4.15.2.6

Aligning the new part

Grind the gluing surfaces on the new part and on the body down to the bare metal using P100 sandpaper and grease with acetone.

- Apply evenly two-component glue on the new part
- Curing time 2-3 hours at 60 °C (140 °F)
- Install the new part with caution and fix it using fasteners.
- Fit all rivets.

Pay attention to the correct rivet length!



4.15.2.7

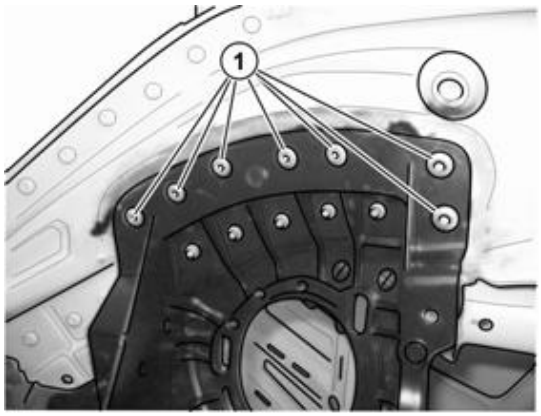


4.15.2.8

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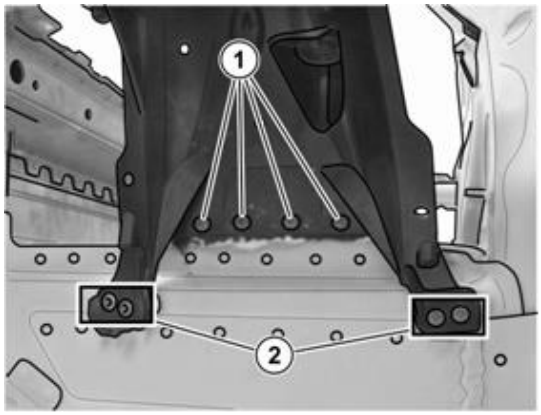
Riveting the new part

The hidden row of rivets (1) should be riveted from the bottom, as the row is hidden by the body.



4.15.2.9

Rivet the first row of rivets (1).

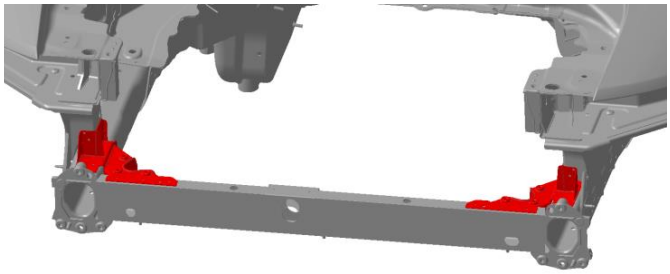


4.15.2.10

Drill the holes for the rivets using a solid carbide drill (Ø 6,7 mm). On the bottom part of the dome, another rivet is fitted in addition to the existing one.

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4.15.3 Repairing the rear end Protective measures



4.15.3.1

The protective equipment listed must always be worn to prevent injuries caused by heat or flying parts.

- Safety glasses
- Safety shoes
- Protective gloves
- Ear protectors

WARNING

Airborne foreign bodies during grinding, drilling, and milling

Risk of eye injuries

- Wear safety glasses.



4.15.3.2

WARNING

Grinding and welding work

Fire or explosion

- Avoid working in an area with flammable or explosive materials.
- Cover flammable or explosive areas.
- Remove flammable or explosive parts.

Caution

Pointed or sharp objects

Risk of lacerations, puncture wounds, or cuts

- Wear personal protective equipment.

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Caution

Hot components

Danger of burns

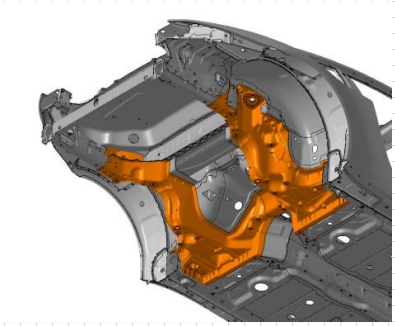
- Let hot components cool down.
- Wear personal protective equipment.

Caution

Hot components

Danger of burns

- Let hot components cool down.
- Wear personal protective equipment.



4.15.3.3

Damage evaluation:

If a rear damage is repairable must be evaluated by a consultant or expert of chassis technology.

In general, the structure of the cross member (Figure 4.15.3.2)) must be completely intact to be repairable.

Required tools (Wieländer & Schill)

DL drill	Item No. 999960
Solid carbide drill, 6.7 mm diameter	Item No. 627010
Ball-peen hammer heavy, 600 gr.	Item No. 999950
Slide hammer with hook 5 Kg	Item No. 511300
Separating chisel incl. handle for body	Item No. 512001
W+S special central punch 2F for self-pierce rivets	Item No. 628006
Taurus 4 blind riveting tool (pneumatic)	Item No. 571110
Cut-off grinder/angle grinder (pneumatic)	
cartridge gun 3M Item No. 831101	
Manual deburrer	Item No. 541030
4 parallel clamps body grip pliers	
Body saw WPS 2010 220V	Item No. 120020
Hot air blower 3000 W	Item No. 801200

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Consumable supplies

Rear carrier

3M 2C adhesive DP 490 (1 per side)

Mixing nozzle (1 per side)

Blind rivet 3.0-8.5 mm (0.12-0.33 inches) (55 pieces, instead of screws)

M5 Torx screw (55 pieces)

Preparation for removing the rear section

Remove bumpers

Remove drive unit

Removing the rear section

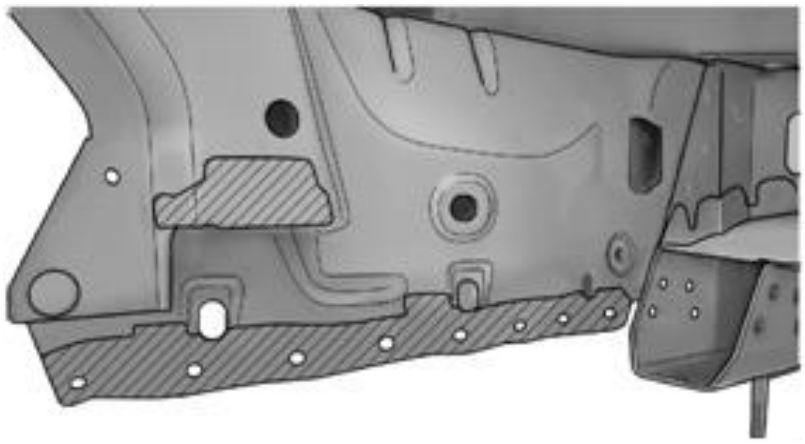
The standard bolts will be replaced by rivets.

Remove the Torx bolts from the carrier frame.

Fit the clamping claw to the carrier frame assembly and knock it loose from the body.

Carry out grinding operations using a stainless steel wire brush. Always use special grinding wheels for grinding aluminum. Use grinding wheels with grain size P80 to P200. Observe corrosion protection measures.

Thoroughly remove paint from the glued joints (hatched).



4.15.3.4

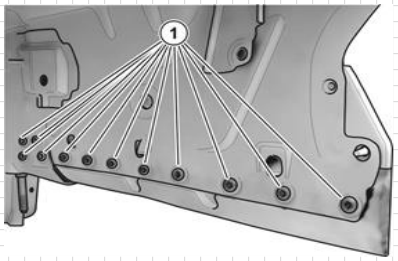
Smooth any roughness on the lower rim that occurs during removal.

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Installing the new part

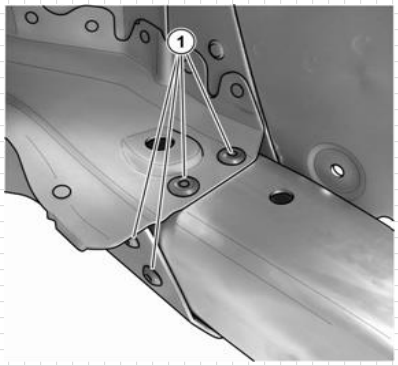
Apply evenly two-component glue on the old bonded joints. The curing time of two-component glue is 2-3 hours at 60 °C (140 °F)

The illustration shows the rivets (1) from the outside on the left. Place the new part, fit the rivets and rivet them.



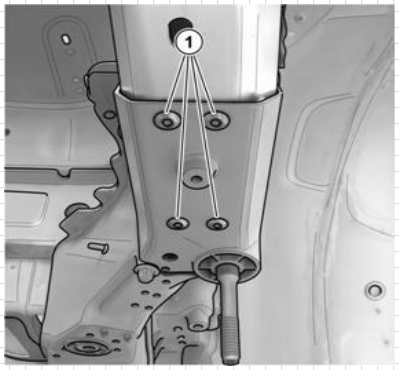
4.15.3.5

The illustration shows the rivets (1) from the inside on the right.



4.15.3.6

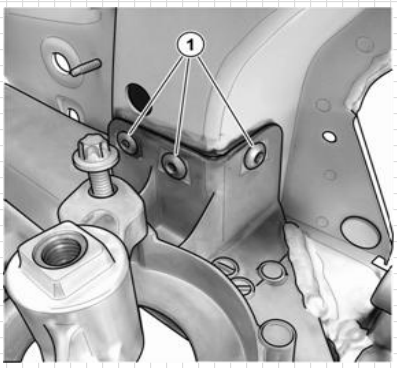
The illustration shows the rivets (1) from below on the right.



4.15.3.7

The illustration shows the rivets (1) on the rear engine mount on the left.

The curing time of two-component glue is 2-3 hours at 60 °C (140 °F).

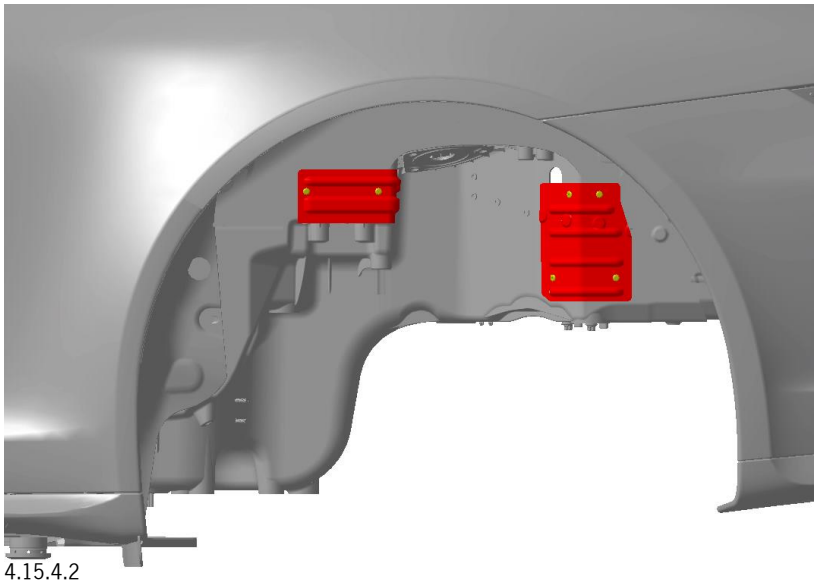


4.15.3.8

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4.15.4 Reinforcement plates cast carrier

The reinforcement plates (shown in red, Figure 4.15.4.1) of the cast carrier can be replaced in the event of damage caused as a result of the rim colliding with something. When removing the reinforcement plates, the area of the cast carrier behind the plates must be checked for damage.



4.15.4.2

Changing the reinforcement plates:

- Center-punch and drill out the rivets
- Head the bonding surface behind the plates using a hot-air gun

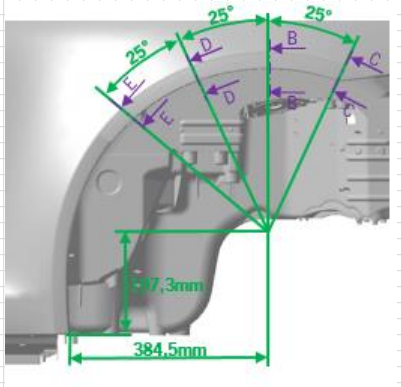
Note

Damage to the cast carrier

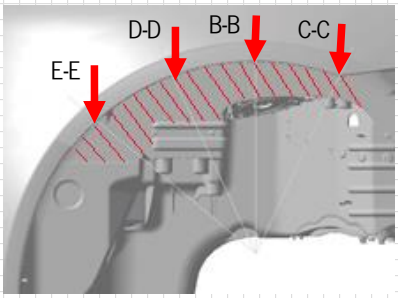
The cast carrier must not be damaged when removing the plates.

- Removing plates, removing adhesive residues
- Check the cast carrier for damage
- Remove paint and primer from the bonding surface
- Degrease the new part and apply adhesive
- Fit the new part and secure using blind rivets 4.8x11.3

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4.15.5.1



4.15.5.3

Measurement (Y) (Figure 4.15.4.3)

Tolerance ± 1,0 mm (0.039 inces)

Cut B-B = 404 mm (15.91 inces)

Cut C-C = 399 mm (15.70 inces)

Cut D-D = 404 mm (15.91 inces)

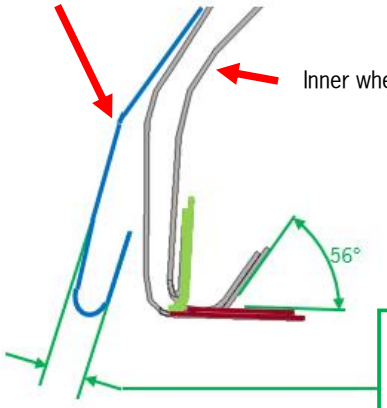
Cut E-E = 401 mm (15.78 inces)

4.15.5 Side panel repair – flange edge wheel arch

After repairing the side panel, a return must be bent on the panel edge of the wheel arch as well as being pulled outwards to generate sufficient clearance (see image 4.15.1 below).

Flange dimensions:

Side panel extended and flanged



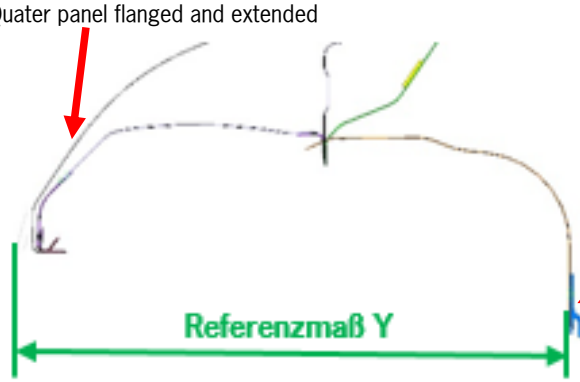
7,0 mm (0.27 inces) (B-B, D-D, E-E)

5,0 mm (0.19 inces) (C-C)

4.15.5.2

Figure 4.15.3 shows the reference measurement points. The reference measurement Y (image 4.15.5.4) corresponds to the measurement from the outer wheel arch flange edge to the wheel arch inner wall.

Quater panel flanged and extended



Measurmentpoint inner wheel well (colored area figure 4.15.5.4)

4.15.5.4

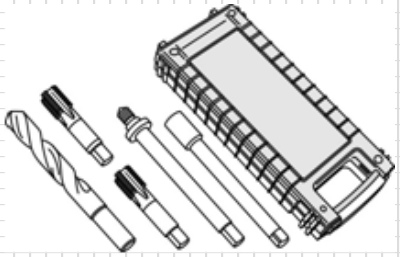
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4.16 Thread repair kit

The chassis and the assembly carriers are bolted to the aluminum cast parts of the body. To meet these special requirements, the threads are provided with Helicoil threads. A repair kit is available for replacing these Helicoil threads. When opening a bolted connection, it is absolutely necessary to replace the bolt. This also applies to the assembly mounts. If the thread is damaged, replace the thread insert and fit a new Time-Sert thread insert.

NOTE

Defective Helicoil threads of the bolted connections of chassis and assembly carrier have to be replaced by Time-Sert thread inserts. It is not allowed to replace a defective Helicoil thread by a new Helicoil.



4.16.1

Two systems are available for thread repair. The Helicoil repair system supplied by Böllhoff and Time-Sert thread inserts supplied by Würth. Porsche recommends special thread repair kits for particular thread sizes.

It is important that the corresponding tightening torque of the bolted connection can be achieved after repair.

Basic method for repairing threads with thread inserts:

1. Remove the defective thread insert
2. Drill a core hole using a special core hole drill
3. Cut a thread using a tap (two-piece/three-piece), use a cutting agent.
4. Insert the new thread insert with a special inserter

Thread repair kits can be ordered at the following companies:

Wilhelm Böllhoff GmbH & Co. KG
Archimedesstr. 1–4
33649 Bielefeld
Germany
Phone: + 49 (0)521-44 82 01/Fax: + 49 (0)521-44 93 64

Adolf Würth GmbH & Co. KG
Reinhold-Würth-Straße 12-17
74653 Künzelsau-Gaisbach
Germany
Phone: +49 (0)7940-15 0/Fax: +49 (0)7940-15 10 00

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4.16.1 Thread repair of chassis bolt connections

WARNING

Airborne foreign bodies during grinding, drilling, and milling

Risk of eye injuries

- Wear safety glasses.

WARNING

Working with compressed air

Risk of eye injuries
Damage and dirtying of components

- Wear safety glasses with side eye protection.
- Protect the point at which the compressed air emerges with suitable material.
- Place the point at which the compressed air emerges on a suitable surface.

NOTE

Threaded joints on chassis and unit suspensions

Unreliable threaded connection

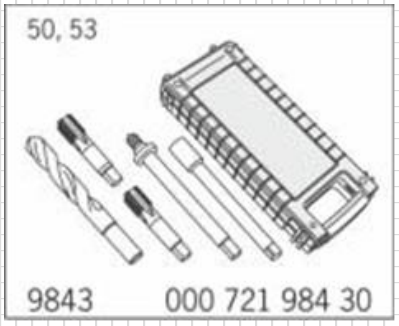
- Defective Helicoil threaded inserts must not be replaced with the same Helicoil threaded inserts.
- Replace defective Helicoil threaded inserts with TimeSert threaded inserts.

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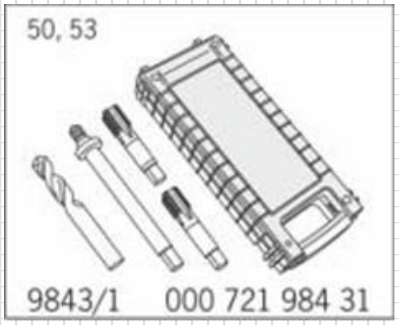
Threaded bushings without collar

Tools:

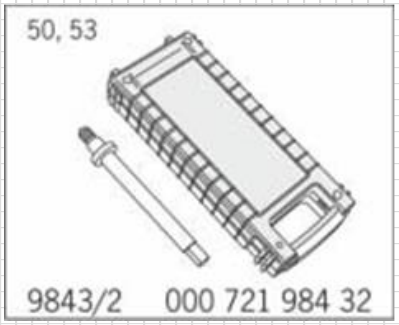
- Hot air blower V.A.G. 1416 (WE1119)
- Thread repair kit 9843
- Thread repair kit 9843/1
- Thread repair kit 9843/2
- Thread repair kit 9843/3
- Time-Sert thread repair No.122-1 Item.1
- Time-Sert thread repair No.122-1 Item.2



4.16.1.1



4.16.1.2



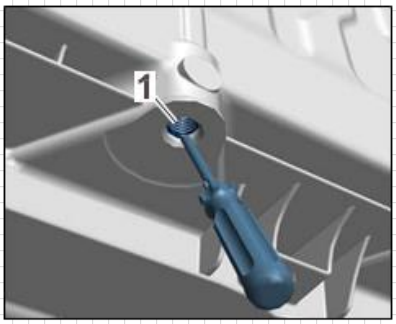
4.16.1.3



4.16.1.4

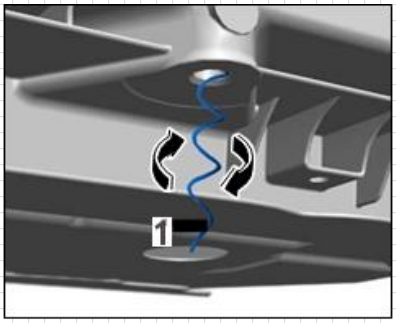
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Repair of threaded bushings without collar



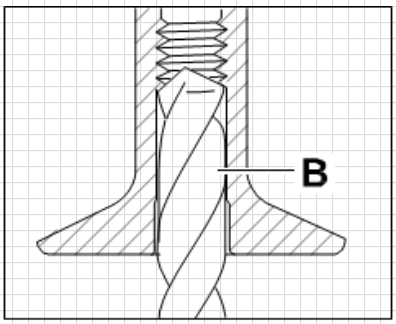
4.16.1.5

- Remove standard wire thread inserts/Helicoil before drilling
- Release the wire thread insert /Helicoil (1) with a suitable screwdriver



4.16.1.6

- Pull out the wire thread insert/Helicoil (1)

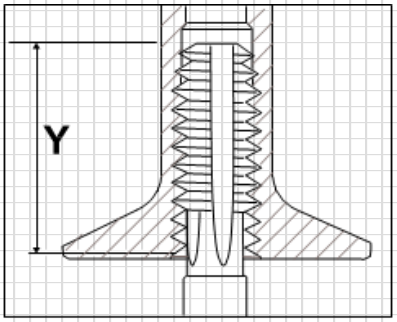


4.16.1.7

- Drill out the old thread completely using a special three-fluted drill (included in the kit) (B)

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Cut the thread to the dimension (Y) with a cutting tool



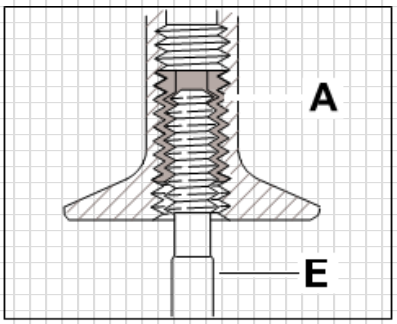
4.16.1.8

- Clean the thread: Blow out chips from the thread with compressed air, flush the thread with brake cleaner, dry the thread with compressed air
- Screw the threaded bushing (1) on the inserter (2)



4.16.1.9

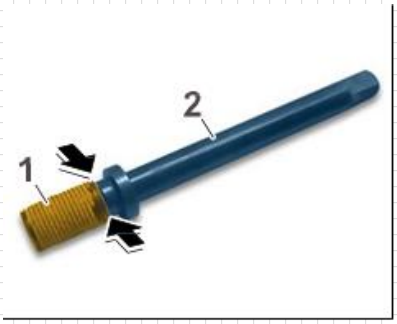
- Unscrew the inserter (E) from the threaded bushing (A)



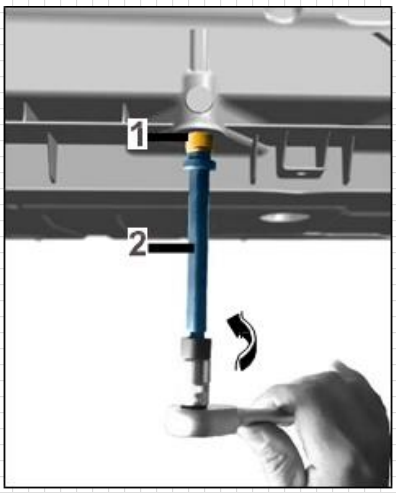
4.16.1.10

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Make sure that the threaded bushing (1) is screwed completely on the inserter (2) – arrows



4.16.1.11



4.16.1.12

- Insert the threaded bushing (1) completely with the inserter (2)

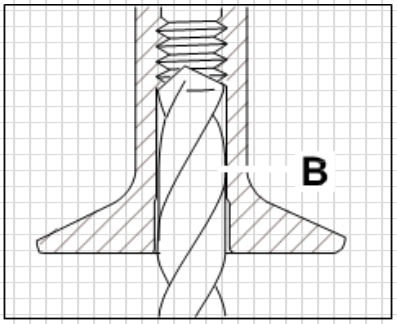
- Briefly heat the thread insert with a WE1119 hot air blower, Leister-Electron/V.A.G. 1416. Time: 2 minutes, temperature: 80 °C (176 °F). Alternatively, do not screw the repaired thread for approx. 3-4 hours.

Information The heating or waiting time is required to prevent the thread insert from turning when screwing in the bolt.

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Threaded bushings with collar

- Remove the standard wire thread inserts (Helicoil) before drilling
- Drill out the old thread completely using the drill (included in the kit) (B)

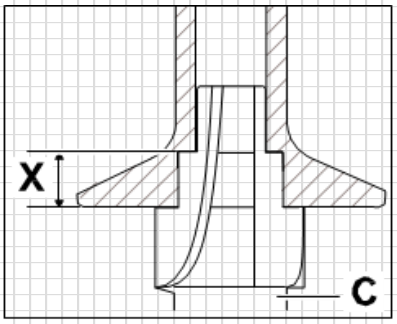


4.16.1.13

The repair bushing has to be fitted more deeply. Use the tool included in the tool kit for milling the appropriate recess

- Mill the recess with the core drill (C)

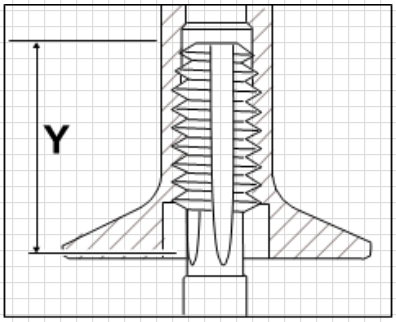
Use an electronically controlled drill for milling and set a speed of approx. 250 rpm



4.16.1.14

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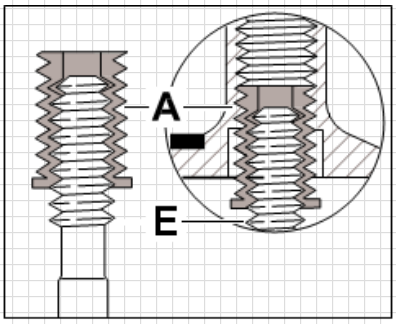
Cut the thread to the dimension (Y) with a cutting tool



4.16.1.15

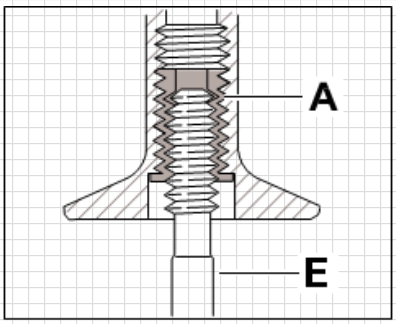
- Place the threaded bushing on the inserter
- Oil the inserter (E)
- Manually screw the threaded bushing (A) on the inserter (E)

During press fitting in the basic thread, forming the internal thread requires perceptibly more force on the inserter. Press fitting is completed as soon as the inserter turns again more easily.



4.16.1.16

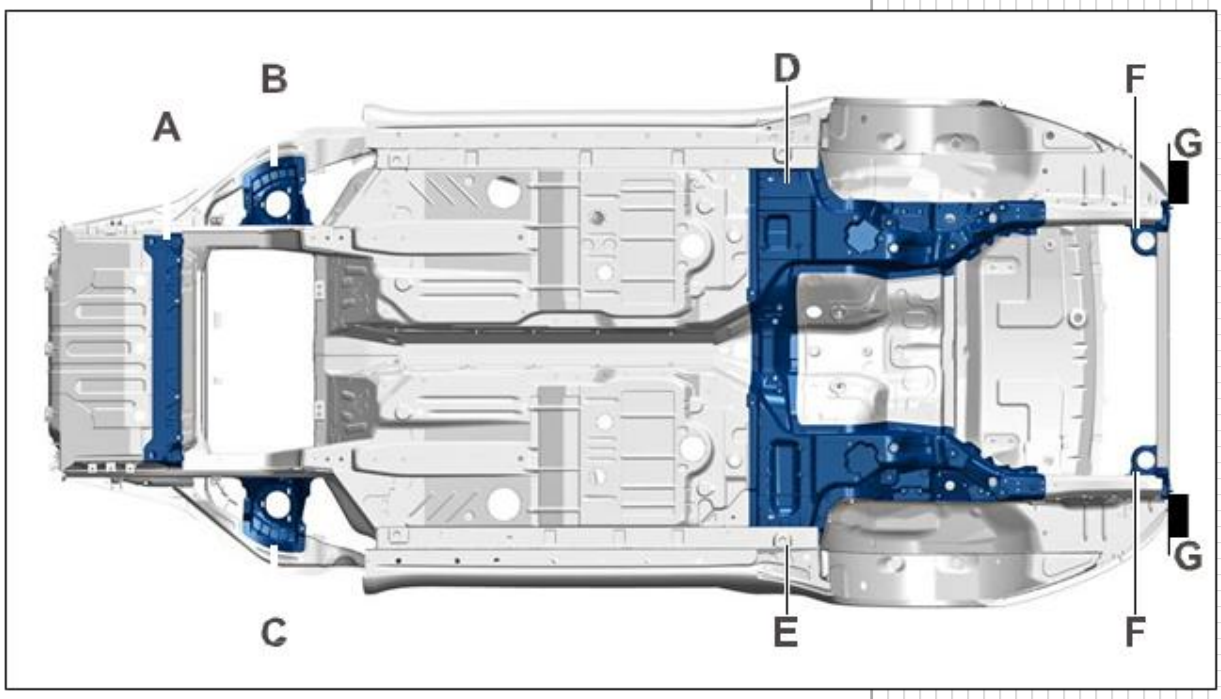
Unscrew the inserter (E) from the threaded bushing.



4.16.1.17

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Repair positions – overview



4.16.1.18

A Trunk cross member

B Strut mount, left

C Strut mount, right

D Rear beam, left

E Rear beam, right

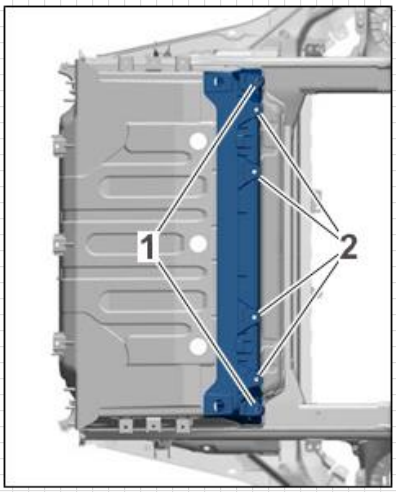
F Engine mount left & right

G Bumper mount (impact absorber) left & right

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Threads – cross member

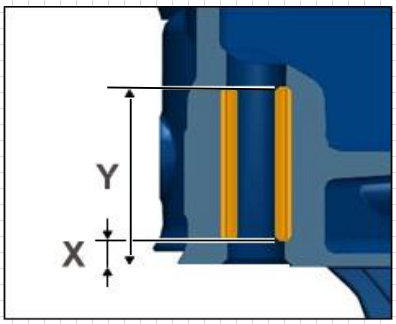
Thread 1; front axle mounting (Helicoil)	M12x1.5x30
Thread 2; axle support mounting (Helicoil)	M12x1.5x30



4.16.1.19

Threads 1 / 2:

Use	Explanation	Type	Basic value
Threads 1 and 2	Dimension Y	Length	33 mm
Threads 1 and 2	Dimension X	Length	5 mm



4.16.1.20

Use repair kit 9843 with threaded bushings (Porsche).

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Threads – strut mount

Thread 1; diagonal brace mounting (Helicoil)	M8x16
Thread 2; alarm horn mounting (only on the left strut mount) (Helicoil)	M8x16
Thread 3, sensor mounting	Thread M6

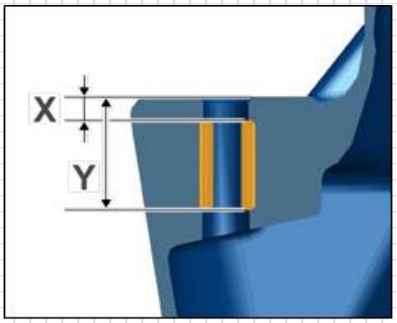
Thread 1:

Use	Explanation	Type	Basic value
Thread 1	Dimension Y	Length	20 mm
Thread 1	Dimension X	Length	5 mm

Use repair kit 9843/3 with threaded bushing (Porsche).



4.16.1.21



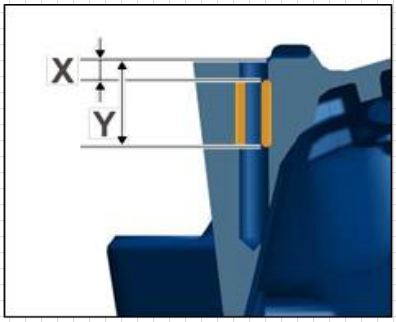
4.16.1.22

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Thread 2:

Use	Explanation	Type	Basic value
Thread 2	Dimension Y	Length	20 mm
Thread 2	Dimension X	Length	5 mm

Use repair kit 9843/3 with threaded bushing (Porsche).

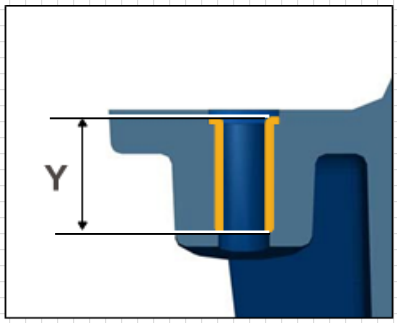


4.16.1.23

Thread 3:

Use	Explanation	Type	Basic value
Thread 3	Dimension Y	Length	9.4 mm

Use repair kit No.122-1 Item 1 Time-Sert with short threaded bushing.



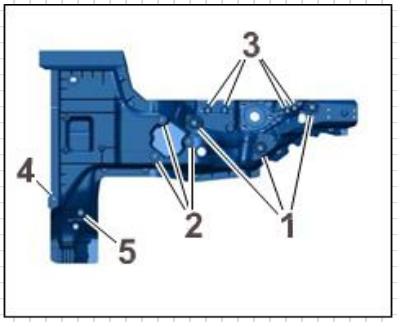
4.16.1.24

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Longitudinal beam, rear

Left beam:

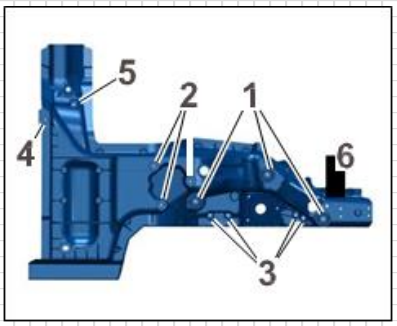
Thread 1; chassis mounting (Helicoil)	M12x1.5x24 (3x)
Thread 2; chassis mounting (Helicoil)	M10x20 (3x)
Thread 3; (Helicoil)	M10x20 (4x)
Thread 4; gearbox mounting (Helicoil)	M10x20 (1x)
Thread 5;	M10 (1x)



4.16.1.25

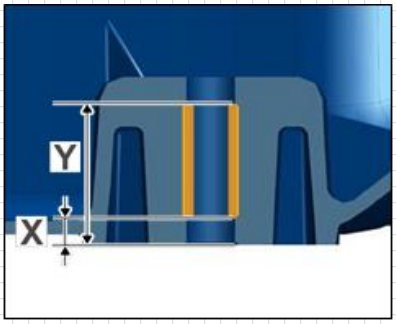
Right beam:

Thread 1; chassis mounting (Helicoil)	M12x1.5x24 (3x)
Thread 2; chassis mounting (Helicoil)	M10x20 (3x)
Thread 3; (Helicoil)	M10x20 (4x)
Thread 4; gearbox mounting (Helicoil)	M10x20 (1x)
Thread 5;	M10 (1x)
Thread 6; ground cable mounting	M8 (1x)



4.16.1.26

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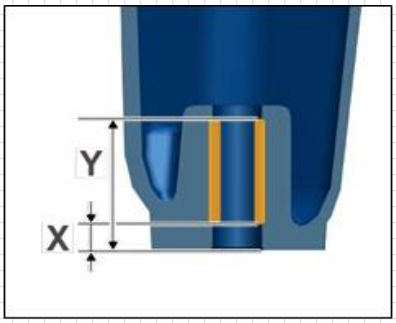


4.16.1.27

Thread 1:

Use	Explanation	Type	Basic value
Thread 1	Dimension Y	Length	27 mm
Thread 1	Dimension X	Length	5 mm

Use thread repair kit 9843 with threaded bushing (Porsche).



4.16.1.28

Thread 2/3:

Use	Explanation	Type	Basic value
Thread 2 and 3	Dimension Y	Length	25 mm
Thread 2 and 3	Dimension X	Length	5 mm

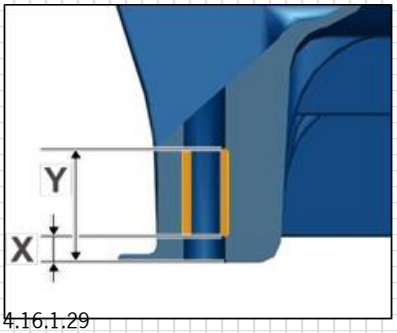
Use thread repair kit 9843-1 with threaded bushing (Porsche).

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Thread 4:

Use	Explanation	Type	Basic value
Thread 4	Dimension Y	Length	25 mm
Thread 4	Dimension X	Length	5 mm

Use repair kit 9843/1 with THREADED BUSHING (Porsche).

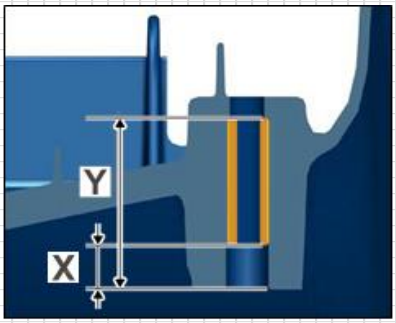


4.16.1.29

Thread 5:

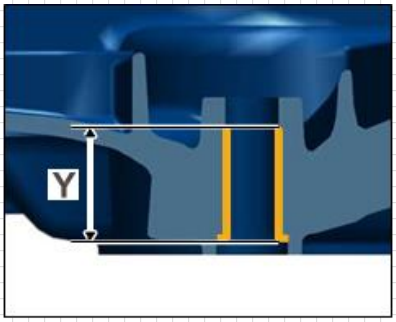
Use	Explanation	Type	Basic value
Thread 5	Dimension Y	Length	37 mm
Thread 5	Dimension X	Length	10 mm

Use repair kit 9843/1 with inserter included in repair kit 9843/2 and threaded bushing (Porsche).



4.16.1.30

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4.16.1.31

Thread 6:

Use	Explanation	Type	Basic value
Thread 6	Dimension Y	Length	16.2 mm

Thread repair 6 only for the right beam.

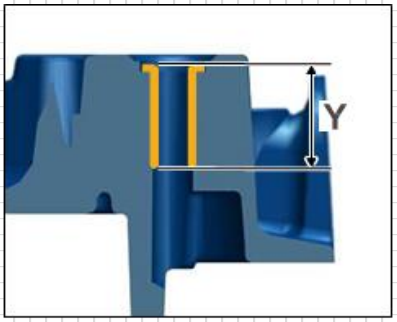
Use repair kit No. 122-1 Item 2 Time-Sert thread repair with long threaded bushing.

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Thread 1:

Use	Explanation	Type	Basic value
Thread 1	Dimension Y	Length	16.2 mm

Use repair kit No. 122-1 Item 2 Time-Sert with long threaded bushing.

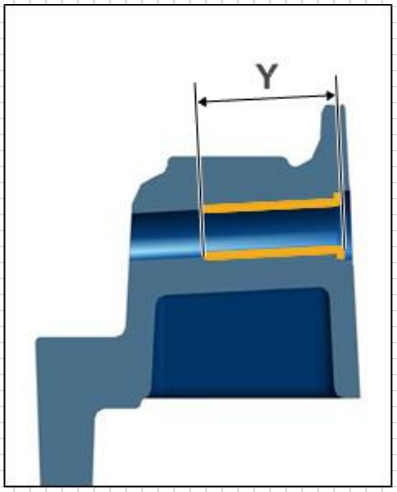


4.16.1.32

Thread 2:

Use	Explanation	Type	Basic value
Thread 2	Dimension Y	Length	9.4 mm

Use repair kit No.122-1 Item 1 Time-Sert with short threaded bushing.



4.16.1.33

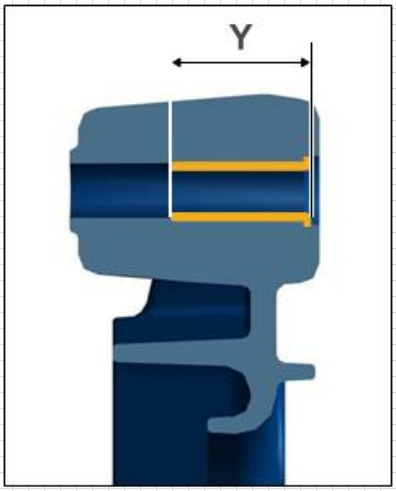
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Longitudinal beam, rear (impact absorber mount)

Thread M8 in cast part



4.16.1.34



4.16.1.35

Use	Explanation	Type	Basic value
Thread 1	Dimension Y	Length	16.2 mm

Use repair kit No. 122-1 Item 2 Time-Sert with long threaded bushing.

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4.17 Installing roof assembly

Preparation measure

WARNING

Toxic substances

Poisoning or suffocation

Burns to the eyes and skin

- Ventilate the work area well.
- Never ingest or inhale.
- Read specific information on the Hazard Sheet.
- Do not smoke, eat, or drink in the work area.

NOTE

Application of adhesive

Poor adhesive bond

Roof module becomes detached

- Fixing time: Approx. 1 hour.
- The vehicle must not be used until a curing time of 2 hours has elapsed.
- Processing temperature at least 10°C (50°F).

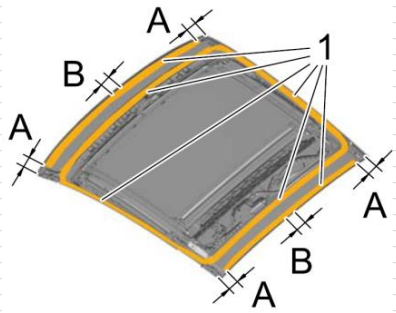
A drying time of at least 10 minutes must be observed between cleaning the frame and applying primer! No cleaning solution residue may remain on the frame.

- The adhesive has an open time of **15 min**, which means that the adhesive must be applied and the component affixed within this period of time.
- To ensure that the substance is completely mixed, apply a 30 mm long bead of fresh adhesive to a piece of cardboard before processing.

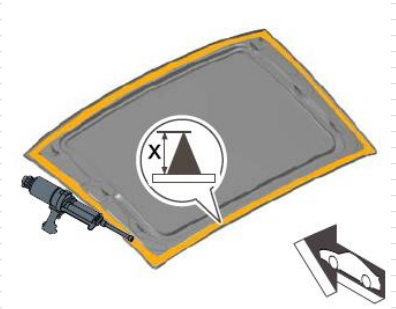


4.17.1

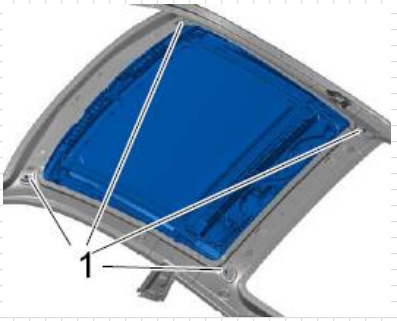
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4.17.2



4.17.3



4.17.4

Installation:

Information Two people are needed in order to insert, position and secure the roof assembly.

- Clean bonding surfaces (1) with cleaning solution.
- Prime bonding surfaces (1).
- Apply adhesive on the primer.
- Do not apply adhesive in areas (A) 50 mm and (B) 30 mm.

- Apply a triangular bead of adhesive measuring **X = approx. 15 mm** (4.17.3).

- Position roof assembly

Gap from front roof pillar to roof	Gap dimension 5.5 mm -1 mm
Offset from front roof pillar to roof	Gap dimension 0 mm -1 mm
Gap from rear roof pillar to roof	Gap dimension 5.5 mm -1 mm
Offset from rear roof pillar to roof	Gap dimension 0 mm -1 mm

- Screw on and tighten fastening nuts (**1**) on the ⇒ Tightening torque **10 Nm** (7.5 ftlb.) roof assembly at front and rear (4.17.4).

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5 Interior

5.1 General

The interior design of the 911 GT3 Cup (991 II) focuses on ergonomics and driver´s safety. The center console is tilted towards the driver in order to improve accessibility of the control elements. Appearance improvements feature colored controls and a Cosworth data logger with colored display. Noise insulation is omitted for weight reduction reasons. The starter battery and the new fire extinguishing system using gaseous extinguishing agent are installed in the passenger footwell.



5.1.1

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5.2 Drivers safety

The substantial occupant safety system of the 911 GT3 Cup (991 II) primarily includes the following components:

- Certified safety cage with feed protection pads
- FIA homologated racing bucket seat with longitudinal adjustment
- Six-point safety belt connected to safety cage
- Safety steering column

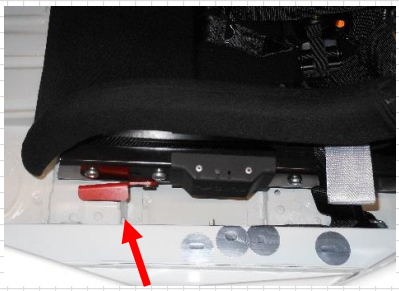
5.2.1 Seat

The new developed Recaro racing bucket seat offers a high degree of safety and individual comfort to the driver. Compared to standard safety seats, this combination of seat and seat console provides considerable adjustment options. The height- and longitudinal adjustment allows setting the best possible seat position for the driver. In addition, the seat padding may be optimally adapted to the driver's body shape by means of seat cushions in different thicknesses. Furthermore, foaming of individual seats is possible (see 5.2.4 Padding System).



5.2.1.1

An adjusting lever on the left side of the seat console allows a longitudinal adjustment of the seat position (5.2.1.2).



5.2.1.2

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DANGER

Use of seats and belts after an accident.

Not sufficient protection.

Serious injury

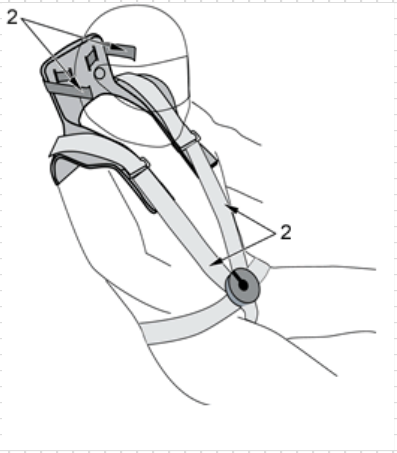
- Check the seats and belts after an accident and replace if necessary.

DANGER

Using Recaroseat without HANS System

Serious injury

- Use Recaro seat only in conjunction with the HANS System (Figure 5.2.1.3).



5.2.1.3

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5.2.2 Seat rail tightening torques

WARNING

Incorrect handling of safety-relevant bolts

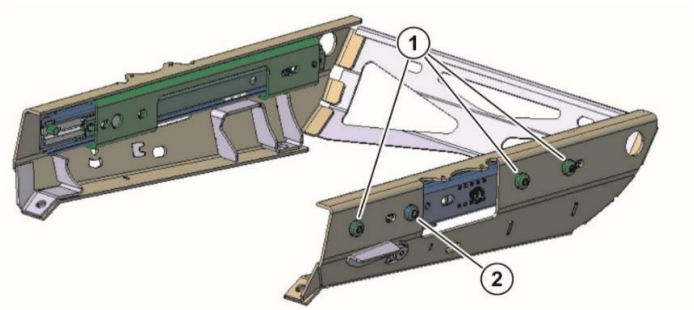
Injuries

Loss of torque

- Always use new fastening bolts and nuts following removal.
- Observe specified tightening torques.
- Carry out a visual inspection of all re-used parts.

Tighten all bolts to a tightening torque **28 Nm ±2 Nm**.

Use medium-strength thread locker.



5.2.2.1

1 M10x16

2 7/16“ UNFx16

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5.2.3 Bucket seat tightening torques

WARNING

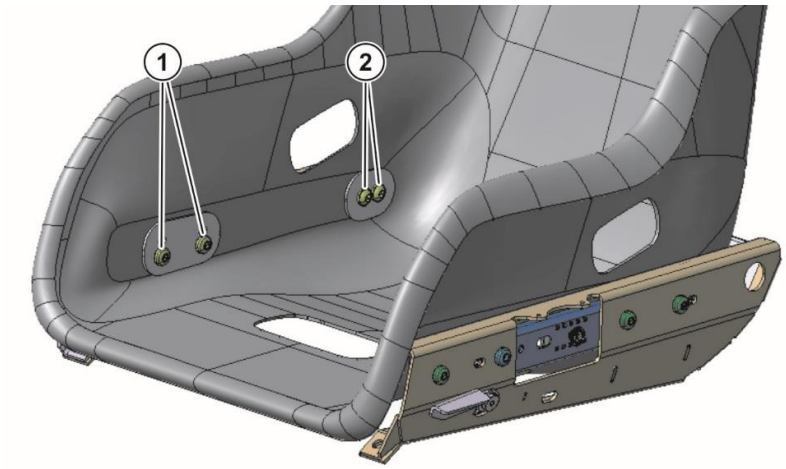
Incorrect handling of safety-relevant bolts

Injuries
Loss of torque

- Always use new fastening bolts and nuts following removal.
- Observe specified tightening torques.
- Carry out a visual inspection of all re-used parts.

Tighten all bolts to a tightening torque **23 Nm ±2 Nm**.

Use medium-strength thread locker.



5.2.3.1

1 M10x16

2 7/16“ UNFx16

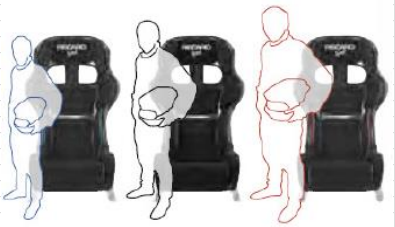
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5.2.4 Padding system

Different seat pads are available and may be ordered in three sizes (S, M, L). The seat pads can be purchased at Recaro. On delivery, the bucket seat is equipped with standard padding in medium size (M).

For safety and homologation reasons only the yellow colored seat pads may be changed (Figure 5.2.4.2) The sections shown in yellow may be covered with a foamed seat insert, as long as all FIA and possible local requirements. The material must be flame proof and must not exceed a thickness of 50 mm in any place.



5.2.4.1



5.2.4.2

Seat pad thickness

S = 30 mm (1.2“)

M = 20 mm (0.8“)

L = 10 mm (0.4“)

Contact address

RECARO Automotive GmbH & Co. KG

Stuttgarter Straße 73

D-73230 Kirchheim unter Teck

Phone: +49 (0) 70 21-93 50 00

Fax: +49 (0) 70 21-93 53 39

E-Mail: info@recaro-automotive.com

Internet: www.recaro-automotive.com

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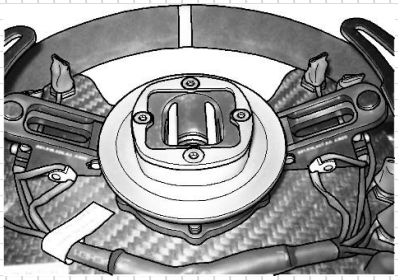
5.3 Steering wheel

Particular attention was paid to the steering wheel as a central control element. All necessary functions which are typical used during driving may be operated by switches and pushbuttons on the steering wheel, without removing the hands from the steering wheel.

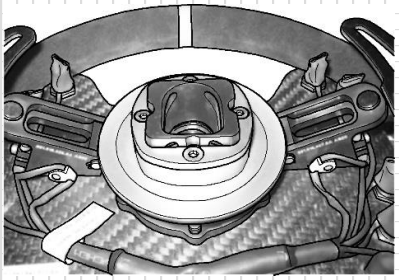


5.3.3

The flattened bottom part of the steering wheel rim provides ample legroom during driving and when getting into and out of the car. In order to provide additional space for getting in and out, the steering wheel is attached to the steering column by using quick release coupling. If required, the steering wheel may be disconnected from the steering column.



5.3.1 Quick release coupling closed



5.3.2 Quick release coupling open

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5.4 Cockpit ventilation

Two NACA air intakes have been integrated into the front bonnet in order to ensure a fresh air supply to the vehicle interior. The left intake – as seen in the driving direction – provides fresh air through a flexible aluminum hose directly onto the driver (yellow arrow). The right intake, leads the air into the blower unit below the dashboard. A switch in the center console allows changing the outlet of the airflow. It is possible to guide the fresh air directly onto the windshield or through openings in the dashboard onto the driver.



5.4.1



5.4.2

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6 Electrical system

6.1 General

The 911 GT3 Cup (991 II) has been significantly improved in terms of operating comfort and functionality. Compared to previous models, the electrical equipment has been upgraded and new and attractive features are available. The integration of an electro-pneumatic gear shift system, the innovative electrical system control unit, and the color display all improve the operating comfort. Moreover, the center console is now oriented towards the driver so that the operating ergonomics are considerably improved.

6.2 Power supply

6.2.1 Battery

An AGM battery (Absorbent Glass Material) with 70 Ah is used in the 911 GT3 Cup (991 II) (6.2.1.1). Special micro-fiber glass mats are inserted tightly between the positive and negative lead plates, binding the entire battery acid. In demanding situations, higher amounts of energy can be delivered by the fast reaction between the acid and the plate material. The battery is maintenance-free and sealed. To optimize the vehicle's weight distribution, the battery is installed inside the vehicle in the passenger foot well.

The maintenance-free AGM battery offers the following advantages:

- Sealed, valve-controlled battery with high cycle stability
- High cold start performance
- No acid leaks in case of damage, vibration-, leak- and tilt-proof
- Flexible installation and safe handling
- High capacity and longer service life

For an improved longevity of the battery, it is recommend to regularly charge/compensation charge the battery.

6.2.2 Generator

In addition to the battery, the generator ensures the power supply to the electrical consumers while the engine is running. The rated current of the generator is 175 amps.



6.2.1.1

The battery is designed for a cut-off voltage of 14.5 to 14.8 V

The generator cut-off voltage is 13.8 V

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6.2.3 Battery master switch

WARNING

Operating the battery disconnect switch

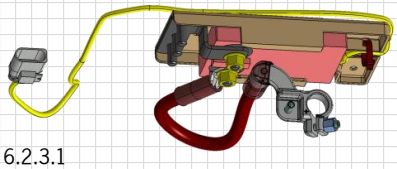
Electrical system disconnected from battery

Electrical consumers turned off

Engine stops

Changed vehicle handling

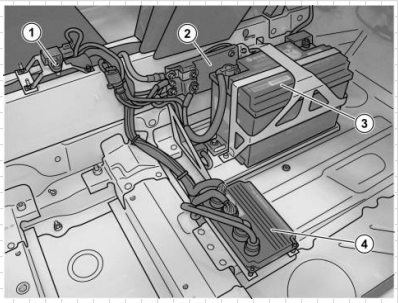
- Only operate the battery disconnect switch in an emergency or when the vehicle is stationary



6.2.3.1

The battery master switch (6.2.3.1) cuts off all electrical circuits (battery, generator, lights, ignition and electrical controls, etc.) as well as the engine. If connecting any additional consumers, it is not recommended to connect any consumers directly to the battery, as the main switch will not actuate their power supply when using the emergency off switch.

The battery master switch (Pos.2 in picture 6.2.3.2) is installed right next to the battery. It´s located on the center tunnel and covered by the battery cover, as well as the battery itself.



6.2.3.2

1 Acceleration sensor
2 Battery master switch
3 Battery
4 Electrical system control unit

The battery master switch can be operated in two different ways:

Inside operation

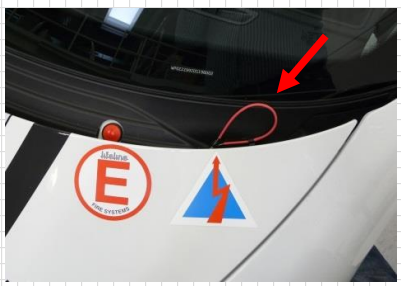
The “Main” switch (1) which is located in the center console is used as the inside actuator.



6.2.3.3

Outside operation

Another release mechanism for the battery master switch is located outside the vehicle on the driver’s side at the bottom of the windshield. Pulling the red loop activates the switch installed below the cowl and disconnects the battery from the electrical system immediately.



6.2.3.4

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6.3 Electrical system protection

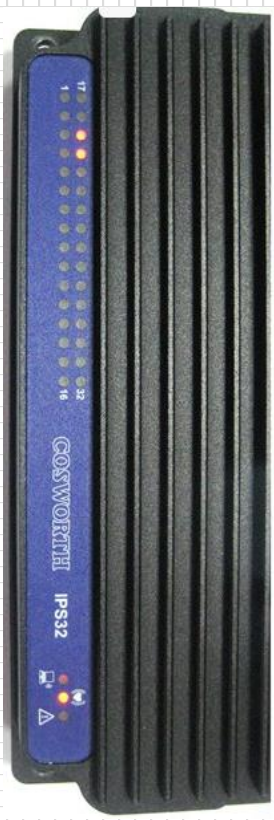
6.3.1 Electrical system control unit IPS32

In the 911 GT3 Cup (991 II), the IPS32 electrical system control unit takes over the functions of fuses and relays. The IPS32 also ensures the power supply to the electrical consumers. The free programmability allows the unit to respond to the individual needs of the consumers. Therefor a channel-selective, separately secured control is carried out. A diagnosis of the module is possible using the appropriate software. The diagnostic connection is located on the B-pillar on the passenger side.

Connections



6.3.1.1



6.3.1.2

1	Power supply
2	HI output
3	LOW input
4	Input switch

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Output C (low power)

Pin name	Pin	LED	Consumer	active if	mean current	Max current	Channel Name
common supply 3	B	1	switch brake light, diagnostic msa box, option CAN/sensor, c50 logger, option abs	Ignition is on	1 A	4 A	pcu_01_com_sply3
common supply 1	T	2	connector headlights left (cabin side), connector headlights right (cabin side), option light ID, transponder	Ignition is on	0,5 A	4 A	pcu_02_com_sply1
foglight front	C	3	Foglight front	Ignition is on and Lights switch is on	0.5 A	4 A	pcu_03_fogLT_f
daytime LED front	D	4	connector headlights left (cabin side), connector headlights right (cabin side)	Ignition is on	1 A	4 A	pcu_04_dayLT
flasher left	E	5	connector headlights left (cabin side), taiillights left	Flasher switch is left or hazard on	1 A	4 A	pcu_05_flasher_L
brakelights	F	6	Taillights right, Taillights left	Brakeswitch is active or brake pressure > 5 bar	2 A	4 A	pcu_06_brkLT
common supply 4	G	7	start button, connector AC flaps, option abs CT15, MS4.6 CT15	Ignition is on	0.5 A	4 A	pcu_07_com_sply4
foglight rear (rainlight)	H	8	rainlight	Switch Rainlight on	0,7 A	4 A	pcu_08_rainLT
flasher right	J	9	connector headlights right (cabin side),taiillights right	Flasher switch is right or hazard on	1 A	4 A	pcu_09_flasher_R
fan engine compartment	K	10	fan engine compartment	not used	-	-	pcu_10_faneng
intank pump 1+2	L	11	connector tank	Ignition is on and Intank switch is on	3 A	5 A	pcu_11_intank1_2
taillights	M	12	taillights left, taillights right	Ignition is on and Lights switch is on	1,5 A	4 A	pcu_12_tailLT
servo pump	N	13	servo pump (signal)	RPM > 300	0.05 A	4 A	pcu_13_steerp
intank pump 3+4	P	14	connector tank	not used	-	-	pcu_14_intank3_4
common supply 2	R	15	yaw rate sensor, C50 logger, diagnostic msa box	Ignition is on	0,4 A	4 A	pcu_15_com_sply2
ICD	S	16	cosworth ICD system	Main switch is on	0,93 A	4 A	pcu_16_dash
wiper	X	17	wiper engine	Ignition on and Wiper Button steering wheel pressed	3 A	14 A	pcu_17_wip
wiper	Y		wiper engine				
n.c.	(a)	18	free	-	-	-	-
shift valve supply	(b)		shifting valve block	Ignition is on (with delay 5 sec)	0,4 A	4 A	pcu_18_gearvlv
option output 1	Z	19	option output 1	Switch Option 1 is on	-	14 A	pcu_19_optH_1
option output 1	(h)		option output 1				
option output 2	(c)	20	option output 2	Switch Option 2 is on	-	14 A	pcu_20_optH_2
option output 2	(j)		option output 2				
radio	(d)	21	radio	Main switch is on	-	24 A	pcz_21_radio
radio	(e)		radio				
radio	(f)		radio				
radio	(g)		radio				
option fuel pump reserve	A	22	connector tank	not used	-	-	pcu_22_sup_rp
option fuel pump reserve	U		connector tank				
option fuel pump reserve	V		connector tank				
option fuel pump reserve	W		connector tank				

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Output B (high power)

Pin name	Pin	LED	Consumer	active if	mean current	Max current	Channel Name
shifting Power source	L	23	shifting power source	Ignition is on (with delay 5 sec)	4 amps (Peaks up to 26 Amps)	24 Amps	pcu_23_shiftcmp
screen heating	K	24	windshield heater 1, option high power	switch heatscreen is on (optional)	-	24 Amps	pcu_24_heatscr
low beam left	J	25	connector headlights left (cabin side)	Switch Lights and Ignition is on	3,5 Amps	15 Amps	pcu_25_dipLTfl
high beam left	H	26	connector headlights left (cabin side)	Ignition is on and High beam Button is pressed	if active 10 Amps	15 Amps	pcu_26_HBLT_fl
low beam right	G	27	connector headlights right (cabin side)	Switch Lights and Ignition is on	3,5 Amps	15 Amps	pcu_27_dipLTfr
high beam right	F	28	connector headlights right (cabin side)	Ignition is on and High beam Button is pressed	if active 10 Amps	15 Amps	pcu_28_HBLT_fr
starter	C	29	engine connector 3 (cabin side)	if starter button is pressed and igntion on, clutch pressed or gear in N	if active up to 22 Amps	30 Amps	pcu_29_starter
starter	D		engine connector 3 (cabin side)				
fan driver	B	30	fan driver	switch fan driver and igntion is on	15 Amps	30 Amps	pcu_30_fandrv
fan driver	N		fan driver				
n.c.	A	31	free			50 Amps	pcu_31_sup_mp
main fuel pump	M		connector tank	switch fuel main pump and igniton is on	14 Amps		
n.c.	S		free				
Bosch ECU, X3.1	E	32	MS4.6, engine connector 2, engine connector 3	Ignition is on	14 Amps	50 Amps	pcu_32_ECUCT30
Bosch ECU, X3.1	P		engine connector 2				
Bosch ECU, X3.1	R		MS4.6, engine connector 2, engine connector 3				

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6.3.2 Fuse holder hydraulic pump

A fuse holder is provided below the battery cover in the passenger foot well. The holder is equipped with an 80 A fuse and protects the hydraulic pump of the electrohydraulic steering system.

6.4 DME engine electronics

CAN network

In addition to the sensors and actuators that are directly connected to the DME control unit, the DME control unit has access to additional data provided by other ECUs as input or output variables. These external data are accessed via the internal high-speed network, the so-called CAN bus (**C**ontroller **A**rea **N**etwork).

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6.4.1 DME control unit

NOTE

Voltage peaks

Damage to the control unit

- The control unit must be disconnected from the wiring harness before welding work is carried out.
- The battery must be disconnected before the control unit is removed.

The Bosch MS 4.6 NG control unit is installed in the rear section of the passenger side. The wiring harness leads through an electrical connection directly to the engine. The 911 GT3 Cup (991 II) is equipped with the engine control unit Bosch MS 4.6 NG that has been developed specifically for use in motorsports. The controller can be programmed using a special software and also offers the possibility of error diagnosis. Device programming is carried out exclusively at Porsche Motorsport. The online Error diagnosis functionality is only available for the engineers of Porsche AG. If an engine overhaul is to be performed at Porsche Motorsport, the corresponding engine control unit has to be sent with the engine. On one hand, this ensures safe operation on the engine test bench; on the other hand, the engine lifetime counter in the ECU can be reset immediately after overhauling the engine.

The MS 4.6 NG provides the following functions:

- Cylinder bank-selective lambda control
- Pit lane speed limiter
- Ignition cut for power shift with sequential gearbox
- Asymmetric injection and ignition control
- Knock control
- Electronic throttle system and blipper function
- DFI control
- Control of intake and exhaust camshaft adjustment

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6.4.2 DME diagnosis

For Bosch component diagnosis, a separate connector is provided on the wiring harness, which is located on the B-pillar of the passenger side. This connection allows communication between the ECU and a computer using an interface cable MSA-Box II. A software tool called RaceCon is available for diagnosis. This software is used to display certain parameters and provides the opportunity to delete error entries in the control unit.

The RaceCon USB-drive is included in the vehicle's scope of delivery.

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6.4.3 Error codes

Errorcodes		Description
1	E_tmot	Error in engine temperature sensor
2	E_toil	Error in engine oil temperature sensor
3	E_tx	not used
4	E_tgear	Error in transmission oil temperature sensor
5	E_tfuel	Error in fuel temperature sensor
6	E_texh	not used
7	E_texh2	not used
8	E_tint	Error in intake air temperature sensor
9	E_tint2	Error in intake air temperature sensor 2
10	E_tamb	Error ambient air temperature
11	E_thr	Error electric throttle
12	E_lsu	Error in oxygen sensor, bank 1
13	E_lsu2	Error in oxygen sensor, bank 2
14	E_lsuh	Error in oxygen sensor heater, bank 1
15	E_lsuh2	Error in oxygen sensor heater, bank 2
16	E_ks1	Error in knock sensor, bank 1
17	E_ks2	Error in knock sensor, bank 2
18	E_ks3	not used
19	E_ks4	not used
20	E_athstagesw	Error in gas pedal map selection switch
21	E_crank	Error crankshaft revolutions detection
22	E_ub	Error in operating voltage
23	E_speedgps	Error GPS – speed sig.
24	E_trumpet	Error resonance flaps
25	E_poil	Error oil press sensor
26	E_pcrank	Error in crankcase pressure sensor
27	E_pwat	Error water press. sensor
28	E_pamb	Error in ambient pressure sensor
29	E_paddn	Error in downshift paddle
30	E_padup	Error in upshift paddle
31	E_etcdiff	Error throttle difference
32	E_aps	Error electric pedal
33	E_lap	Error laptrigger
34	E_tshiftact	Error temp. sensor shift cylinder
35	E_gearpoti	Error gear potentiometer
36	E_steer	Error steering-angle sensor
37	E_yaw	Error yaw angle sensor
38	E_mapsw	Error map- switch
39	E_tcsw	Error TC – map switch
40	E_boostsw	not used
41	E_accx	Error acceleration sensor lengthways
42	E_accy	Error acceleration sensor crossway
43	E_accz	Error acceleration sensor vertical
44	E_speed	Error speed capture
45	E_vwheel_fl	Error in wheel speed sensor, front left
46	E_vwheel_fr	Error in wheel speed sensor, front right
47	E_vwheel_rl	Error in wheel speed sensor, rear left
48	E_vwheel_rr	Error in wheel speed sensor, rear right

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Errorcodes		Description
49	E_pclutch	Error in clutch pressure sensor
50	E_gear_can	not used
51	E_pfuel	Error fuel low press.
52	E_pfuel2	not used
53	E_pgear	Error oil press. gearbox sensor
54	E_brev	Error reverse gear switch
55	E_shiftcylpos	Error shift cylinder position switch
56	E_camctrl	Error camshaft intake control bank1
57	E_opc_diff	not used
58	E_opc_dc	not used
59	E_camctrl2	Error camshaft intake control bank2
60	E_camctrl_out	Error camshaft exhaust control bank 1
61	E_psdia_fpump	Error output stage diag. fuel pump
62	E_psdia_mil	not used
63	E_psdia_oillamp	not used
64	E_psdia_dsv	not used
65	E_psdia_vcv	not used
66	E_psdia_etc	Error output stage diag. throttle
67	E_psdia_intakemanifoldflap	Error output stage diag. resonate flap 1
68	E_psdia_intake manifoldflap2	Error output stage diag. resonate flap 2
69	E_psdia_camctrl1	Error output stage diag. camshaft intake control bank 1
70	E_psdia_camctrl2	Error output stage diag. camshaft intake control bank 2
71	E_can1	Error CAN1 (ICD - DME)
72	E_can2	Error CAN 2 (DME-compressor-DIAG)
73	E_can3	Error CAN 3 (C50 - Logger)
74	E_psdia_camctrlout1	Error output stage diag. camshaft exhaust control bank 1
75	E_psdia_camctrlout2	Error output stage diag. camshaft exhaust control bank 2
76	E_camctrl_out2	Error camshaft exhaust control bank 2
77	E_psdia_vlvdn	Error output stage diag. shift valve downshift
78	E_psdia_vlvup	Error output stage diag. shift valve upshift
79	E_cam	Error camshaft position detection intake bank 1
80	E_cam2	Error camshaft position detection intake bank 2
81	E_cam_out	Error camshaft position detection exhaust bank 1
82	E_cam_out2	Error camshaft position detection exhaust bank 2
83	E_funcsw	Error function switch (S12)
84	E_gearpoti2	Error in gearbox potentiometer 2
85	E_ecusply	Error ECU voltage supply
86	E_ignition_bank1	Error Ignition, bank 1
87	E_ignition_bank2	Error Ignition, bank 2
88	E_ignition_cyl1	Error ignition output cylinder 1
89	E_ignition_cyl2	Error ignition output cylinder 2
90	E_ignition_cyl3	Error ignition output cylinder 3
91	E_ignition_cyl4	Error ignition output cylinder 4
92	E_ignition_cyl5	Error ignition output cylinder 5
93	E_ignition_cyl6	Error ignition output cylinder 6
94	E_injector_cyl1	Error injector control cylinder 1
95	E_injector_cyl2	Error injector control cylinder 2
96	E_injector_cyl3	Error injector control cylinder 3
97	E_injector_cyl4	Error injector control cylinder 4
98	E_injector_cyl5	Error injector control cylinder 5

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Errorcodes		Description
99	E_injector_cyl6	Error injector control cylinder 6
100	E_nvram	Error in NVRAM
101	E_ssply1	Error in sensor supply 1
102	E_ssply2	Error in sensor supply 2
103	E_ssply3	Error in sensor supply 3
104	E_etccal	Error throttle calibration
105	E_canmsg_dyno_0	Error CAN- communication dyno_0
106	E_canmsg_dyno_1	Error CAN- communication dyno_1
107	E_canmsg_dyno_2	Error CAN- communication dyno_2
108	E_canmsg_icd_0	Error CAN- communication ICD_1
109	E_canmsg_icd_1	Error CAN- communication ICD_2
110	E_canmsg_icd_2	Error CAN- communication ICD_3
111	E_canmsg_ml_comp1	Error CAN- communication compressor 1
112	E_canmsg_ml_comp2	Error CAN- communication compressor 2
113	E_icmpr	Error current measurement compressor
114	E_tcmpr	Error temp. sensor compressor
115	E_ucmpr	not used
116	E_accx_can	Error longitudinal acceleration via CAN
117	E_accy_can	Error cross acceleration via CAN
118	E_accz_can	Error vertical acceleration via CAN
119	E_steer_can	Error steering angle via CAN
120	E_yaw_can	Error yaw capture via CAN
121	E_paccu	Error shift system sensor press.
122	Error 115	not used
123	E_etccal_abort	Error throttle calibration abrupt
124	E_prail	Error in rail pressure sensor
125	E_prail2	Error in rail pressure sensor 2
126	E_psdia_blipper	Error blipper driver diagnosis

6.4.4 Carburation

Carburation is cylinder-selective and is created by injecting fuel into the intake ducts. One fuel pressure sensor (low press.) of the 911 GT3 Cup (991 II), is located at the supply line in the engine compartment. Two fuel high pressure sensors are located at the rails.

6.4.5 Ignition system

A fully electronic ignition system is used on the 911 GT3 Cup (991 II) engine. This means that the ignition coils receive the ignition signals directly from the ECU. The direct-ignition coils which mounted on top of the spark plugs are extremely rugged and temperature-resistant. Even under extreme conditions the coils provide the required ignition energy.

For safety reasons, the engine can only be started in first gear with the clutch pedal pressed. This prevents the vehicle from unintentionally moving off.

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6.5 Transmission

6.5.1 Error codes

The list includes the faults transmitted by the engine control unit and provides support during troubleshooting.

Information

ICD data: bit numbers from 0-7 are displayed.

RaceCon: bit numbers from 1-8 are displayed.

gc_error		
Bit	Dec	Designation
0	1	tcmpr - sensor
1	2	icmpr - sensor
2	4	prsv - sensor
3	8	CAN compr 1
4	16	CAN compr 2
gc_error2		
Bit	Dec	Designation
0	1	shift valve up
1	2	shift valve dn
2	4	paddle up
3	8	paddle down
4	16	reverse button
gc_warning		
Bit	Dec	Designation
0	1	high duty cycle
1	2	load quality
2	4	leak
4	16	high current
5	32	low current
6	64	compressor temp
7	128	lifetime compressor
gearpot_error		
Bit	Dec	Designation
0	1	gearpot 1
1	2	gearpot 2
2	4	gearpot
3	8	gearpot_1 noisy
4	16	gearpot_2 noisy
5	32	diff gearpot
6	64	adapmax
7	128	defect
gc_alarm		
Bit	Dec	Designation
0	1	gearpot error / warning
1	2	compressor error / warning
2	4	missshift
3	8	gearratio warning
4	16	CAN error Megaline
5	32	Actuator error/warning
6	64	clutch error
7	128	paddle / button error

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6.6 Sensors

Upon delivery, the following sensors are used in the vehicle:

Parameter	Label in the Cosworth ICD Display	Label in Bosch RaceCon
Engine		
Oil temperature	Oil Temp	toil
Water temperature	Water Temp	tmot
Oil pressure	Oil Pressure	poil
Water pressure	Eng Coolant Pres	pwat
Fuel pressure	Fuel Pres	pfuel
Accelerator pedal position	APS	aps
Throttle angle	ATH	ath
Air pressure	Air Pressure - Airbox	pamb
Air temperature	Air Temp - Intake	tint
Crankcase pressure (relative)	–	pcrank
Gearbox		
Gearbox potentiometer	Gear Pos Volts	ugearp
Flywheel speed sensor	RPM	nmot
Clutch pressure	Pressure clutch	pclutch
Gearbox oil temperature	Gearbox Oil Temp	tgear
Entire vehicle		
Wheel speed sensor (4x)	Wheel Speed	vwheel_xx
Cooling water level switch	Water Level Switch	–
Battery voltage	Battery Voltage	ub
Acceleration sensor (x,y,z)	G Lat G Long G Force Vert	accy_can accx_can
Brake bias potentiometer	Brake Bias Setting	–
Brake light switch	Brake Status	–
Brake press.	Brake P Front/ Brake P Rear	pbrake_flpbrake
Steer angle	Steering Angle	steer_can

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6.6.1 Sensor rated values

Parameter	Bosch label RaceCon	Rated value	Comment
Engine idle speed	nmot	2000 +/-100 rpm	At operating temperature (oil 80 °C (176 °F)
Throttle angle idle	ath	5,8 % +/- 1,0 %	
Throttle angle full power	ath	100 %	
Lambda cyl. 1-3/4-6	Lambda / 2	0.9 +/- 0.1	Throttle > 10 %
Lambda control factor	flc / 2	1.0 +/- 0.2	
Battery voltage	ub	13 +/- 1 V	
Water pressure	pwat		
Fuel pressure	pfuel	5 ± 0,3 bar (72,52 – 4.35 psi)	Averaged over a full lap
Fuel high pressure	prail	30-200 bar	Load and engine rev. dependent
Clutch pressure	pclutch	> 30 bar (435 psi)	Clutch completely pressed
Gearbox potentiometer voltage	ugearp	4.5 V	at gear 6
Camshaft adjustment	B_camena		enable after 10 sec. at idle speed
	B_camena2		
	B_camena_out		
	B_camena_out2		

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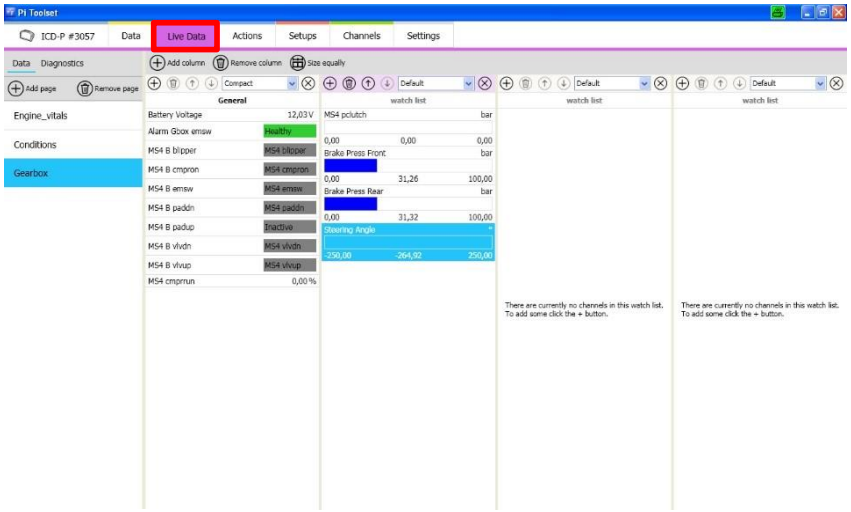
6.6.2 View online sensor values

The steering-angle sensor and the brake pressure sensors can be calibrated (zeroed) using Pi Toolset.

Procedure:

Brake system must be pressure-free.

Select the tab "Live Data" in the main toolbar. If the steering-angle sensor, accelerometers or brake pressure sensor channels are not visible, a new channel must be generated using the "+" button.

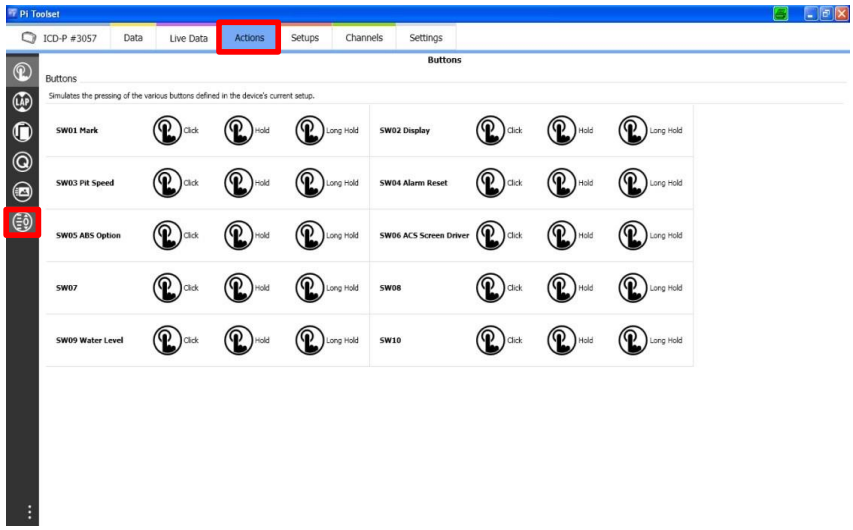


6.6.2.1

6.6.3 Calibrating sensors

Calibrating the new sensor channel:

- Select the "**Action**" tab in the main toolbar
- Select the "**Zeroing**" page by clicking "**Zeroing**"



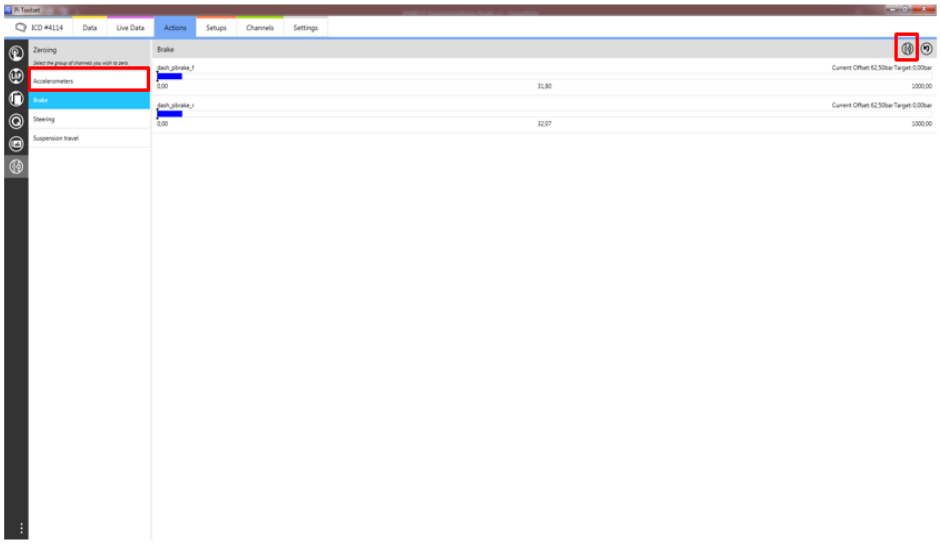
6.6.3.1

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Calibrating the Accelerometer sensor

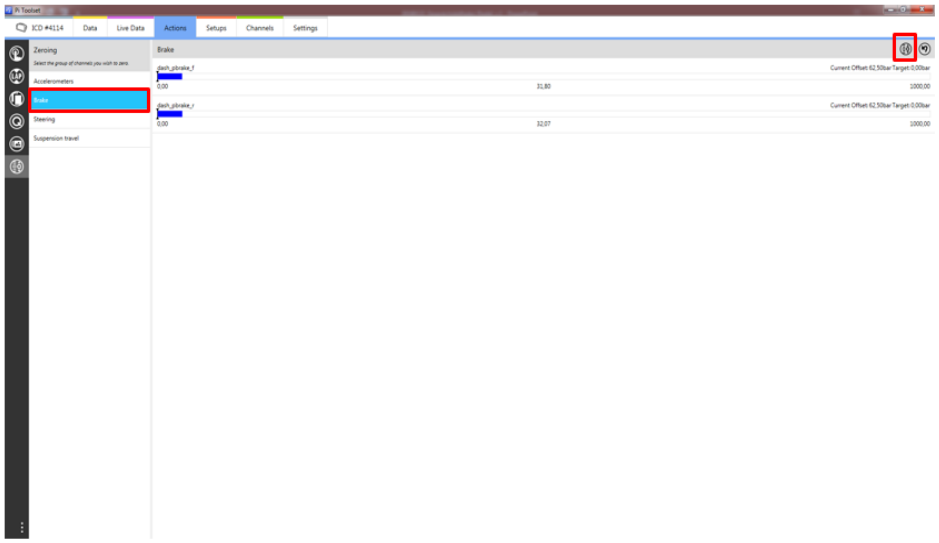
- Select the group "**Accelerometers**"
- Zero the channel by pressing the "**Zero**" button



6.6.3.2

Calibrating the brake pressure sensor

- Select the group "**Brakes**"
- Zero the channel by pressing the "**Zero**" button



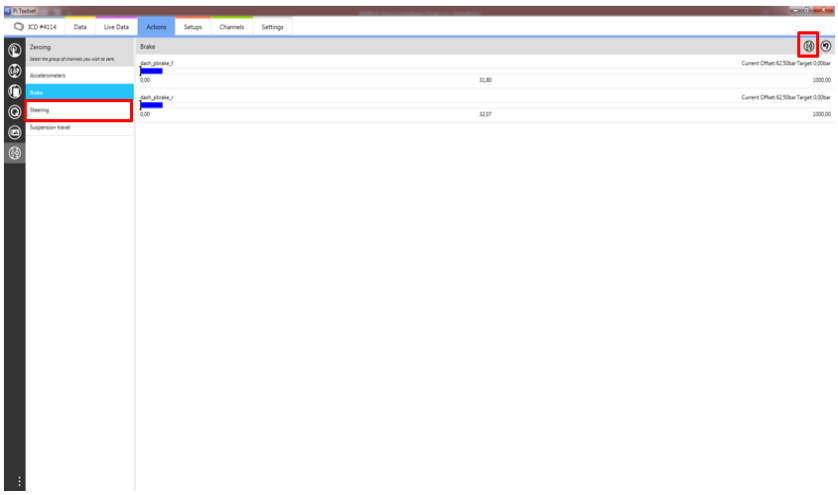
6.6.3.3

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Calibrating the steering-angle sensor

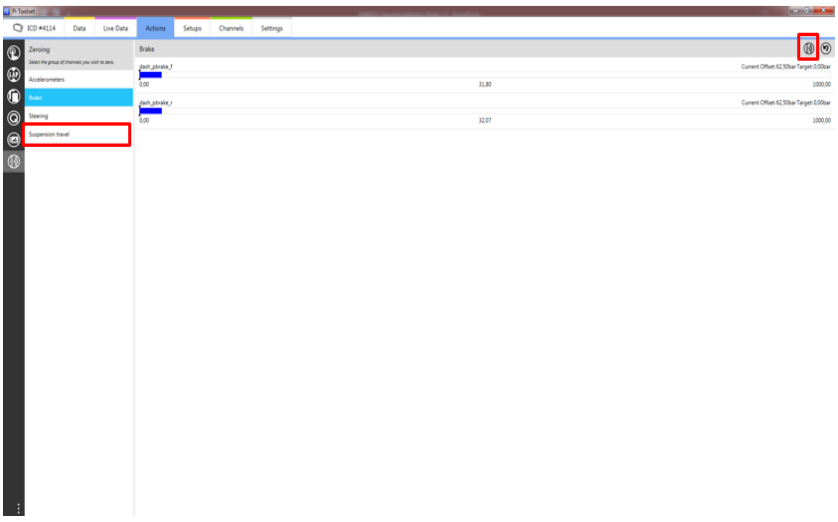
- Select the group "**Steering**"
- Zero the channel by pressing the "**Zero**" button



6.6.3.4

Calibrating the Suspension travel sensor

- Select the group "**Suspension travel**"
- Zero the channel by pressing the "**Zero**" button



6.6.3.5

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6.7 Display ICD

6.7.1 General information

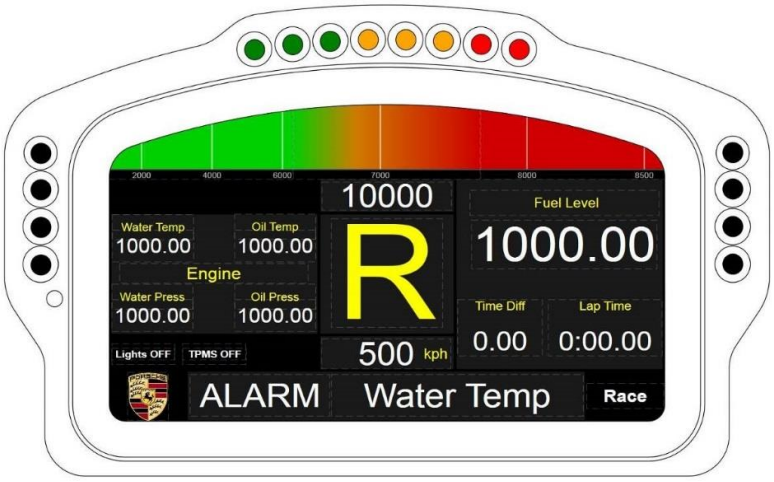
WARNING

Using the ICD (Intelligent Color Display) while driving

Using the ICD and changing ICD settings while driving can distract your attention from the road. You may lose control over the vehicle.

The ICD may only be used while driving if the traffic situation allows you to do so safely.

Carry out any complicated operating or setting procedures only while the vehicle is stationary.



6.7.1.1

The ICD (Intelligent Color Display) from Pi Cosworth is a universal display unit with integrated data storage. The color 6.2" TFT display provides detailed information to the driver and was further developed for the 991 II . The display also has 8 LEDs along the top that act as shift lights (green – yellow – red). It also has four LEDs down each side that act as alarm indicators. The data stored in the internal memory (128 MB) can be downloaded using an interface cable connected to the diagnostic socket on the passenger's side.

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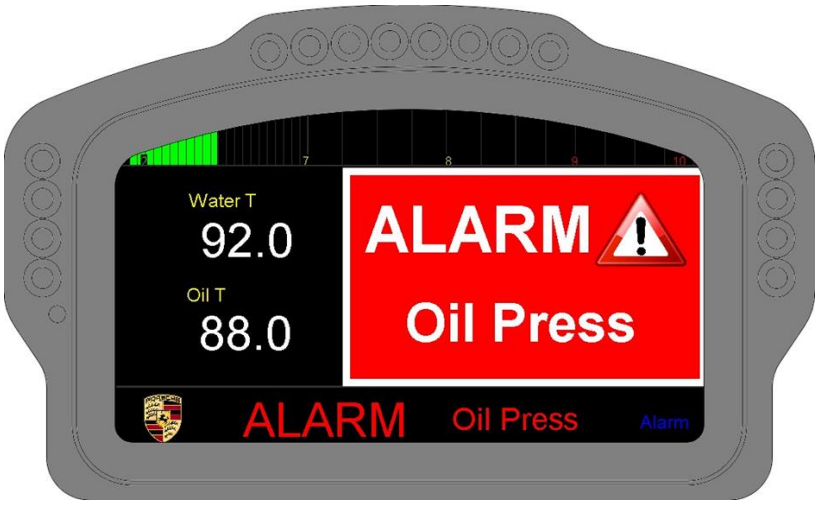


The display has five main pages that are configured in accordance with requirements. Only the following two purpose-configured pages are available while driving:

- Race
- Practice

Three diagnostic interfaces are additionally available when driving at below 10 km/h (6 mph).

The yellow button (1) on the right-hand side of the steering wheel is used to navigate through the different pages. Pressing and holding the button cycles the pages. Briefly pressing the button returns to the main page (Race). Any short click on the "display" button will toggle through the different available gauges on the actual page e.g. through race page 1,2 or 3.



6.7.1.2

When adjusting the brake balance, activating the pit lane speed, or when an alarm is active, the corresponding displays are prioritized and superimposed over the other items.



6.7.1.1

Contact address:

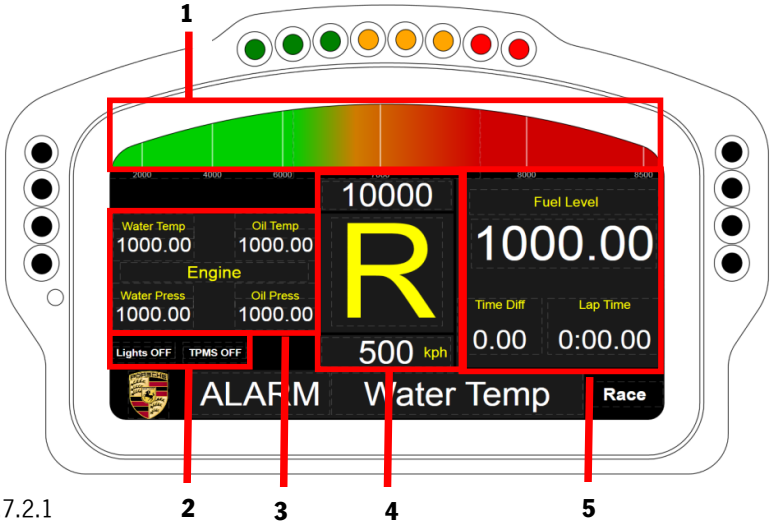
Brookfield Technology Centre
Twentypence Road
Cottenham
Cambridge
CB24 8PS
United Kingdom
Tel.: +44 (0)19 54-25 36 00
Fax: +44 (0)19 54-25 36 01
E-Mail: sales.electronics@cosworth.com

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6.7.2 Race page 1

The "Race" page configured for racing is divided into five sections.



6.7.2.1

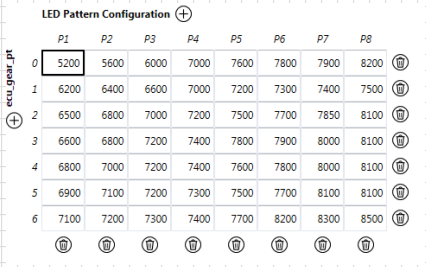
1. Engine speed display

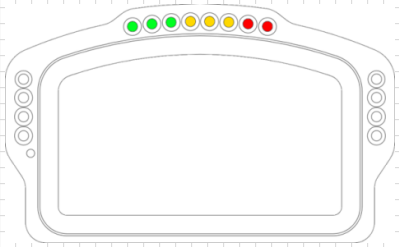
The engine speed is transmitted to the display by the Bosch engine control module and shown in a range from 1,500 to 9,000 rpm. The engine speed range is divided into three zones:

- Green: 1,500 – 6,000 rpm
- Green/orange: 6,000 – 7,000 rpm
- Red: 7,000 – 9,000 rpm

The shift lights arranged at the top of the display are linked with the engine speed signal, and are activated in accordance with the above thresholds. The thresholds can be individually adapted on a gear-specific basis in Pi Toolset.

2. Light and TPMS displays
   - OFF: → → Black
3. Engine parameter information can be cycled by briefly pressing the "Display" button on the steering wheel





6.7.2.2

Page	Name	Channel description	Channel designation
Engine	Water Temp	Water temperature	ecu_tmot
	Water Press	Water pressure	ecu_pwat
	Oil Temp	Oil temperature	ecu_toil
	Oil Press	Oil pressure	ecu_poil

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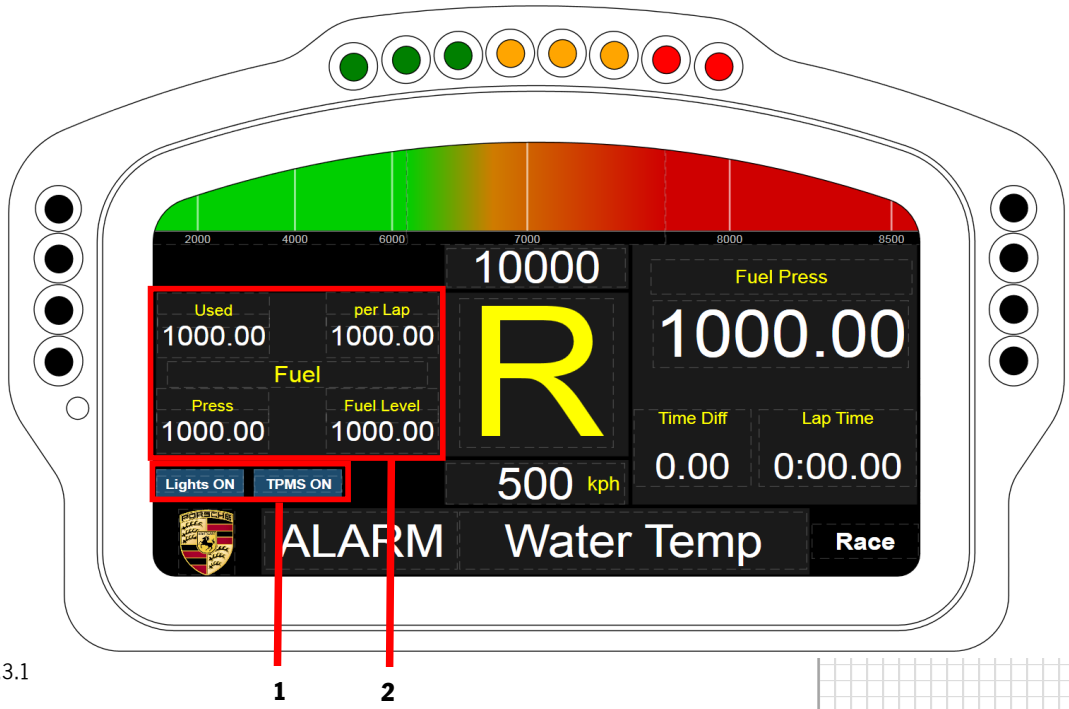
4 Permanent display of engine speed, selected gear, speed

Display	Description
-	Indicates a gear shift drum position between two gears
R	Reverse gear
N	Neutral
F	Unknown value from control unit
1,2,3,4,5,6	Valid gear indications

5 Permanent display of

- Fuel Level/Fuel Press (while stationary)/Fuel Used
- Time Diff
- Lap Time (30 sec. after Beacon Lap Time old, then Rolling Lap Time)

6.7.3 Race page 2



6.7.3.1

1 Light and TPMS displays

- ON: Blue

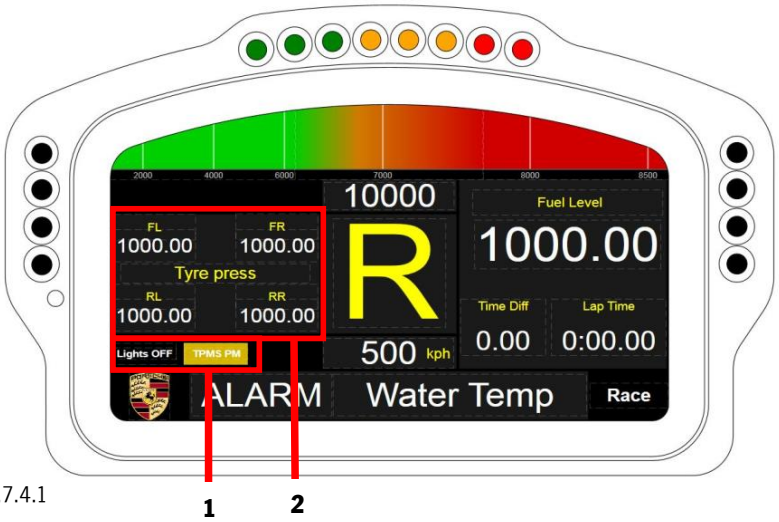
2 Fuel parameter information can be cycled by briefly pressing the "Display" button on the steering wheel

Page	Name	Channel description	Channel designation
Fuel	Used	Fuel used	ecu_fuelcons
	Press	Fuel pressure	ecu_pfuel
	per Lap	Fuel consumption per lap	ecu_fuellap
	Fuel Level	Fuel level	dash_fuellevel_calced

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6.7.4 Race page 3



6.7.4.1

1 Light and TPMS displays

TPMS PM: Black background: Off

Yellow background: Status not OK (e.g. sensor failure), partial monitoring only

2 "Tyre press": Parameter information can be cycled by pressing the "Display" button on the steering wheel. Tyre pressure parameterisation is also possible via the ToolSet.

Page	Name	Channel description	Channel designation
Tyre press	FL	Front left tire pressure	TPMS_press_FL
	RL	Rear left tire pressure	TPMS_press_RL
	FR	Front right tire pressure	TPMS_press_FR
	RR	Rear right tire pressure	TPMS_press_RR

Tire Pressure Monitoring System [TPMS]

The vehicle is equipped with a tire pressure monitoring system as standard. The system continuously monitors the tire pressure. The sensors are located at the valves on the rims. Setting the nominal tyre pressures is only possible via the ToolSet. If the system detects a pressure drop in a tire, the driver is notified via the display. The TPMS sensors are self-programming. The procedure can take up to 120 seconds, conditions: all sensors are detected and speed> 60 km/h.

Substitute value (deError value) = 6.3 bar (91.4 psi) (this value is displayed if there is no sensor installed, the sensor is Error, or the TPMS is off (ignition off)).

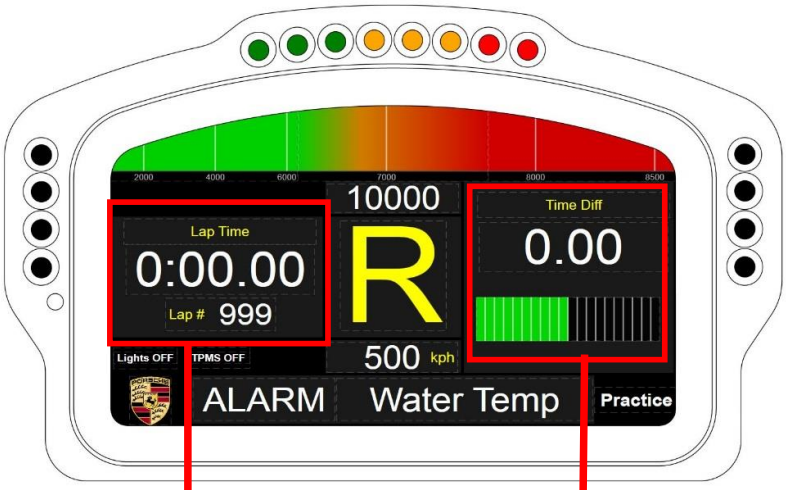
The preset setpoint pressure is approx. 1.9 bar (27.6 psi). Other pressure values must be set via the ToolSet (see 6.7.9 Chassis page).

A superimposed alarm display (overlay) appears on the display in the event of pressure loss, see 6.7.9 Chassis page or 9.7.11 Alarm displays.

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6.7.5 Practice page

The relevant data for training sessions especially for qualifying sessions is configured on the "Practice" page on the display. This page has a similar structure to the "Race" page, but contains different information.



6.7.5.1

1

2

1 Left-hand area: Lap Time and Laps

After crossing of start / finish (= laptrigger by beacon activated) the lap time of the past lap will be displayed for 30 secosnds. Afterwards the display will automatically switch to show the "rolling lap time", showing the actual lap time.

The time is shown in the following format:

m:SS.ss

Display	Description
Lap Time	Time of the lap just completed. This is shown for 30 seconds.
Rolling Time	Time of the current lap; is updated after the finish line is passed.

Lap #: Number of laps driven



6.7.5.2

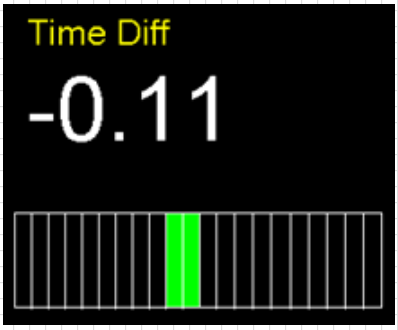
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2 Right-hand area: Time Diff

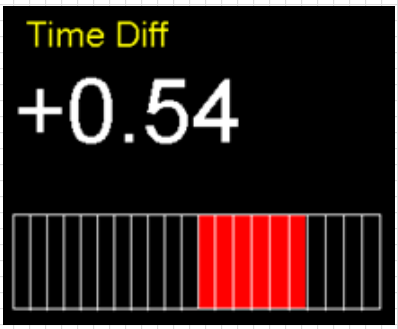
This value calculated in "Qualifying Mode" is the time difference between the lap currently being driven and a reference lap.

The top image (Figure 6.7.5.3) shows a lap 0.11 seconds faster than the reference lap. This is represented graphically by the green bar. The bar scale goes from -1 second to + 1 second.



6.7.5.3

The bottom image (Figure 6.7.5.4) shows a lap 0.54 seconds slower than the reference lap.

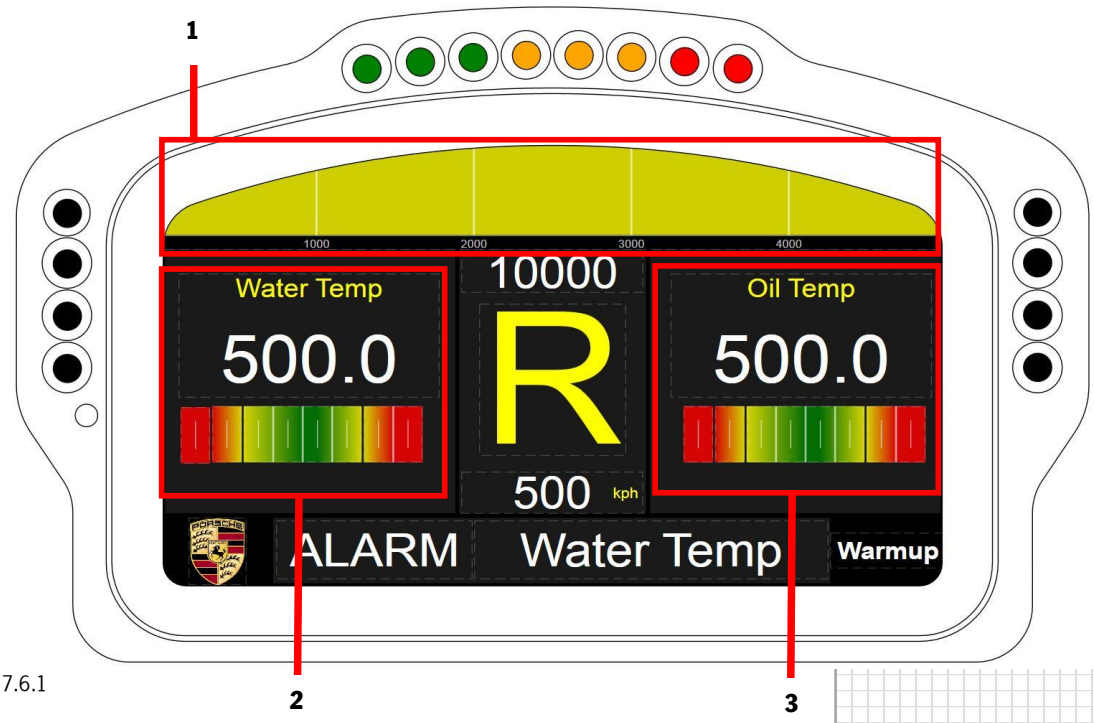


6.7.5.4

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6.7.6 Warmup page

The "Warmup" page (Figure 6.7.6.1) shows the engine speed, water temperature, and oil temperature in an enlarged display. This means that the values can also be seen from outside the vehicle.



6.7.6.1

1 Engine speed display

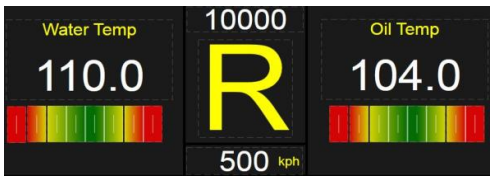
The engine speed range for engine warm-up is shown using a smaller scale. The following engine speed range is sufficient for the units to warm up:

Engine speeds from 0 to 5,000 rpm are shown using a yellow bar display.

2+3 Water and oil temperature display

The bar display for the water and oil temperature goes from 0 to 120°C (32 to 248°F). All values above 100°C (212°F) are shown in red.

The gear indicator is also located in the center in the "Warmup" page.

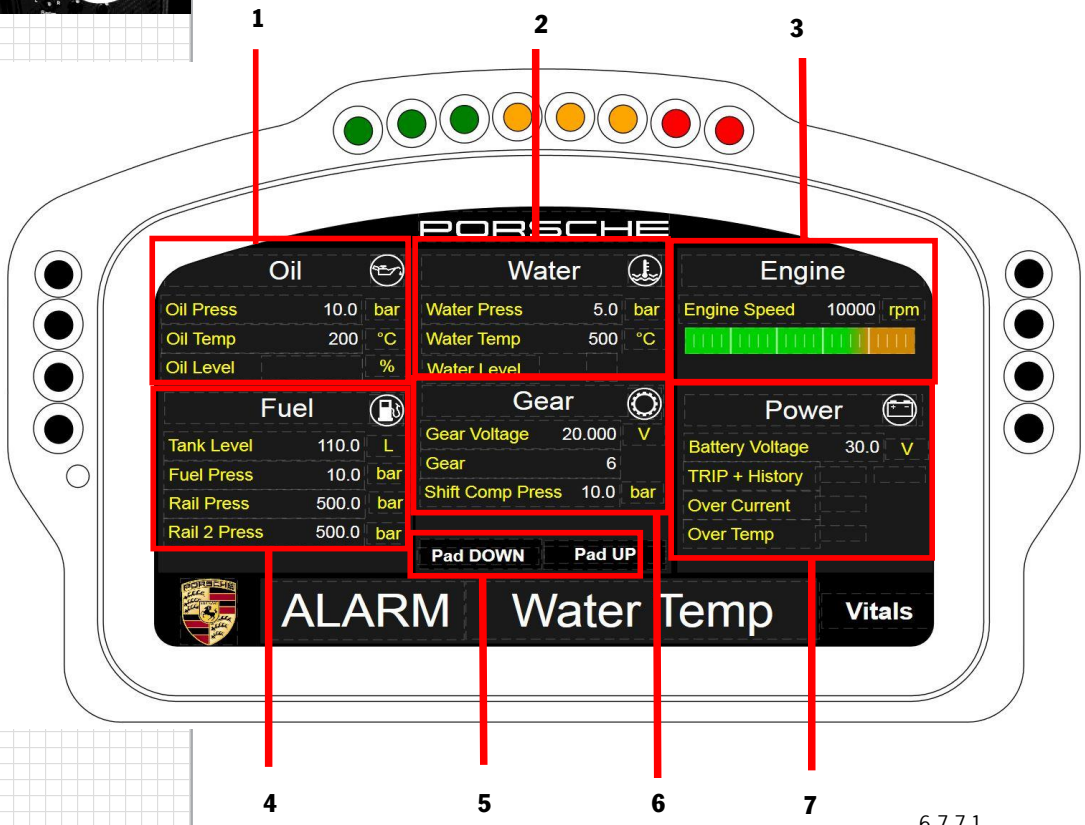


6.7.6.2

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6.7.7 Vitals page



6.7.7.1

The "Vitals" page (Figure 6.7.7.1) provides an overview of the vital functions of the engine and vehicle. All the important channels are shown on one page here. The views and values are fixed on this page and cannot be changed.

1 Oil display

Display	Channel designation	Resolution	Unit	Value range
Oil Press	ecu_poil	0.1	bar	0 to 10 (0 to 145 psi)
Oil Temp	ecu_toil	1	°C	-100 to 200 (-148 to 392°F)
Oil Level	ecu_oillevel	1	%	-30 to 130

2 Water display

Display	Channel designation	Resolution	Unit	Value range
Water Press	ecu_pwat	0.1	bar	0 to 5 (0 to 72.5 psi)
Water Temp	ecu_tmot	1	°C	40 to 200 (104 to 392°F)
Water Level	dash_sw09_watlev Button	"Low" warning symbol		

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3 Engine speed display

- Green: 0 – 3,500 rpm
- Orange: 4,000 – 5,000 rpm

4 Fuel display

Display	Channel designation	Resolution	Unit	Value range
Tank Level	dash_fuellevel_filt	0.1	liters	0 to 110 (0 to 116.2 quarts)
Fuel Press	ecu_pfuel	0.1	bar	0 to 10 (0 to 145 psi)
Rail Press	ecu_prail	0.1	bar	0 to 500 (0 to 7,251.9 psi)
Rail 2 Press	ecu_prail2	0.1	bar	0 to 500 (0 to 7,251.9 psi)

5 Rocker switches

- Black: unactuated
- Yellow: actuated

6 Gear

Display	Channel designation	Resolution	Unit	Value range
Gear Voltage	ecu_ugearp	0.001	Volt	0 to 20
Gear	ecu_gear_pt	1	-	1 to 6, R, N
Shift Comp press	ecu_ml_prsvr	0.1	bar	0 to 10 (0 to 145 psi)

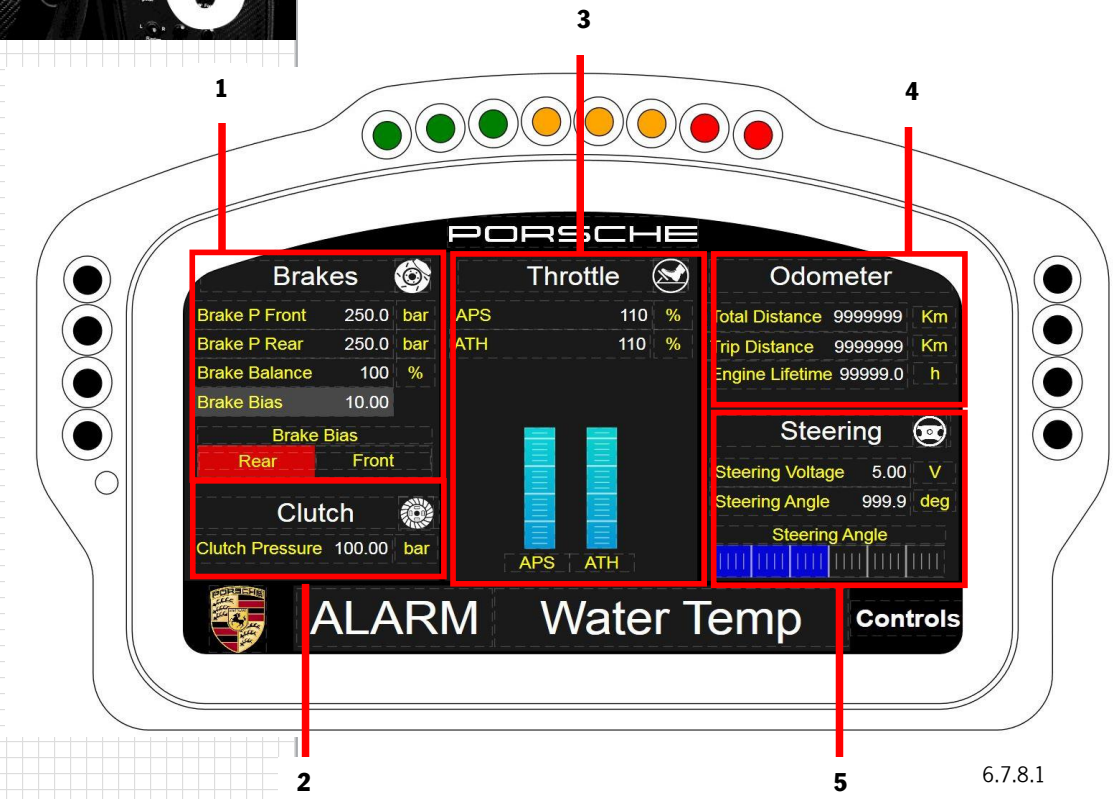
7 Power

Display	Channel designation	Resolution	Unit	Value range
Battery Voltage	pcu_ubat	0.1	Volt	0 to 30
TRIP	pcu_error_alarm	"Active" warning symbol		
History	pcu_error_alarm_latched	"Active" warning symbol		
Over Current	pcu_output_current_alarm	"Active" warning symbol		
Over Temp	pcu_temp_alarm	"Active" warning symbol		

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6.7.8 Control page



6.7.8.1

The "Control" page (Figure 6.7.8.1) of the display shows all the important information about the pedals and steering wheel. This means that the brake pressures as well as the position/function of the gas pedal and the electronic throttle valve can be checked.

Fixed overview of various vehicle systems.

1 Brakes

Display	Channel designation	Resolution	Unit	Value range	Description
Brake P Front	dash_pbrake_f	0.1	bar	0 to 250 (0 to 3,625.9 psi)	250 bar (3,625.9 psi) sensor
Brake P Rear	dash_pbrake_r	0.1	bar	0 to 250 (0 to 3,625.9 psi)	250 bar (3,625.9 psi) sensor
Brake Balance	dash_brk_balance	0.1	%	0 to 100	Mathematically calculated brake balance
Brake Bias	dash_brkbias	1	-	0 to 10	Rotary switch position
Brake Bias	dash_brkbias	Visual representation of brake bias between front and rear axles			

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2 Clutch

Display	Channel designation	Resolution	Unit	Value range	Description
Clutch Pressure	ecu_pclutch	0.01	bar	0 to 100 (0 to 1,450 psi)	100 bar (1,450 psi) sensor

3 Throttle

Display	Channel designation	Resolution	Unit	Value range	Description
APS	ecu_aps	1	%	0 to 110	Gas pedal position
ATH	ecu_athcan	1	%	0 to 110	Throttle valve position
APS	ecu_aps	Graphical representation of the gas pedal and throttle valve position			
ATH	ecu_athcan				

4 Odometer

Display	Channel designation	Resolution	Unit	Value range	Description
Total Distance	Odometer	1	km	0 to 9999999 (0 to 6,213,999 miles)	Odometer
Trip Distance	Odometer Trip	1	km	0 to 9999999 (0 to 6,213,999 miles)	Trip meter
Engine Lifetime	dash_englifetime	0.5	h	0 to 99999.0	Hour counter

5 Steering

Display	Channel designation	Resolution	Unit	Value range	Description
Steering Voltage	Input 5 Voltage	0.01	Volt	0 to 5	Steering-angle sensor voltage
Steering Angle	dash_asteer	0.1	Degrees	0 to 999.9	Steering angle
Steering Angle	dash_asteer	Graphical representation of steering-angle sensor			

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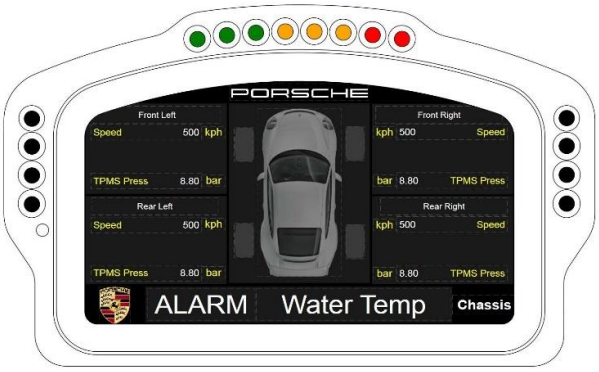


6.7.9.2



6.7.9.1

6.7.9 Chassis page



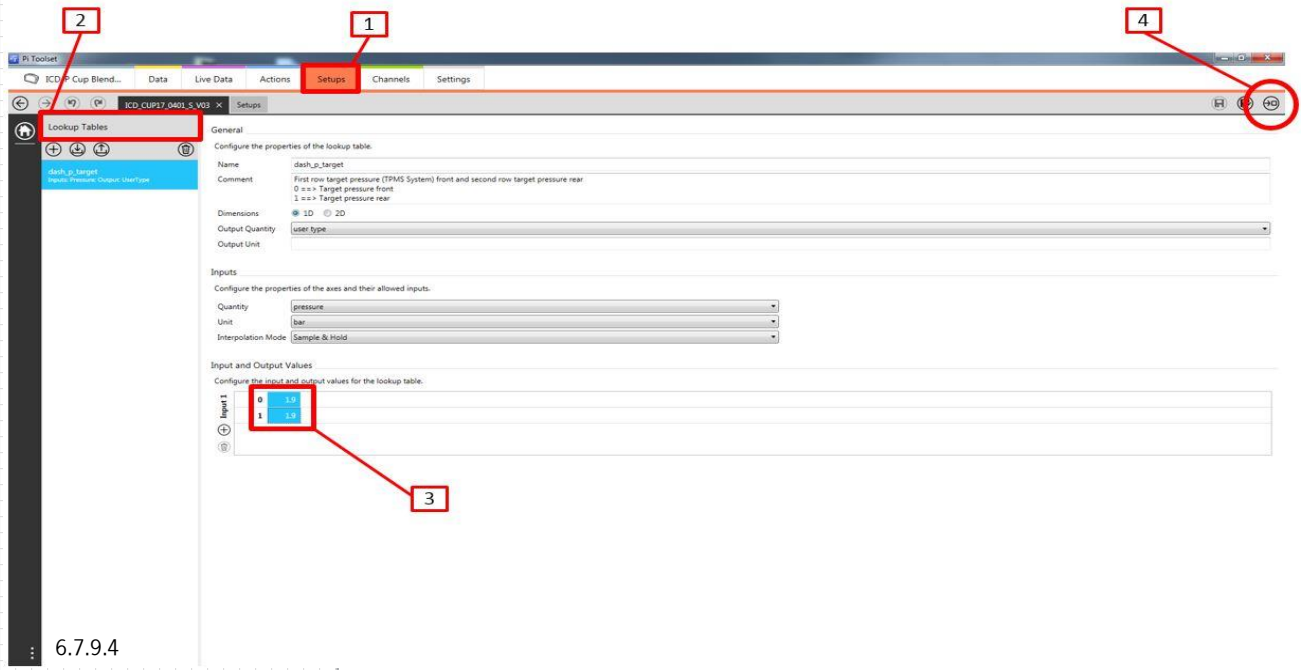
6.7.9.1

Setting the setpoint pressures for the TPMS:

NOTE The tyre manufacturer's specifications must be observed!

Information **Preset value 1.9 bar (27.6 psi) (for front axle and rear axle)**

1. Select "**Setups**" in the ToolSet
2. Select "**Lookup Tables**"
3. Enter the desired tyre pressures
4. Send the entered data to the ICD



6.7.9.4

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TPMS alarms

Flat tire alarm:

The symbol  in the overlay additionally shows which tire is flat.

Conditions: pressure drop of 0.7 bar/min (Figure 6.7.9.5)

Slow puncture alarm:

The symbol  in the overlay additional shows which tire has a slow puncture.

Conditions: pressure drop of 0.3 bar/min (Figure 6.7.9.6)



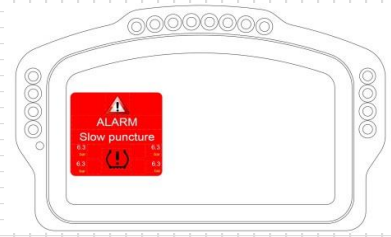
Information

The sensor detects at a frequency of 0.33 Hz.

In normal mode, the control unit prompts the wheel electronics to transmit CAN messages every 54 seconds, provided there is no pressure difference between two measuring points.

If a pressure drop is detected from one measuring point to another, a CAN message is transmitted immediately in a 0.33 Hz cycle.

If a pressure drop >0.2 bar is detected between two measuring points, the system switches to boost mode and a CAN message is transmitted every second.



6.7.9.5



6.7.9.6

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TPMS Overlays:

Display	Channel designation	Resolution	Unit	Value range	Description
FL Speed	dash_speed_fl	1	kph	0 to 500 (0 to 311 miles)	Front left wheel speed
FL TPMS Press	TPMS_press_FL	0.1	bar	0 to 6.3 (0 to 27.6 psi)	Front left tire pressure
RL Speed	dash_speed_rl	1	kph	0 to 500 (0 to 311 miles)	Rear left wheel speed
RL TPMS Press	TPMS_press_RL	0.1	bar	0 to 6.3 (0 to 27.6 psi)	Rear left tire pressure
FR Speed	dash_speed_fr	1	kph	0 to 500 (0 to 311 miles)	Front right wheel speed
FR TMPS Press	TPMS_press_FR	0.1	bar	0 to 6.3 (0 to 27.6 psi)	Front right tire pressure
RR Speed	dash_speed_rr	1	kph	0 to 500 (0 to 311 miles)	Rear right wheel speed
RR TPMS Press	TPMS_press_RR	0.1	bar	0 to 6.3 (0 to 27.6 psi)	Rear right tire pressure

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Information overlays

Additional information of increased information during driving are shown for a short time, superimposed over the other values.

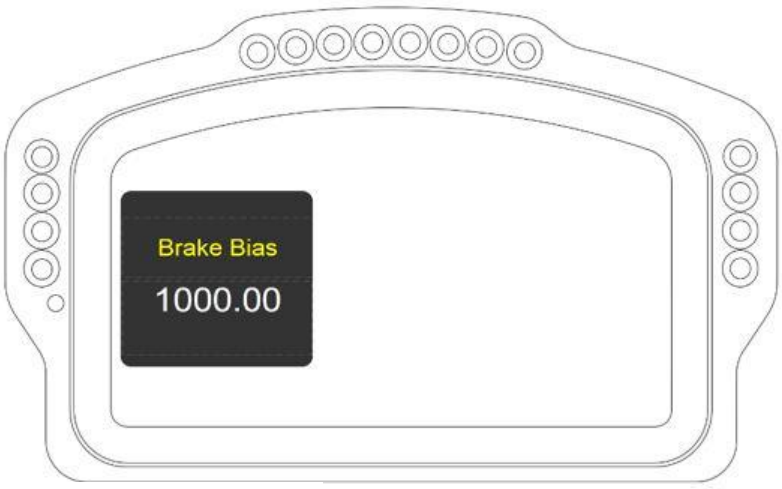
Brake Bias

⚠ WARNING	Adjustment of the brake force
	Different braking behavior
	Loss of control over the vehicle
	Adjust the setting to the weather conditions
	Adjust the settings to the vehicle setup
	Exercise care when testing the new setting.

The mechanical adjustment of the brake force at the adjusting wheel is shown in increments of 0.25. Once adjustment is complete, the display is retained for one second (Figure 6.7.9.6) and then the previously selected display is shown again.

Checking the brake force distribution when stationary:

- Vehicle stationary
- Main switch on
- Ignition off
- Brake pressed
- Brake pressure of 35 bar at front and rear axle
- The following overlay is displayed in the ICD



6.7.9.6

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6.7.10 Pit Speed

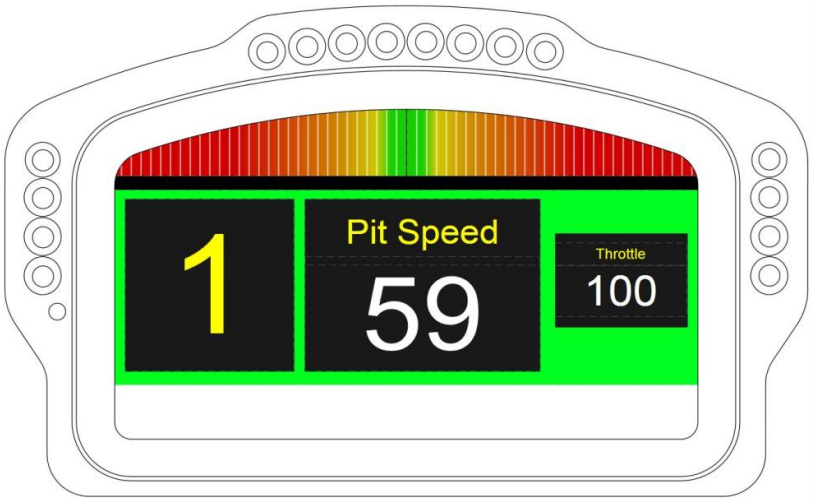
"Pit Speed" mode is activated via an orange button (1) on the steering wheel (Figure 6.7.10.1). Activation is only possible above a vehicle speed of 10 km/h (6 mph).

There are two kinds of pit speed display:

The green background is shown as long as the speed of 60 km/h (37 mph) is not exceeded (Figure 6.7.10.2).

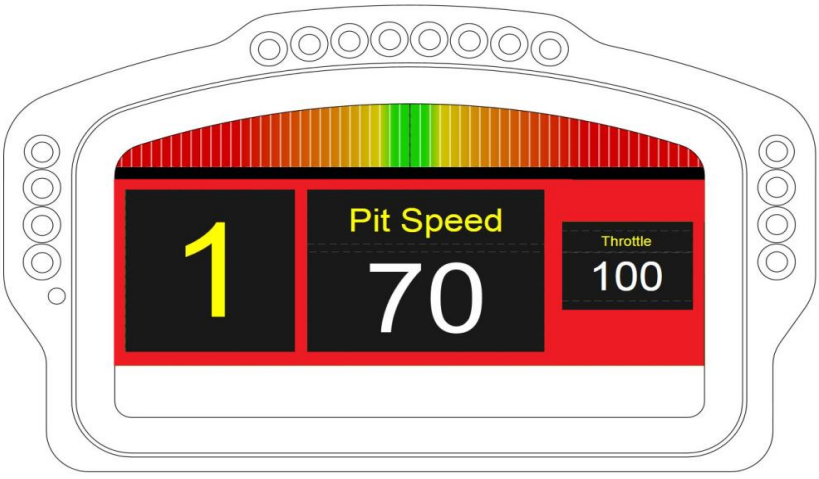


6.7.10.1



6.7.10.2

A red background appear as soon as the speed of 60 km/h (37 mph) is exceeded (Figure 6.7.10.3).

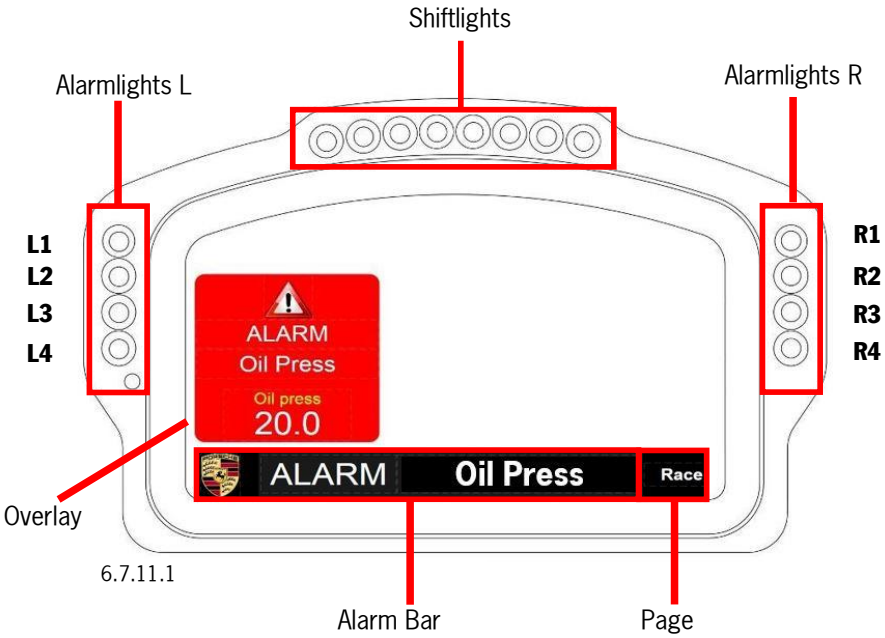


6.7.10.1

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6.7.11 Alarm displays



Information Every alarm message can be manually deleted. The alarm message may appear on the display again if the Error is not sporadic and remains active.

Priorität	Alarm name	Chanal	Conditions	Display
1	Oil pressure	ecu_poil	ecu_B_oillamp =1 [diagnosis in the DME]	**Overlay**: ALARM Oil Press [Wert] **Bar:** ALARM Oil Press **Alarmlight**: L4+R4 flash red
2	Oil temperature	ecu_toil	ecu_toil > 120°C (248°F)	**Bar:** ALARM Oil Temp **Alarmlight:** L4+R4 lights up red
3	Water temperature	ecu_tmot	ecu_tmot >110°C (230°F)	**Overlay**: ALARM Water Temp [Wert] **Bar:** ALARM Water Temp **Alarmlight**: L4+R4 flash rot
4	Crank pressure	ecu_pcrank	ecu_pcrank < 300 or ecu_pcrank >800	**Overlay:** Crank Press [Wert] **Bar:** ALARM Crank Press **Alarmlight:** L3 lights up yellow
5	Fuel low pressure	ecu_pfuel2	ecu_pfuel < 3.5 bar (50.8 psi) [when ignition is on and vehicle is stationary]	**Overlay:** ALARM Fuel Pressure [Wert]
6	Fuel low pressure	ecu_pfuel	ecu_pfuel < 2,5 bar (36,3 psi) [when nmot > 1800 rpm]	**Bar:** ALARM Fuel Press **Alarmlight:** L4+R4 lights up red

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Alarm Name	Kanal	Bedingungen	Anzeige
Camshaft control	Dash_alarm_cam	Dash_alarm_cam_ctrl >0.0 [camshaft control not enabled]	**Bar:** ALARM No Cam ctrl **Alarmlight:** L4+R4 lights up red
Min. oil level	alarm_oillvl_low2 ecu_oillevel	alarm_oillvl_low = triggered ecu_oillevel <10% [idle speed and toil >80°C (176°F) or pit speed active and toil>80%]]	**Overlay**: REFILL OIL [value] **Bar**: WARN Oil level <min
Fuel level	dash_fuellevel_meas	dash_fuellevel_meas< 7 liters (7.4 quarts) [vehicle stationary]	**Overlay:** Low Fuel [value] **Bar:** WARN Low Fuel
Max. oil level	ecu_oillevel_high	ecu_oillevel <100% [idle speed and toil >80°C (176°F)	**Bar:** WARN Oil level > MAX
Gearbox Error, switch for manual control	ecu_B_emsw	ecu_B_emsw = 1 [diagnosis in the DME]	**Overlay:** WARN Gbox EMSW [value] **Alarmlight:** L3 lights up yellow
Flat tire	tpms_alarm_hard	tpms_alarm_hard > 0.0 [when engine is running and vehicle is in motion]	**Overlay:** ALARM Flat Tyre [Wert] **Bar:** Alarm Flat Tyre + betroffener Reifen **Alarmlight:** L4+R4 lights up red
Gearbox temperature	ecu_tgear	ecu_tgear ≥ 120°C (248°F)	**Bar:** ALARM Gear Temp **Alarmlight:** L4+R4 lights up red
Compressor pressure	ecu_ml_prsvr	ecu_ml_prsvr < 3,5 bar	**Bar:** ALARM **Alarmlight:** L4+R4 lights up red
Water pressure	ecu_pwat	ecu_pwat < 0.15 bar (2.2 psi) [when neng > 5,000 rpm, teng > 68°C (154°F) and vehicle is moving]	**Bar:** ALARM Water Press **Alarmlight:** L4+R4 lights up red
Battery voltage	ecu_ub	ecu_ub < 12 V [when neng > 1,700 rpm]	**Bar:** ALARM Battery **Alarmlight:** L4+R4 lights up red
Slow puncture	tpms_alarm_soft	tpms_alarm_soft > 0.0 [when engine is running and vehicle is in motion]	**Overlay:** ALARM slow punture [Wert] + betroffener Reifen **Bar:** ALARM Tyre press **Alarmlight:** L4+R4 lights up red
Water level	dash_sw09_watlev Button	dash_sw09_watlev Button = released	**Bar:** ALARM Water Level **Alarmlight:** L4+R4 lights up red
Pit Speed	ecu_B_pitspeed	ecu_B_pitspeed > 0.0 [when engine is running]	**Overlay:** Pit Speed [Wert], Gear [Wert], Throttle [Wert] **Alarmlight:** L3+L4 lights up yellow
Generator	dash_cond_alt_stopped	dash_cond_alt_stopped = 1.0	**Bar:** ALARM Check Belt **Alarmlight:** L3 lights up red

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Alarm Name	Kanal	Bedingungen	Anzeige
Starter	dash_alarm_startbtn	dash_alarm_startbtn > 0.0	**Bar:** ERROR Starter **Alarmlight:** L3 lights up yellow
DME Error	ecu_B_mildiag	ecu_B_mildiag > 0.0 [when engine is off]	**Bar:** ALARM ECU mildiag **Alarmlight:** L3 lights up yellow
Ignition switched on	dash_cond_ign_ch	dash_cond_ign_ch > 0.0	**Bar:** WARN Ignition ON **Alarmlight:** L3 lights up red
Low revs	dash_cond_rpm	dash_cond_crank ≠ 0,0	**BAr:** WARN Low RPM **Alarmlight:** L3 lights up red
Locked wheel fl	dash_speed_fl_lock	dash_speed_fl_lock ≠ 0.0 [when vehicle is in motion]	**Alarmlight:** L1+L2 lights up purple
Locked wheel fr	dash_speed_fr_lock	dash_speed_fr_lock ≠ 0.0 [when vehicle is in motion]	**Alarmlight:** R1+R2 lights up purple
Locked wheel rl	dash_speed_rl_lock	dash_speed_rl_lock ≠ 0.0 [when vehicle is in motion]	**Alarmlight:** L4 lights up yellow
Locked wheel rr	dash_speed_rr_lock	dash_speed_rr_lock ≠ 0.0 [when vehicle is in motion]	**Alarmlight:** R4 lights up yellow
IPS outputs	pcu_E_combined	pcu_E_combined > 0.0	-

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PORSCHE

MOTORSPORT



Electrical system 6

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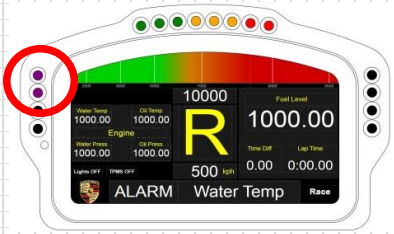


Locking warning

This function is designed to help the driver prevent an unnecessary load and damage due to unwanted locking of the front and rear wheels.

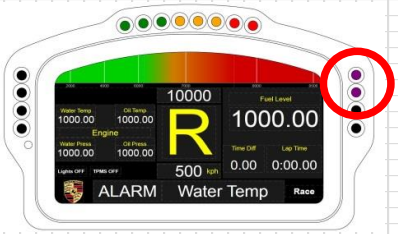
A flashing LED on the display indicates a risk of the front or rear wheels locking.

If the front brake pressure is at least 10 bar (145 psi) and the speed of the left front wheel is more than 20 km/h (12 mph) below that of the left rear wheel, the top left warning lights come on (Figure 6.7.11.2).



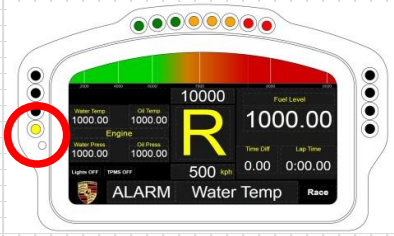
6.7.11.2

If the front brake pressure is at least 10 bar (145 psi) and the speed of the right front wheel is more than 20 km/h (12 mph) below that of the right rear wheel, the top left warning lights come on (Figure 6.7.11.3).



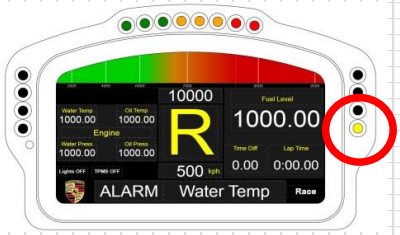
6.7.11.3

The bottom left warning light comes on if the left rear wheel locks (Figure 6.7.11.4).



6.7.11.4

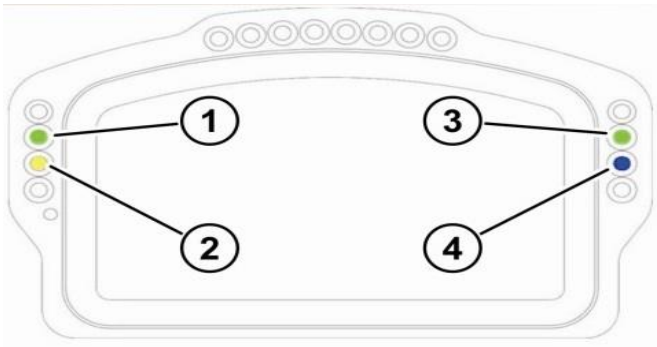
The bottom right warning light comes on if the right rear wheel locks (Figure 6.7.11.5).



6.7.11.5

Other indicator lights on the display

- Left turn signal: Green LED (1) flashes.
- Right turn signal: Green LED (3) flashes.
- Hazard warning lights: Green LEDs (1) and (3) flash.
- High beam: Blue LED (4) lights up, LED (4) flashes in the event of malfunction (e.g. of right headlamp).
- Engine indicator light: Yellow LED (2) comes on in the event of an error. The information comes directly from the engine control module.
- Ignition on: Yellow LED (2) without engine running

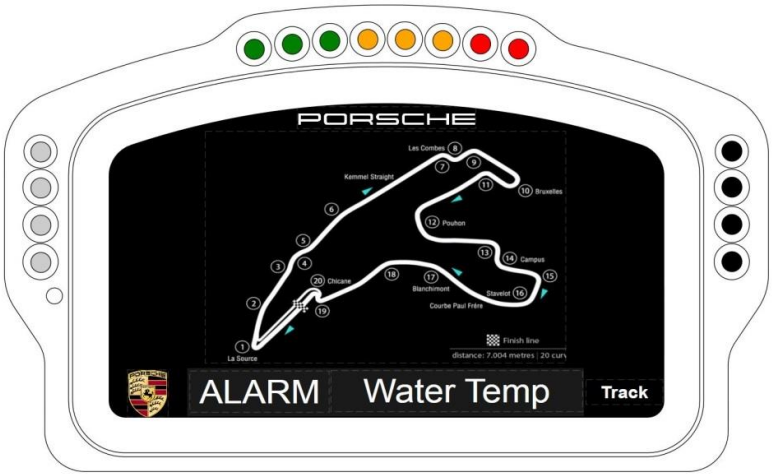


6.7.11.6

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6.7.12 Trackmap page



6.7.12.1

Files in bmp format with a resolution of 800x480 can be uploaded on this page, for example to show the track layout.

6.7.13 Diagnose page

The Diagnose page provides a quick overview of the alarms or Error entries that occurred while driving.

The following four Diagnose pages show the Errors that occurred while driving. The Diagnose pages are only displayed if a Error/alarm was actually active.

Reset condition: The reset conditions for hiding the Diagnose pages are as follows:

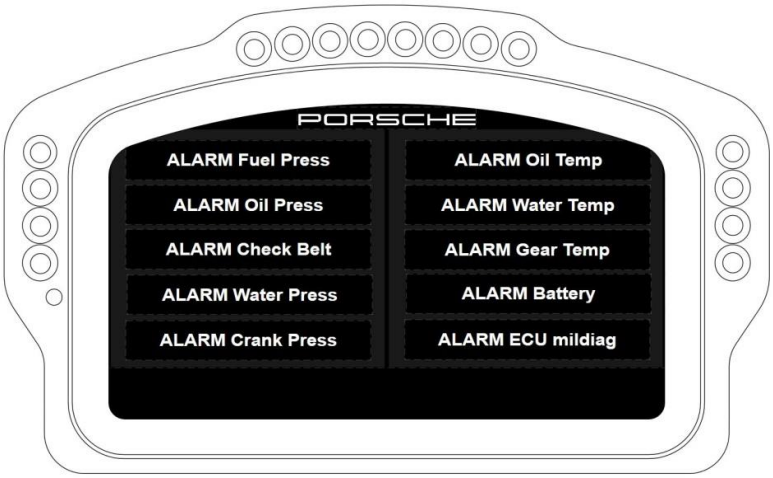
1. RPM >0
2. Press and hold alarm button (min. 3 seconds)

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Example:

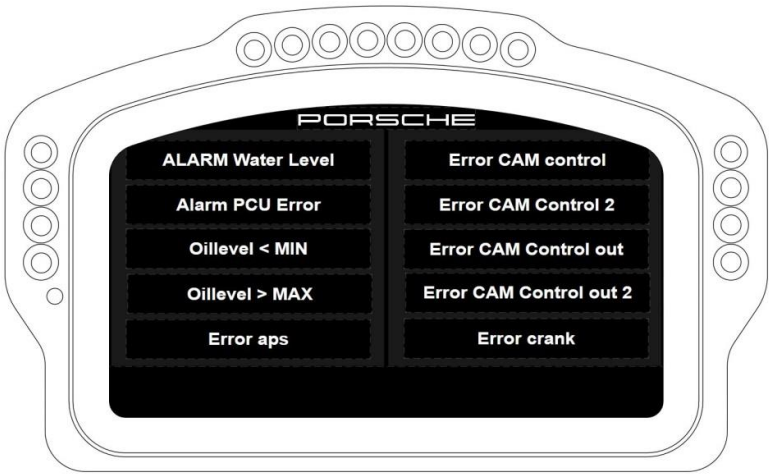
Vehicle leaves the pit. An ALARM Fuel Press occurs during the outing. This Error is then displayed on Diagnose page 1. All other Errors are grayed out on Diagnose page 1. Diagnose pages 2 to 4 are not displayed.

Diagnose page 1:



6.7.13.1

Diagnose page 2:

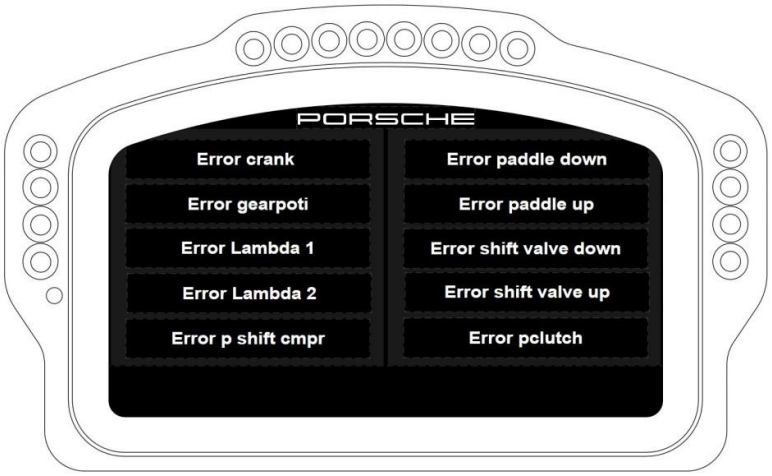


6.7.13.2

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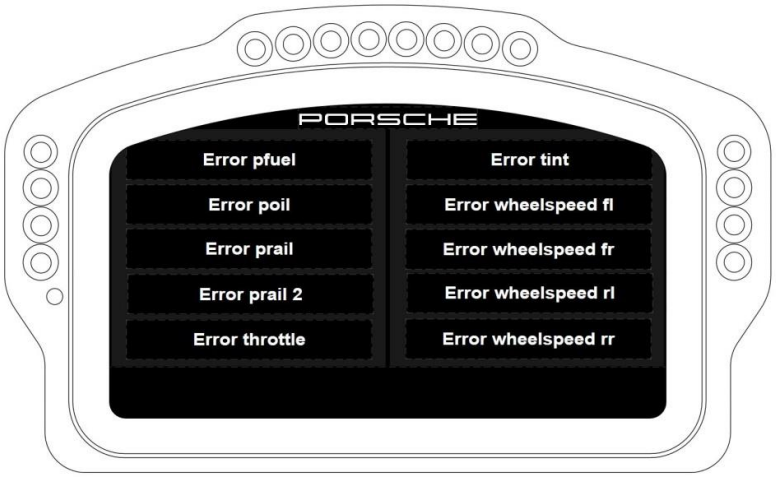


Diagnose page 3:



6.7.13.3

Diagnose page 4:



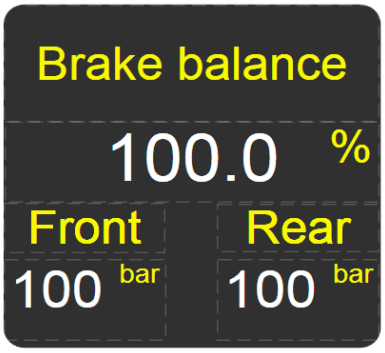
6.7.13.4

6.7.14 Position of balance bar

To check the position of the balance bar, the brake pedal must be pressed for more than 3 seconds (pressure > 35 bar).

Conditions: Main switch on, ignition on.

The overlay is displayed for 10 seconds in the display (Figure 6.7.14.1).



6.7.14.1

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6.8 Lights

The 911 GT3 Cup (991 II) is equipped with xenon headlights and front lights incl. daytime running lights, position, and indicator lights in LED technology. The headlight leveling control is without function. The headlight leveling control motor is only used for fixing the xenon lens.

The rear lights are also designed in LED technology. The fog lamps are also without function.

WARNING



Caution when working on xenon lights. The system is under high voltage.

The system has to be de-energized before working on xenon lights. Risk of electric shock.



6.8.1



6.8.2

Xenon (low beam light)



6.8.3

Middle rear light

The middle rear light is used as rain lights. It is actuated by the “Rear Fog” switch in the center console.

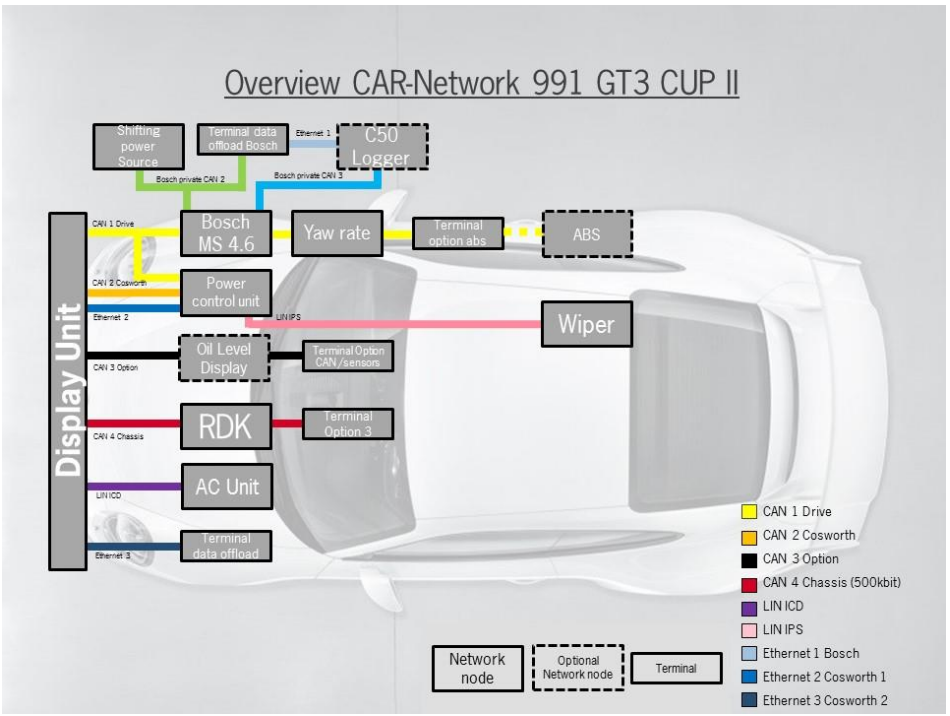
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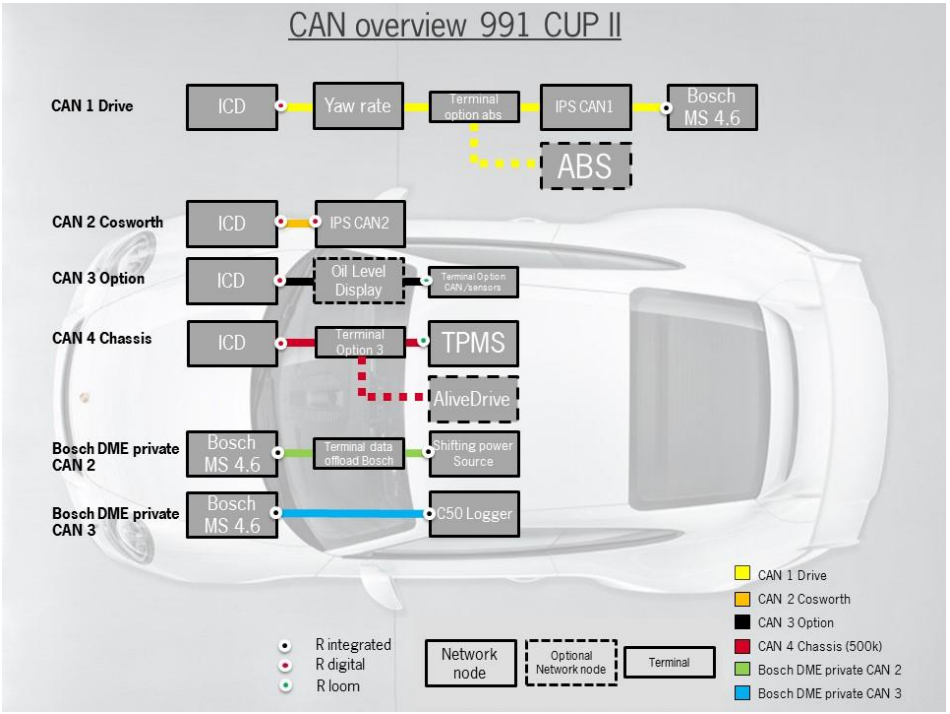
6.9 Data bus system

Four CAN bus systems and two LIN bus systems are used in the vehicle.

Data bus overview:



6.9.1



6.9.2

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CAN ID

The following table shows the CAN ID´s, respective channel names and properties which are necessary to program any external data device.

The connection of the devices is made through connector "option CAN", pin layout see chapter 6.10. All Endianness are in Intel.

Name	ID	Startbit	Length [Bit]	Datatype	Gain	Offset	Unit
RPM	1F1	0	16	Unsigned	1	0	rpm
gear	1F1	16	8	Signed	1	0	
throttle_pos	1F1	24	8	Unsigned	0.5	0	%
pbrake_front	1F1	32	16	Unsigned	0.01	0	bar
asteer	1F1	48	16	Signed	0.0625	0	degree
accx	1F2	0	16	Signed	0.025	0	G
accy	1F2	16	16	Signed	0.025	0	G
accz	1F2	32	16	Signed	0.025	0	G
yaw_rate	1F2	48	16	Signed	0.01	0	°/s
lapnumber	1F3	0	8	Unsigned	1	0	
laptime	1F3	8	16	Unsigned	0.01	0	s
wheelspeed_fl	1F4	0	16	Unsigned	0.1	0	kph
wheelspeed_fr	1F4	16	16	Unsigned	0.1	0	kph
wheelspeed_rl	1F4	32	16	Unsigned	0.1	0	kph
wheelspeed_rr	1F4	48	16	Unsigned	0.1	0	kph
pbrake_rear	1F5	0	16	Unsigned	0.01	0	bar
fuellevel	1F5	16	8	Unsigned	1	0	ltr
brake_switch	1F5	24	1	Unsigned	1	0	
lambda	1F5	32	16	Unsigned	0.001	0	
lambda2	1F5	48	16	Unsigned	0.001	0	
a_camctrl	1F6	0	16	Signed	0.02	0	°KW
a_camctrl2	1F6	16	16	Signed	0.02	0	°KW
ign_out	1F6	32	8	Signed	0.5	0	°KW
mappos	1F6	40	8	Unsigned	1	0	
te	1F6	48	16	Unsigned	0.01	0	ms
p22	1F7	0	16	Unsigned	0.1	0	mbar
pamb	1F7	16	16	Unsigned	0.1	0	mbar
pfuel	1F7	32	8	Unsigned	0.05	0	bar
prail	1F7	40	8	Unsigned	1	0	bar
prail2	1F7	48	8	Unsigned	1	0	bar
throttle_paddle	1F8	0	8	Signed	0.5	0	%
tint	1F8	8	8	Signed	1	-40	°C
fuelcons	1F8	16	16	Unsigned	0.01	0	ltr
speed	1F8	32	16	Signed	0.1	0	kph
tmot	1F8	48	8	Signed	1	-40	°C

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The wiring harness is separated as follows:

- Engine
- Vehicle cable harness
- Front axle wheel carrier
- Rear axle wheel carrier
- Front section
- Fuel tank
- Starter cable B+
- Steering

6.10 Wiring harness

For the 911 GT3 Cup (991 II), a wiring harness that runs along the center tunnel from the front to the back has been specially developed for racing use. The cable ends of the main wiring harness are labeled and color-coded; a white marking indicates a plug connection that is mated as standard, a blue marking indicates an optional plug connection.

Information

If a plug connection is required for video systems or data loggers, only the CAN Option/Sensor may be used.

Further information is available from 'Technical Racing Support'.

Pin assignment options cable harness

Item	Connection designation	Plug type on the wiring harness	Corr. mating connector	Pin assignment/max. current
1	connector optionlights right	DT 04-4 P	DT 06-4 S	1. +12V high beam/15A 2. GND high beam 3. +12V foglight/4A 4. GND foglight
2	t ambient sensor	DTM 06-2 S	DTM 04-2 P	1. +5V 2. sig
3	transponder	DTM 06-2 S	DTM 04-2 P	1. +12V 2. GND
4	windshield heater 2	B01G01		GND
5	connector optionlights left	DT 04-4 P	DT 06-4 S	1. +12V high beam/15A 2. GND high beam 3. +12V foglight/4A 4. GND foglight
6	option abs	DTM 06-12 SA	DTM 04-12 PA	1. +12V Ct. 30/3A 2. +12V Ct. 15/0,5A 3. sig 1 4. sig 2 5. CAN 1 high 6. CAN 1 low 7. GND 8. n.c. 9. n.c. 10. n.c. 11. n.c. 12. n.c.
8	windshield heater 1	B01G01		1. +12V 2. GND
9	option light ID	DTM 06-2 S	DTM 04-2 P	1. GND 2. +12V

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Pos.	Connection designation	Plug type on the wiring harness	Corr. mating connector	Pin assignment/max. current
10	option 3	DTM 06-8 SA	DTM 04-8 PA	1. +12V/0,5A 2. GND 3. nc 4. nc 5. nc 6. nc 7. CAN 4 high 8. CAN 4 low
11	Bosch C50 logger	AS 6 14-35 SN	AS 0 14-35 PN	1. n.c. 2. n.c. 3. Ct. 15 4. GND 5. +5V USB Pwr 6. sig USB D + 7. sig USB D - 8. GND USB 9. Ethernet1 RX- 10. Ethernet1 TX- 11. n.c. 12. n.c. 13. n.c. 14. n.c. 15. n.c. 16. n.c. 17. n.c. 18. n.c. 19. n.c. 20. n.c. 21. n.c. 22. shield 23. n.c. 24. Ethernet1 RX+ 25. Ethernet1 TX+ 26. n.c. 27. n.c. 28. n.c. 29. CAN calibration, high 30. CAN calibration, low 31. n.c. 32. Ct. 30 33. n.c. 34. n.c. 35. n.c. 36. n.c. 37. n.c

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Item	Connection designation	Plug type on the wiring harness	Corr. mating connector	Pin assignment/max. current
12	Bosch C50 USB logger	DTM 06-4 S	DTM 04-4 P	1. sig USB D- 2. +5V USB 3. GND USB 4. sid USB D+
13	option cockpit light	DTM 06-2 S	DTM 04-2 P	1. +12V 2. GND
14	gps	DTM 06-3 S	DTM 04-3 P	1. +5V 2. GND 3. sig
15	oil level LED module	DTM 06-4 S	DTM 04-4 P	1. GND 2. CAN L 3. CAN H 4. +12V
16	fan engine compartment	B02A46		1. GND 2. +12V
17	option 2	DTM 06-3 S	DTM 04-3 P	1. +5V/0,5A 2. GND 3. sig
18	radio	DT 06-4 S	DT 04-4 P	1. +12V/20A 2. GND 3. sig
19	CAN Option/Sensor	DTM 06-12 SA	DTM 04-12 PA	1. CAN 3 H 2. CAN 3 L 3. +5V sensor supply 4. GND sensor 5. +12V BATT 6. AI2 7. AI1 8. AI4 9. AI19 10. GND 11. n.c 12. n.c

6.11 Ground connection roof antenna

Since the roof panel is bonded to the body, there is no electrically conductive connection with the bodywork. If an antenna is mounted on the roof, a ground connection must be made from the roof to the body. Therefore, you can use the stud in the back strut. (Figure 6.11.1).



6.11.1

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6.12 Fire extinguisher

DANGER

Activation of the gas fire extinguishing system

Risk of suffocation

- Exit the vehicle without delay after the fire extinguishing system is activated. Loss of consciousness can occur in under 1 minute. Loss of consciousness in an atmosphere filled with extinguishing gas can result in death by suffocation.
- If possible, activate the fire extinguishing system when the vehicle is unoccupied.
- Before each race event, check the extinguishing nozzles, connections, and all components of the system.

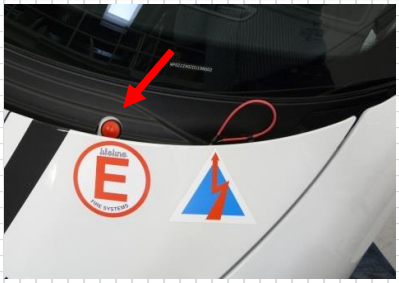
The fire-extinguishing system uses a liquid extinguishing agent. It consists of a two-chamber reservoir that stores the liquid extinguishing agent and turns it into gas when it is activated. This allows residue-free extinguishing. Two gas cartridges that are activated by a control unit are used as propellant. The contents of the extinguishing agent container have a mass of 2.25 kg (5 lb), which helps to keep the overall vehicle weight low. The extinguishing agent passes through three nozzles into the cockpit and through another three nozzles into the engine compartment. The system can be activated from the outside (6.12.2) and from the center console (6.12.3) by a pushbutton. The switch function can be tested. The system is powered by a 9 V block battery.



6.11.1

NOTE

The manufacturers expiration date is 2.5 years after the production date. Please note that all FIA rated series mandate a fire extinguisher expiration date of 2 years after production.



6.12.2

Contact address:

Fire Extinguisher Valve Company Ltd (FEV)
Unit 10 Ford Lane Business Park
Ford Nr Arundel West Sussex
BN18 0UZ
United Kingdom
Phone: +44(0) 12 43-55 55 66



6.12.3

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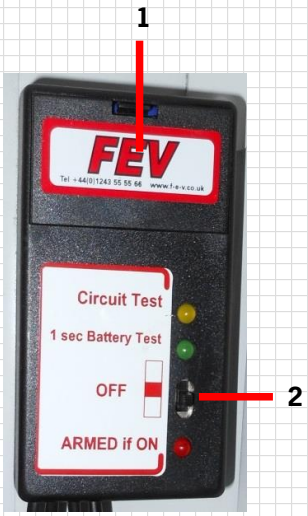


1 Driver's footwell

2 Interior B-pillar top

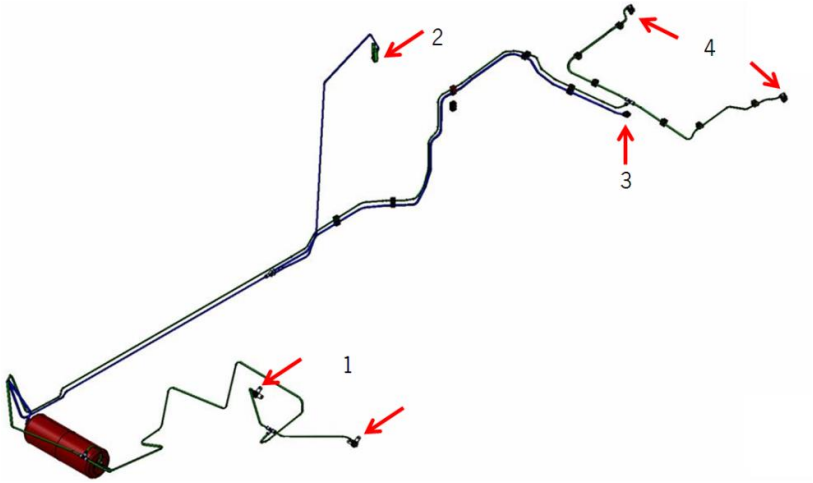
3 Engine compartment front middle

4 Engine compartment rear left/right



6.12.1.1

Extinguishing nozzle positions



6.12.4

6.12.1 Testing the trigger switch

The switch test is performed on the fire extinguishing system control unit (Figure 6.12.1.1). Always follow the steps below to prevent unintended triggering of the system. The switch (2) has three positions.

Upper position: = Battery/Circuit test

Central position: = (OFF) The system is switched off

Lower position: = (ARMED if ON) The system is armed if the red LED will be ON. If either the wiring or firing detonator is Error or the detonator is either not there or has already fired, then the LED will not light.

Testing the trigger switch:

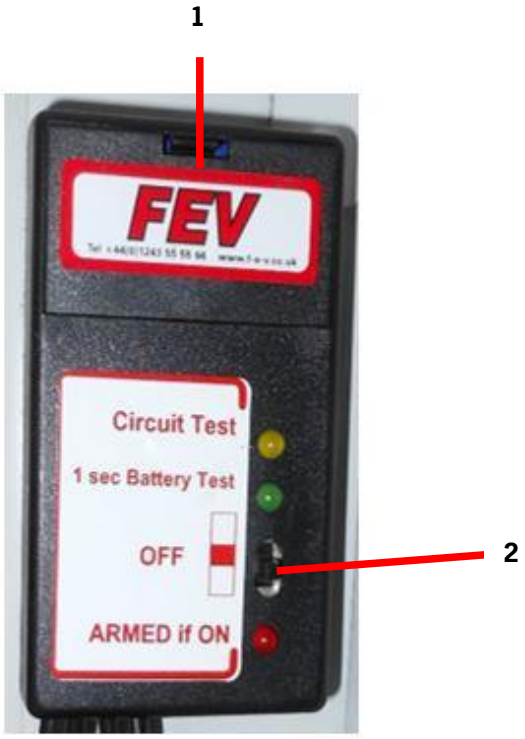
- Set the switch on the control unit to the upper position
- The green LED lights up 1 sec. (battery is OK)
- The system is in test mode and not active. The trigger switch on the center console and the outside trigger switch can now be actuated.
- When pressing the switch inside/outside the yellow LED should be off. The LED lights steadily and goes out when you press the switch.

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6.12.2 Battery change

The battery is located behind a cover in the control unit (1). It is a 9 V block battery.

Turn off the system when changing the batter.



6.12.2.1

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6.13 Driver Control Systems

6.13.1 Steering wheel

The most important functions can be comfortably carried out with the press of a button directly from the steering wheel.



6.13.1.1



6.13.1.2

The steering wheel is attached to the steering column by means of a quick release coupling.

Pushbutton functions on the steering wheel:

Wiper	= Push button for the wipers, 2-stage
High Beam	= High beam flash
Radio	= Radio system (Push to talk)
Mark	= Marking for data recording/reset fuel
Reverse	= Reverse gear
Alarm	= Acknowledge button to confirm display messages
Display	= Selection of individual display pages
Pit Speed	= Pit speed



6.13.1.3

Parking Mode:

The parking mode allows a servo-assisted steering if the engine is switched off.

Conditions:	Main switch on and battery voltage higher than 12.2 V
Function activation:	Short press the Mark button (<0.75s) activates the parking mode for 30 seconds. Function status is shown in the display. In addition, the first upper LED (left and right) alternately flashes blue-orange as long as the function is active.

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Preselection downshift (Shiftomat)

There is a function included in the ECU, which preselects up to 3 downshifts by pulling the downshift paddle (SHIFTOMAT). The preselection is only active during coast / breaking, during normal race operating conditions (no clutch actuation) and no gearbox errors are active. If the downshifts were preselected, they will be automatically carried out one after another if all normal downshifts conditions are set (nmot of next gear < rev -limit, coast/breaking mode, no gearbox - errors). If the throttle paddle is pressed again, the preselection will be reset to zero.

6.13.2 Center console

Switches and pushbuttons are located in the center console. Their functions are described below.

Main	= Power supply 4 to 6 sec. overrun
Fuel Pump Service	= High pressure pump switch
Intank Pump Service	= Intank pump switch
Ignition	= Ignition
Light	= Low beam light with daytime running light
Rear Fog Light	= Middle rear light
Flasher	= Flasher left/right
Fan	= Fan
Screen/Driver	= Fan position windshield/driver
Emergency Gear Box	= Press only if shifting gears is no longer possible. Pressing the button activates an emergency mode to drive to the pit
Hazard	= Warning lights
Fire Ex.	= Fire extinguishing system
Option 1	= additional power supply max. 14 Amps plug connection at co-driver foot well
Option 2	= additional power supply max. 14 Amps plug connection at co-driver foot well



6.13.2.1

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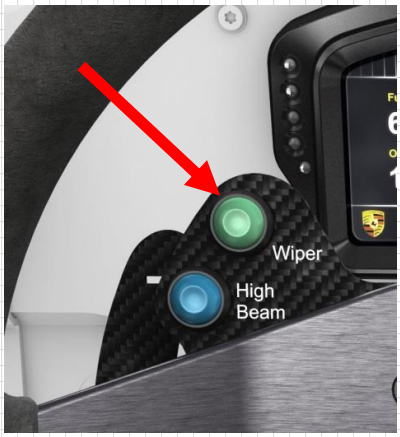
6.13.3 Windscreen wiper

The wiper motor is activated by the display via the LIN.

A green push button is provided on the steering wheel (Figure 6.13.3.1). The wiper motor has two stages: slow and fast.

Switching logic:

Press once short:	one time wiping
Press once longer 1.5 second:	continuity wiping
Press once short:	off



6.13.3.1

6.13.4 Interior fan switch

The On/Off switch is located in the center console. The fan speed is not adjustable. Another switch in the center console controls the air distribution.

There are two options: “Screen” (windscreen) and “Driver”. The fan is used to cool the driver or to ensure a clear view when the windshield is misting up.



6.13.4.1

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7 Maintenance

7.1 Engine

7.1.1 Oil level measurement

The oil level is determined electronically by means of a level sensor in the oil tank. The oil level can be read off in two ways:

1. Via the dashboard display

2. Via Notebook/RaceCon

WARNING

Hot fluid

Danger of scalding

- Avoid contact with hot fluid.
- Wear personal protective equipment.

NOTE

Oil level too high

Oil getting into the intake duct
Damage to the engine

- Oil level must not exceed 100%.

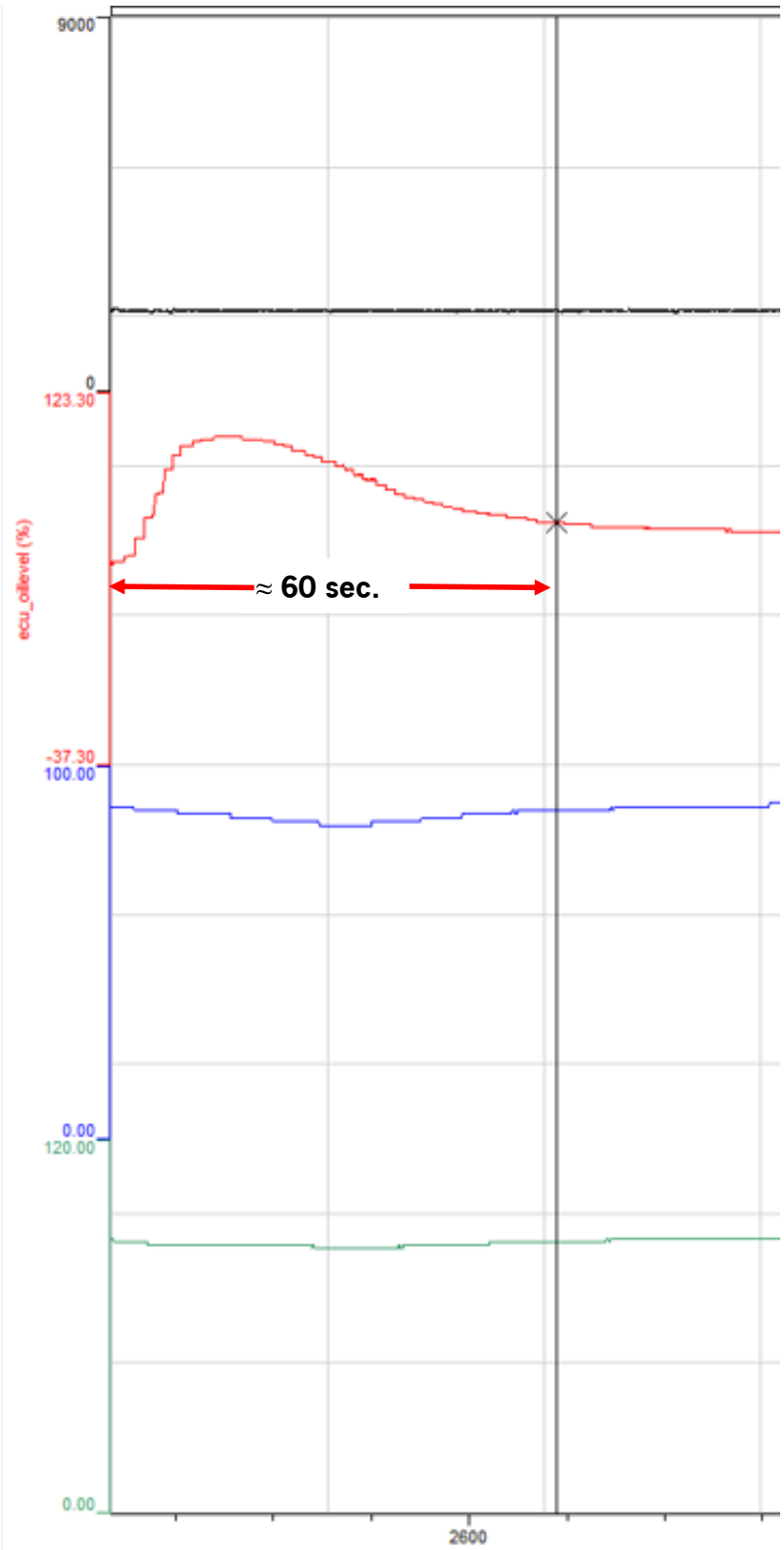
NOTE

High temperature

Overheating
Damage to the engine

- Oil and water temperatures must be under observation.
- The engine must not overheat

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7.1.1.1

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Conditions for a correct measurement:

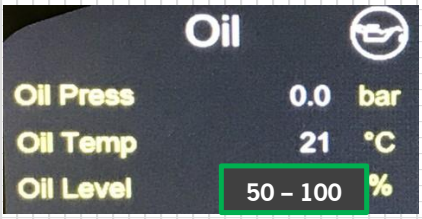
- Filling port for oil must be closed!
- The vehicle must be on a flat, level surface (Figure 7.1.1.2)
- Engine at operating temperature, oil temperature 80°C /176°F (“eco_toil” <80°C/176°F)
- Oil measurement requires ~120 sec. transient adjustment (Figure 7.1.1.1)
- The oil level should read between 50-100% (Figure 7.1.1.3)
- Each 10% interval represents 0,1 liter of oil



7.1.1.2

Information

The difference between the MIN. and MAX. marks is approx. 1 liter (1 qt). Top up engine oil one half liter (half quart) at a time! The filling level is specified in the ICD as a percentage (0% = min, 100% = max).



7.1.1.3

7.1.2 Oil level measurement with display (optional)

NOTE

Oil level too high when measured using the LED display

Oil getting into the intake duct
Damage to the engine

- Oil level must not exceed 90% according to the LED display.
- Filling port for oil must be closed

A digital oil level indicator (Figure 7.1.2.1) is available as an option.

The vehicle wiring harness is already prepared for using this indicator. The connector for the indicator can be found vehicle-mounted on the main wiring harness near the center tunnel.



7.1.2.1

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7.1.3 Changing engine oil

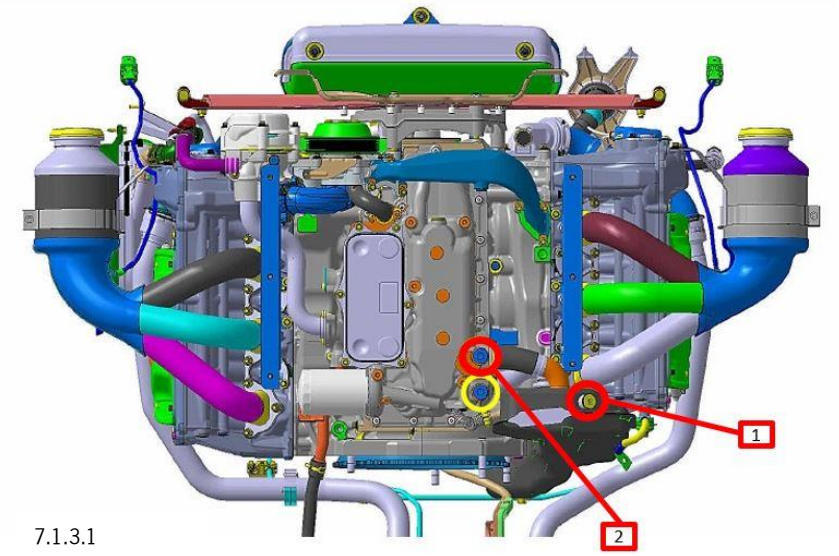
WARNING

Hot fluid

Danger of scalding

- Avoid contact with hot fluid.
- Wear personal protective equipment.

Run the engine until the oil temperature has reached 80°C (176°F) and then switch it off



7.1.3.1

- Open the cover of the filler neck
- Remove the oil drain plugs from the oil tank (1) and oil guide module (2) (Fig. 7.1.3.1)
- Allow the oil to run into a suitable container
- Fit new sealing rings to the oil drain plug (1) and tighten (torque **30 Nm**)
- Tighten the oil drain plug (2) (torque **50 Nm**)
- Change the oil filter
- Fill in oil -> see 7.1.4 filling quantities

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7.1.4 Refilling engine oil

NOTE

Improper adding of engine oil

Risk of damage to the engine

- Engine oil must not be added when the engine is running.
- The engine must be stopped before adding engine oil.

- New engine: 9.5 liters (10 qts)
- Oil change incl. oil filter change: 6.6 liters (7 qts)
- Oil change without oil filter change: 6.0 liters (6.3 qts)

7.1.5 Oil specification

- Mobil 1 FS 0W-40
- Mobil 1 New Life 0W-40

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7.1.6 Engine cooling system

Periodically remove dirt from the radiators and carry out a visual inspection for damage.

Information For support races to the FIA Formula 1 Worldchampionship, the coolant is to be substituted as described below: approx. 20 liters (21.1 qt) of water plus min. 2 liters (2.1 qt) of corrosion protection,

Filling quantity: 22 liters (23.2 qts.)

Draining the coolant system

WARNING Hot fluid

Danger of scalding

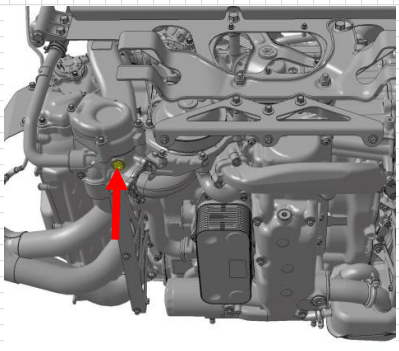
- Let the fluid cool down.
- Wear personal protective equipment.

WARNING Corrosive fluids

Danger of chemical burns

- Wear personal protective equipment.
- Ensure good ventilation.
- Avoid contact with corrosive fluid.
- If you do come into contact, wash off immediately with plenty of warm water and contact a doctor if necessary.

- Open cooling system only in cooled down condition
- Open the cap on the coolant expansion tank
- Remove the drain plug on the thermostat housing (Figure 7.1.6.1)
- Drain the coolant into a suitable container
- Place new sealing rings onto the drain plug and tighten it again (torque **10 Nm** (7 ft-lb))



7.1.6.1

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Filling the cooling system

WARNING

Hot fluid

Danger of scalding

- Let the fluid cool down.
- Wear personal protective equipment.

WARNING

Corrosive fluids

Danger of chemical burns

- Wear personal protective equipment.
- Ensure good ventilation.
- Avoid contact with corrosive fluid.
- If you do come into contact, wash off immediately with plenty of warm water and contact a doctor if necessary.

- Detach the rapid-action coupling in the engine compartment and attach the open ends to the two couplings of the filling device
- Switch on the pump, the system is filled
- The unit must be switched on for ten minutes to guarantee good filling and bleeding

WARNING

Sealed cooling system

Danger of scalding

Damage to the engine

- Always keep the cap of the coolant expansion tank closed at operating temperature.

- Allow the engine to warm up (80°C (176°F)) and, if necessary, top up the tank to the maximum level using the connected filling device
- The cap of the expansion tank must remain closed during the entire process

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A special filling device should be used for filling the water system (7.1.6.2). This device is distributed by Sobek. The filling device includes an electric pump that pumps the cooling water from a tank into the system.

Information

Never open the cover of the coolant compensating tank after reaching the operating temperature. The system pressure would escape and will not be built up again as the operating temperature has already been reached. This pressure is, however, required to increase the boiling point of the cooling water.



7.1.6.2

SOBEK Motorsporttechnik GmbH & Co.KG

Industriestraße 8

68542 Heddesheim

Tel.: +49 (0)62 03-40 43 90 0

Fax: +49 (0)62 03-40 43 91 8

E-Mail: info@sobek-motorsporttechnik.de

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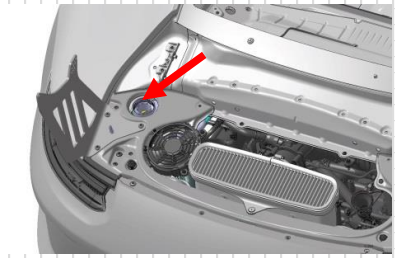
Checking the coolant level

As far as possible, only open the cap of the expansion tank when the engine is cold (arrow in Figure 7.1.6.3). If the system is opened when the engine is at operating temperature, air can get in and impair the function. Behind the cap is a filler gauge that shows the fluid level (Figure 7.1.6.4). This must be between the min. and max. marks when the engine is cold. The vehicle must be on a level surface for a correct measurement.

WARNING

Exercise caution when opening the system when the engine is at operating temperature. The system is pressurized! Danger of scalding!

- Place a cloth over the cap and carefully open.



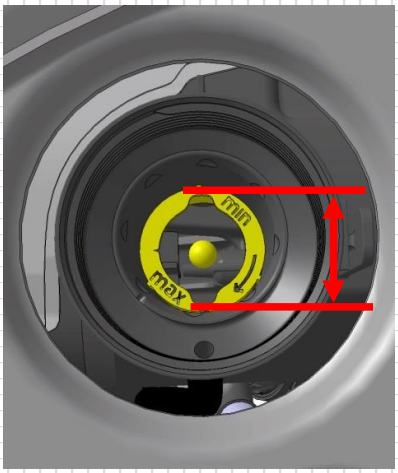
7.1.6.3

WARNING

Corrosive fluids

Danger of chemical burns

- Wear personal protective equipment.
- Ensure good ventilation.
- Avoid contact with corrosive fluid.
- If you do come into contact, wash off immediately with plenty of warm water and contact a doctor if necessary.



7.1.6.4

Information

Cooling system overfilled

Stop filling the system as soon as the filler gauge is at max. (Figure 7.1.6.4), overfilling will not be indicated.

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7.1.7 Engine tightening torques

Component	Screw dimension	Tightening torque [Nm (ft-lb)]
Engine		
Retaining bracket at central oil supply line	M6x16	13 Nm (9.6 ft-lb)
Pulley on crankshaft	M8x1.25	20 Nm (14.8 ft-lb) +90° crossed
Pulley on alternator	A/F	55 Nm (40.6 ft-lb)
Oil filter	1"-12 UNF	20 Nm (14.8 ft-lb)
Oil drain plug on oil modul	M16x1.5	30 Nm (22.1 ft-lb)
Screw plugs oil modul	M20x1,5	50 Nm
Water drain plug on water pipe	M14x1.5	35 Nm (26 ft-lb)
Flywheel	M10x1	See 1.5.2
Service cover on valve cover	M5x20	7 Nm (4.8 ft-lb)
Intake distributor on cylinder head	M6x35	13 Nm (9.6 ft-lb)
Holder tank drain on intake distributor	M6x12	10 Nm (7.4 ft-lb)
Holder fuel pipe low prs. on intake distributor	M8x12	20 Nm (14.8 ft-lb)
Knock sensor	M8x35	23 Nm (17 ft-lb) ± 2 Nm (1.5 ft lb)
Spark plugs (install max. twice)	M12x1.25	25 Nm (18.4 ft-lb)
Ignition coil fastening	M6x16	10 Nm (7.4 ft-lb)
Starter	M10x35	45 Nm (33.2 ft-lb)
Generator	M8x90	15 Nm (11.1 ft-lb)
Fuel		
High-pressure lines		See 1.6.5
High-pressure pumps	M6x25	Initial tightening: 6 Nm (4.4 ft-lb) Final tightening: 13 Nm (9.6 ft-lb)
Fuel rail	M6x16	13 Nm (9.6 ft-lb)
Pressure sensor on fuel rail	M10x1	32 Nm (24 ft-lb) ± 2Nm (1,8 ft-lb)

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Exhaust system		
Restraining strap on muffler	M8x50	18 Nm (13.3 ft-lb)
Oxygen sensor	M18x1.5	50 Nm (36.9 ft-lb) ± 8 Nm (6 ft-lb)
Muffler ball clamp on manifold	M8x50	18 Nm (13.3 ft-lb)
Engine mount		
Engine strut on body	M10x130	60 Nm (44.3 ft-lb)
Engine strut on crankcase	M10	60 Nm (44.3 ft-lb)
Heat protection on engine carrier	M5x12	5 Nm (3.3 ft-lb)
Underbody fastening	M6x12	12 Nm (8.8 ft-lb)
Underbody fastening	M8x20	23 Nm (17 ft-lb)
Oil tank		
Oil tank on crankcase	M8x35	23 Nm (17 ft-lb)
Oil tank on intake distributor	M8x30	23 Nm (17 ft-lb)
V-band clamps on oil tank	M6x25	4 Nm (2.6 ft-lb)
Oil drain plug on oil tank	M18x1.5	30 Nm (22.1 ft-lb)
Clutch		
Flywheel		See 1.6.1
Clutch to flywheel		Pre 8 Nm (6 ft-lb) Final 33 Nm (24.4 ft-lb)

7.1.8 Engine runtime

NOTE

Engine speed of 8,500 rpm exceeded

Serious damage to the engine

Porsche warranty voided

- Do not exceed an engine speed of 8,500 rpm.

Component	Running time
Stop-choc elements of the exhaust system (see 1.9)	60 h
Engine	100 h

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Information The engine of the 911 GT3 Cup (991) is designed for a maximum engine speed of 8,500 rpm, with an overhaul interval of **100 hours**.

7.2 Fuel system

7.2.1 Fuel

Superplus, unleaded (min. 98 ROZ)

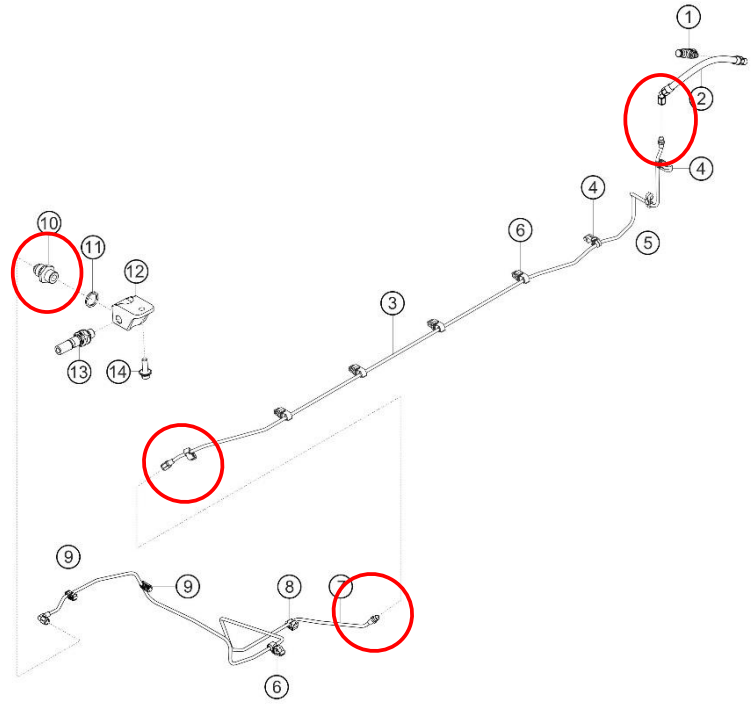
NOTE Ethanol content of the fuel

Engine damage

- The ethanol content of the fuel must not exceed 20% (E20).

7.2.1.1 Check fuel lines

Information Porsche Motorsport recommends inspecting all fuel line adapter fittings (Figure 7.2.1.1.1/red circles before the next operation of the aforementioned vehicle.



7.2.1.1.1

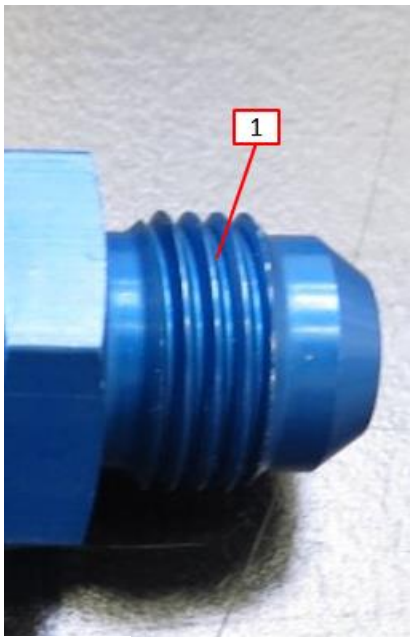
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If a leaking connection is identified during the inspection, then this connection must be tightened in accordance with the instruction below:



7.2.1.1.2

1. Remove all foreign object debris and thoroughly clean both ends of the connectors and their threaded sections (1).



7.2.1.1.3

2. Apply motor oil to the threaded section of the adapter.
   Apply motor oil to **ONLY** the threaded section!
   The tapered end must be free from dirt and oil!
3. Tighten the adapter with **19 Nm (14 ft·lb)** torque

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7.2.2 Fuel extraction

WARNING

Highly flammable or explosive substances

Fire or explosion

- Before draining the tank, make sure to attach an earthed ground terminal to the body.
- Avoid contact with hot parts or sources of ignition.
- Use suction to remove ignitable vapors.
- Attach a warning sign in a clearly visible position.

A defueling valve is provided close to the tank filler neck to empty the fuel tank. Use a special hose with a quick disconnect coupling for defueling. Connect the quick disconnect coupling to the nipple of the tank filler neck in the front section. To start the process, the fuel pump switches located on the center console have to be in position **„Fuel Pump Service"**. The fuel pumps are is then powered for 120 seconds. If this is not enough time to completely drain the fuel tank, turn the switches again from the middle position (pump off) to the "Service" position. Keep the fuel in suitable containers!

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Switching logic of the fuel pump switches (center console):

Switch position	up	Defueling position/manual activation
Switch position	center	Off
Switch position	down	Normal operation

Auxiliary material:

Fuel extraction hose

WARNING

Drainage process

Danger of chemical burns

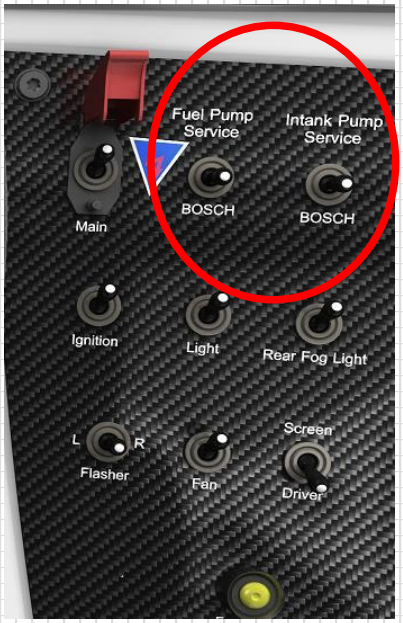
- Make sure that the hose fitting is securely seated.
- The end of the hose must be inserted into a suitable container.

NOTE

Running dry during drainage process

Damage to the fuel pumps

- The fuel pumps must not run dry.



7.2.2.1

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7.3 Power transmission

7.3.1 Gearbox

The running time is **60 hours**.

Running time cross shaft 30 hours

Transmission oil fill quantity

WARNING

Hot fluid

Danger of scalding

- Let the fluid cool down.
- Wear personal protective equipment.

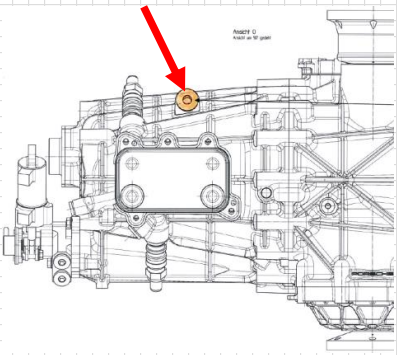
For a rebuild, the fill quantity is 3 liters (3.2 qt).

Filling:

- Place the gearbox on a flat and even surface
- Slowly fill transmission oil in the inclined filler neck

Oil specifications

Mobilube 1SHC75W90



7.3.1.1

7.3.1.1 Quick release coupling care points

Running time intervals

- **30h**: Stäubli quick release coupling inspected
- **60h**: Stäubli quick release coupling rebuild

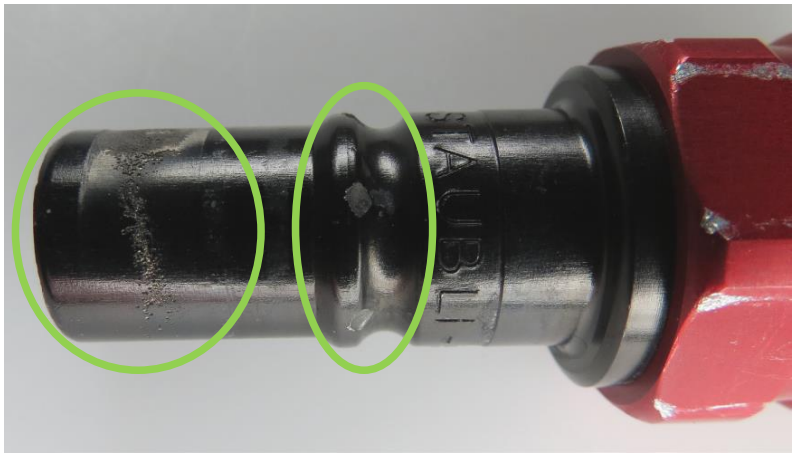
Information

Furthermore, correct mechanical locking between the male and female parts MUST be checked and ensured. The points to be checked are listed on the following pages

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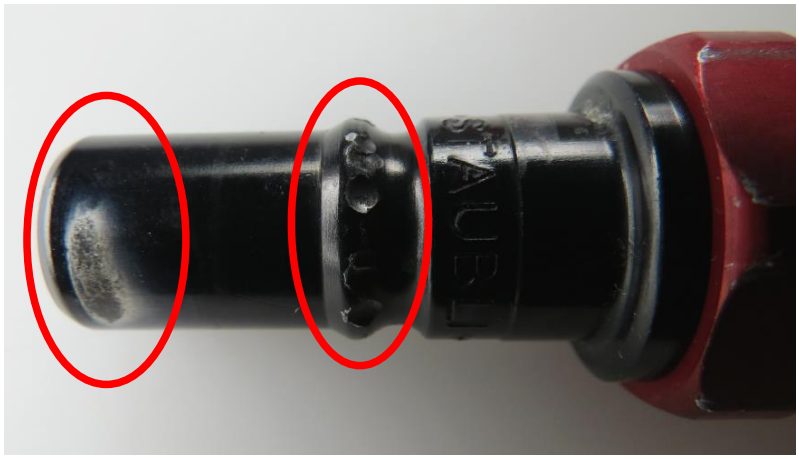
For any maintenance work, the following items should be respected:

Gearbox mounted neck



7.3.1.1.1

- Light wear
- Neck ca be used further with regular inspections.

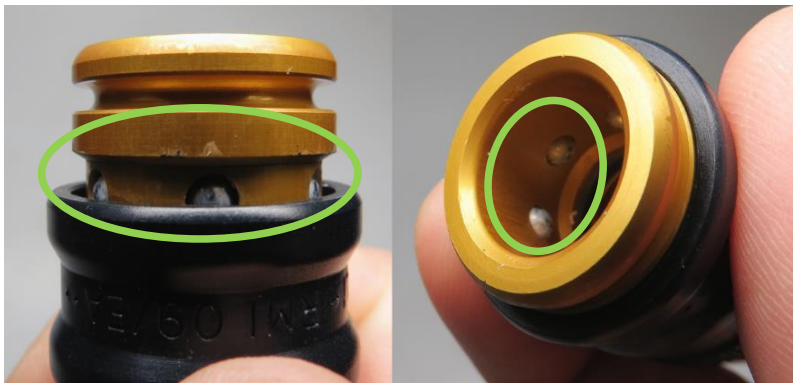


7.3.1.1.2

- Excessive wear
- Neck and the chassis side quick release couplings must be replaced

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Chassis mounted quick release couplings



7.3.1.1.3

- Light contamination
- Quick release coupling can be used further but requires regular inspection



7.3.1.1.4

- Excessive contamination
- Quick release coupling should be cleaned as described below

Information

Please ensure that the car-side quick release coupling is always clean and free of dirt, and if necessary the coupling should be lubricated with acid-free grease.

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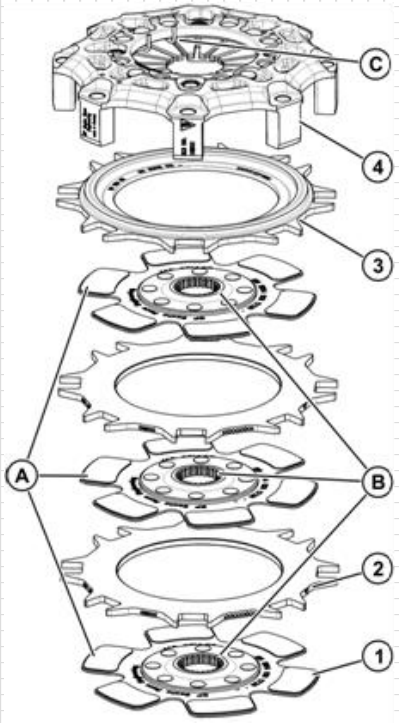
7.3.2 Clutch

Check the following during any inspection:

- Check clutch basket, hub, sintered disk for cracks
- Check spring tongues for wear
- Check housing lugs for wear
- New sintered lining 3.40 mm (0.13")
- Replace at 3.00 mm (0.12")

Installation

- Make sure that the star shapes of the multiple-disk clutch sintered disks are aligned if possible.
- Lightly grease the gear teeth and move the clutch disks back and forth on the drive shaft until the hub moves smoothly on the shaft, remove excess grease.
- No grease should get on the clutch linings.



7.3.2.1

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Clutch actuation

Racing Brake Fluid-325° from Performance Friction Brakes is used as clutch fluid.

Porsche recommends bleeding the system after each practice and changing the fluid after each race.

- Fill quantity: approx. 500 ml (17 oz)

Bleeding procedure:

WARNING

Corrosive fluids

Danger of chemical burns

- Wear personal protective equipment.
- Ensure good ventilation.
- Avoid contact with corrosive fluid.
- If you do come into contact, wash off immediately with plenty of warm water and contact a doctor if necessary.

- Depress the clutch pedal 2 to 3 times and keep it depressed
- Shortly open the vent valve – the clutch pedal has to be depressed and should not be released
- Close the vent valve again
- Repeat this procedure 2 to 3 times
- Check the fluid level on the fluid reservoir

Replacement:

- Remove the old fluid out of the reservoir and fill with new fluid
- Then proceed as for venting, perform the steps approx. 10 times and make sure that there is enough fluid in the reservoir

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Central release mechanism

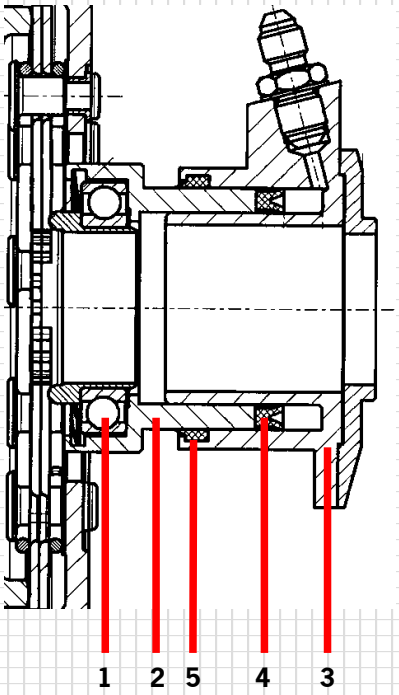
NOTE

Central clutch release lever seal

Damage to the central clutch release lever
Loss of clutch function

- Do not allow the seal to come into contact with engine oil or transmission oil.
- The seal must only be fitted using the special tool from Sachs.

- Also be sure to remove oil residues from your hands and the working environment before handling the seal (this also applies to engine oil and other oils).
- According to the manufacturer, the seal is compatible with hydraulic fluids with DOT4 and DOT5.1 specification.



7.3.2.2

1 Thrust bearing
2 Piston
3 Housing
4 Seal
5 Dust protection ring

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7.3.3 Paddle shift

The maintenance includes the compressor, the valve block and the shift cylinder.

Small Service:

- Once p.a.
- Max. 10.000 km
- Max. 10 h compressor run time

Big Service:

- Every two years
- Max 20.000 km
- Max. 20 h compressor run time

Information The lifetime counter of the shift system compressor will only be reset after the big service (20h).

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Handling Mega-Line components

NOTE

Mega-Line components

Failure of the circuit

- Oils and lubricants must not get into the compressed air system. The system is designed for unlubricated operation.

- Cover all open air lines/device adapters immediately after dismounting to protect from contamination
- Don`t crush air filter on valve block outlets (air flow reduction)
- Transport the car without pressure in the shift system
- After longer periods of storing the car, the valve block might need 2-3 test shifts to give full function to the system (e.g. sticking valves)
- Cover the tapered areas of the dash adapters with o-ring grease for better sealing
- Check free play of the shift cylinder and all lines
- Clean shift cylinder piston (do not clean with brake cleaner or other aggressive detergents)
- Drain the compressor tank regularly (recommendation: after each race event)
- Observe the installation note in Section 2.9

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7.3.4 Drive shafts

It is recommended breaking in drive shafts on new vehicles or newly fitted drive shafts for about **50 km** (31 miles) with reduced load and at max. **200 km/h (124 mph)**. The load on the drive shaft should be continuously increased, this helps to prolong the lifetime of the joints.

Information Due the extremely high load on the drive shaft, these should be checked regularly

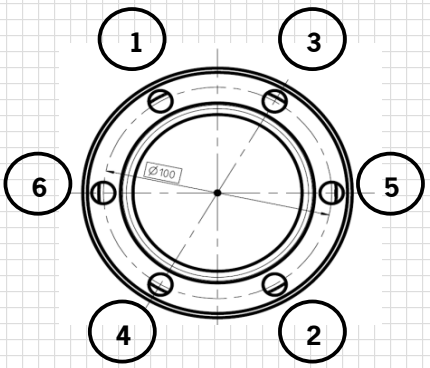
- The clearance can be checked by turning the drive shaft from hand. If the clearance obviously gone up the cage is heavily worn. In this case the drive shaft should be replaced.
- The easy movement of the joints is checked by push and pulls the drive shaft. If the drive shaft moves tight it might degrees, the joint temperature and the shaft is to replace.

- Only use HT 1 LF grease for lubrication when overhauling the drive shafts
- Do not interchange used drive shafts left-right

Grease quantity for joint on wheel side: 150 g (5.3 oz)

Grease quantity for joint on gearbox side: 120 g (4.2 oz)

Service Partner Address: GKN Service International GmbH see chapter 7.9



7.3.4.1

Torque Tightening Specifications

1 Lightly oil the bolts. Follow these tightening instructions whenever the drive shaft bolt connections have been untightened.

2 Tighten all bolts to **30 Nm** (22.1 lb-ft) in the specified order

3 Tighten all bolts to **60 Nm** (44.3 lb-ft) in the specified order

4 Tighten all bolts to **90 Nm** (66.4 lb-ft) in the specified order

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7.4 Chassis

7.4.1 Wheel nut

WARNING

Loose wheel nut

Loss of wheels
Loss of control over the vehicle

- Porsche Motorsport also recommends replacing the wheel nuts during a long distance race (approx. 6 hours run time). The replacement is required for checking and regenerating the used wheel nut. Regenerating includes cleaning of the threads, visual inspection for damage.

To ensure the correct wheel nut tightening torque and corresponding clamping load is achieved the wheel nut or wheel cone MUST be lubricated with Optimol TA grease EVERY time the wheels are changed.

NOTE

Instruction for check tightening of wheel nut

Check the tightening of the wheel nut only when the car is on the ground to prevent the suspension from damage.

- A second mechanic is need to push the brake during the procedure

Also, if wheel guns are used, the manometer on the compressed air bottles should be calibrated to ensure that the tightening torque of **500-520 Nm** (368.8 – 383.5 lb-ft) is correct.

Proceed as follows to prevent the wheel nuts from settling: Tighten the new part 3 to 4 times using an impact wrench (**500 – 520 Nm** (368.8 – 383.5 lb-ft)), then untighten and regrease.

Consumables:

Optimol Paste TA

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7.4.2 Locking piece

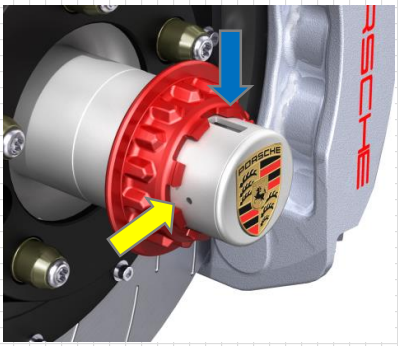
The locking pieces are used as the locking mechanism for the wheel nuts. Make sure that they can be moved freely. Grease the mechanism using “Optimol Paste”.

Consumables:

Optimol Paste HAT

The locking mechanism may be removed from the hub for maintenance and cleaning. Proceed as follows:

- Press the locking pieces into the hub (blue arrow)
- Press the locking pins into the hub using a thin object (yellow arrow)
- Pull the mechanism approx. 5 mm (0.2”) out of the hub



7.4.2.1

⚠ WARNING

Removal of the safety device

Risk of eye injuries
Risk of lacerations, puncture wounds, or cuts

- Wear protective goggles.
- Protect against individual components under high spring pretension. Cover the safety device with a strong bag or heavy cloth before removing.

- Put the protection over the hub
- Completely remove the mechanism from the hub

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7.4.3 Wheel bearings

Regularly check the tolerance in the wheel bearings. While one person holds the steering wheel, a second person turns the wheel as shown in the illustration below.

- Horizontal tolerance
- Vertical tolerance

Proceed in the same way to check the dome bearing and the suspension arm. Check the dome bearing by means of vertical movements.

7.4.4 Wheel hub

The wheel hub is a reinforced racing wheel hub with a central locking mechanism. Make sure that the retaining keys of the central lock are free to move.

7.4.5 Wheel rim

Visual inspection for cracks and deformation

NOTE

When painting rims all functional surfaces must remain untreated and unpainted. Functional surfaces are: inner rim bed, contact surface wheel nut, contact surface of the rim onto brake disk / upright.

When repairing any rims, the friction strip (contact surface rim/tire) on the inner rim bed must remain untreated. In doubt, the rim must be changed.



7.4.4.1

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7.4.6 Brake system

Brake pad wear limit:

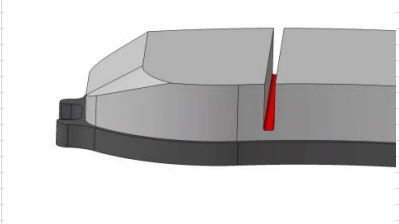
NOTE

Removing brake piston

Damage of piston seal

- Clean the piston before they move back

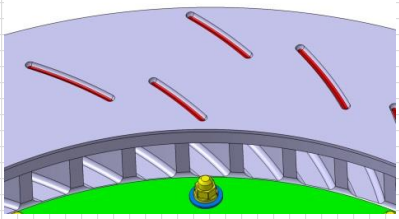
The wear limit is reached when the pad has been worn down to the bottom of the slot (7.4.6.1).



7.4.6.1

Brake Disk Wear Limit:

The wear limit is reached when the disk has been worn down to the bottom of the slot (7.4.6.2). The disk should also be replaced if there are cracks up to the edge of the disk.



7.4.6.2

7.4.7 Replacing the piston seal rings

NOTE

Cleaning Brake system

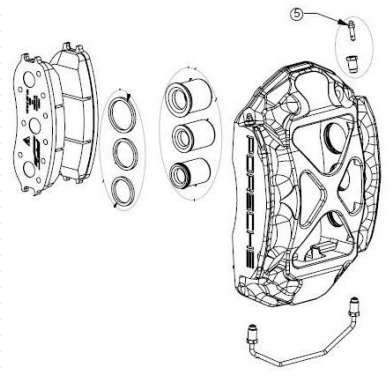
Damage of piston seal and brake fluid reservoir

Do not use brake cleaner, cleaning benzene, cleaning solvents, all spray oils (e.g. WD 40).

- Use isopropanol or ethanol for cleaning

Dismounting

- Remove the caliper from the wheel carrier
- Place a piece of wood in the caliper to prevent the piston from falling out



7.4.7.1

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Caution

Extending the brake piston

Risk of crush injuries

- Do not insert fingers between the brake pistons.

- Press the brake piston outwards with low air pressure
- Completely pull the brake pistons out of the caliper by hand
- Clean all components and remove any dirt (brake dust)
- Check the holes and sealing grooves for damage. Replace the caliper if any damage is detected

Installation

WARNING

Corrosive fluids

Danger of chemical burns

- Wear personal protective equipment.
- Ensure good ventilation.
- Avoid contact with corrosive fluid.
- If you do come into contact, wash off immediately with plenty of warm water and contact a doctor if necessary.

- The brake fluid can be used as assembly lubricant; wet pistons and seals with brake fluid
- When inserting the pistons into the holes, a slight resistance is caused by the seals (normal)
- Place the piece of wood again in the caliper
- Pressurize the brake caliper with low air pressure a few times to ensure that the seals are properly seated
- Mount the caliper again on the wheel carrier
- Vent the brake system

Brake system cooling channels

Carry out a visual inspection for damage and remove any impurities and foreign particles in the channels.

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Brake fluid

WARNING

Corrosive fluids

Danger of chemical burns

- Wear personal protective equipment.
- Ensure good ventilation.
- Avoid contact with corrosive fluid.
- If you do come into contact, wash off immediately with plenty of warm water and contact a doctor if necessary.

- It is recommended venting the system after each practice and changing the fluid after each race
- Use the brake fluid from Performance Friction Brakes, Racing Brake Fluid-325° (DOT 4)
- Three persons are required.
- Fill quantity: approx. 1,000 ml (1.06 qt)

Proceed as follows for changing the brake fluid:

1. Remove the brake fluid from the brake fluid reservoir of the two master cylinders using a syringe
2. Pour in new brake fluid

Flushing/Bleeding:

3. Build up pressure with the brake pedal
4. Open the front axle and rear axle brake bleeder valves simultaneously and close them again
5. Only release the brake pedal when the bleeder valves have been closed. Build up new pressure with the brake pedal.
6. Repeat the process and make sure that there is enough brake fluid in the reservoir.
7. Perform flushing operation on both valves of a caliper (order of no importance)

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7.4.8 Remodeling/Maintenance Main brake cylinder

WARNING

Failure of the brake system

Loss of control of the vehicle

- Particular care must be taken when working on the brake system
- Ensure that the components are correctly fitted

NOTE

Cleaning the brake system

Damage to the piston seal and reservoir.

Use of the following cleaning agents is prohibited in the entire brake system: brake cleaner, white spirit, cold cleaning solvent and all spray oils e.g. WD-40

- Isopropanol and ethanol are recommended as cleaning agents

Information

Owing to signs of wear, the service life of the brake master cylinder seals is restricted to a maximum of **5,000 km** or **30 h**, effective immediately

Preparation:

- Wear protective clothing
- Ensure cleanliness at the assembly location
- Immerse new seal in brake fluid for 30 minutes
- Mark and measure the length setting of the pushrod at the thread

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Removing:




7.4.8.1

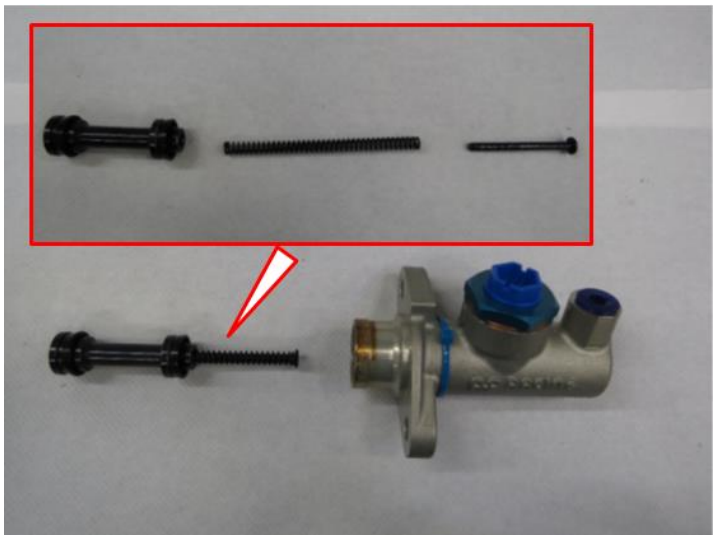
- Remove the bellows from the seat
- Lightly press the pushrod and remove the circlip
- Remove the pushrod and spacer (Fig. 7.4.8.1)




7.4.8.2

- Remove the brake piston (Fig. 7.4.8.2)

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7.4.8.3

Information Components must not be interchanged with parts from other brake master cylinders.

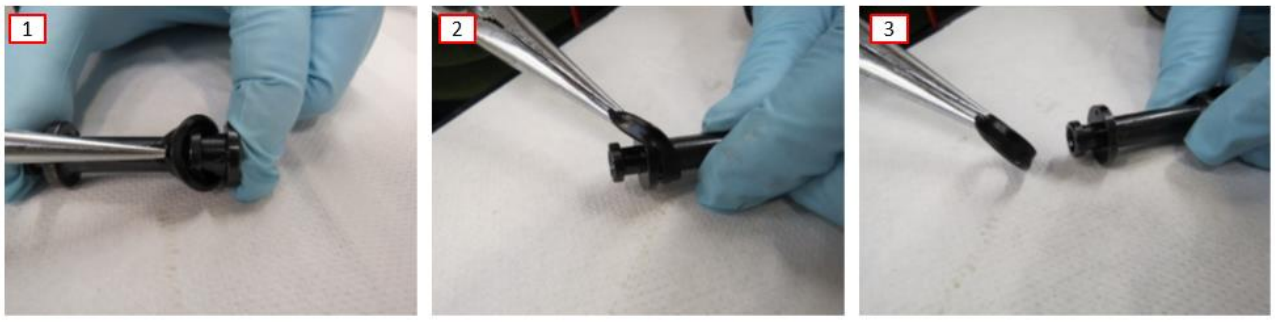
- Remove brake piston, spring and guide pin (Fig. 7.4.8.3)



7.4.8.4

Information Perform all work on the seals using **new** gloves.

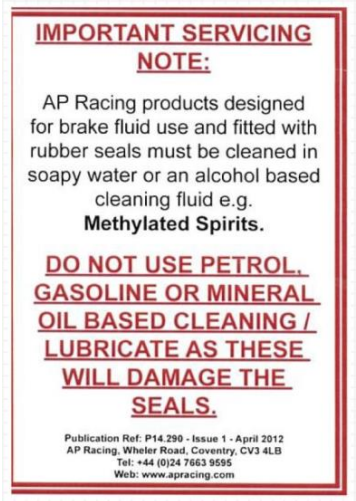
- Remove the main seal and piston ring in the specified sequence (Fig. 7.4.8.4)



7.4.8.5

- Remove the secondary seal as specified (Fig. 7.4.8.5)

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7.4.8.6

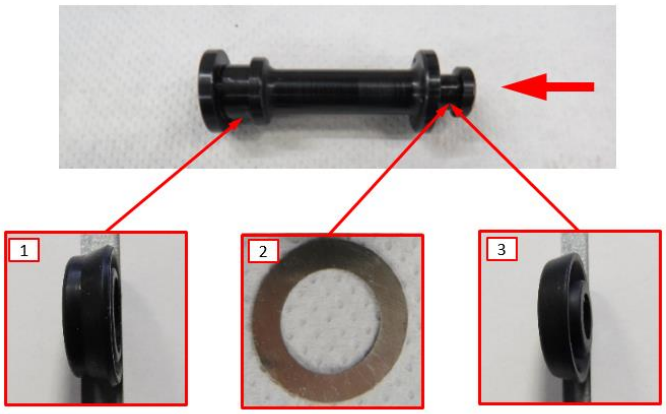
Assembly preparation:

Information

As described in the manufacturer's warning instructions, (Fig. 7.4.8.6), all **metallic** repair kit components must be cleaned using soapy water or alcohol-based cleaning agent.

All repair kit **seals** must be cleaned with brake fluid.

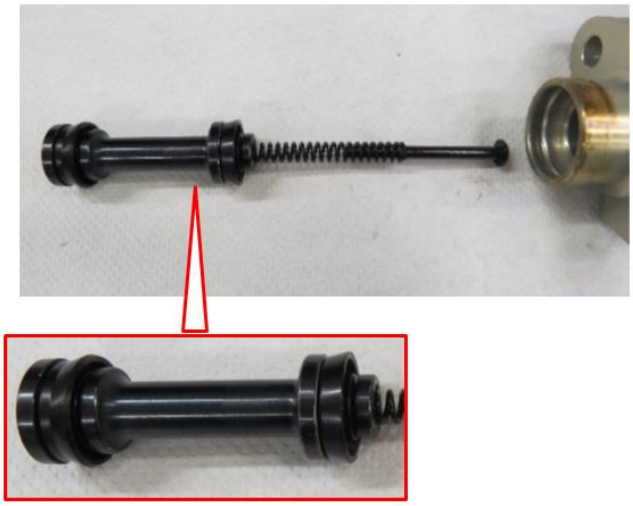
Assembly:



7.4.8.7

- Fit the seals from the end marked by the arrow with the contour opening pointing to the right (Fig. 7.4.8.7).

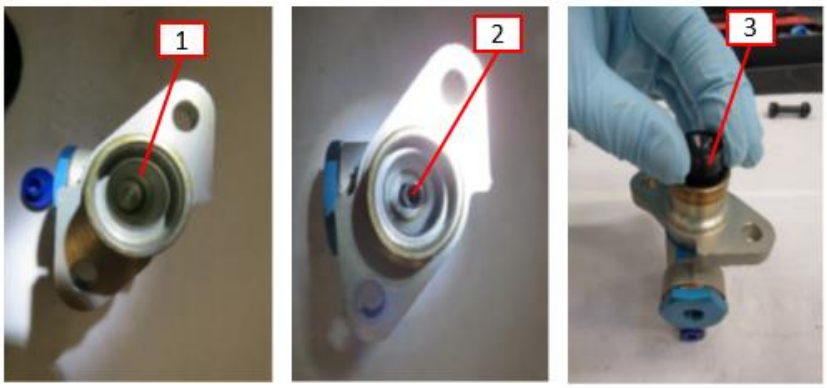
1. Large inner diameter
2. Metal disc
3. Small inner diameter



7.4.8.8

- Before fitting, check the alignment of the seals
- Coat the housing and the seals with brake fluid for installation (Fig. 7.4.8.8)

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7.4.8.9

- Check the housing (1) for contamination and sharp edges
- Position the guide pin and spring (2) centrally
- Install the piston with seals (3) without folding back the seals (Fig. 7.4.8.9)



7.4.8.10

- Do not close off the supply bore when assembling
- Check for free movement of the piston via the pushrod (Fig. 7.4.8.10)

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7.4.8.11

- Use a **new** circlip
- Lightly press down the pushrod and fit the circlip (Fig. 7.4.8.11)



7.4.8.12

- Check that the circlip is correctly seated (Fig. 7.4.8.12)

Information

The copper sealing rings for the distributor must be replaced before assembly.

After completing assembly, the brake system must be completely bled and checked for leaks

Setting the balance bar, see chapter 3.8.1

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7.4.9 Shock absorber/spring

Clean the shock absorber/spring unit after each practice or race and carry out a visual inspection for damage and leaks.

7.4.10 Anti-roll bar

Check all moving components for free movement. Check the bearings of the anti-roll bar connection and suspension for inadmissible play.

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7.4.11 Steering system

Reservoir capacity: 0.65 liter (0.7 qt)

Bleeding the steering system

NOTE

Hydraulic pump running dry

Damage to the hydraulic pump

- The reservoir must always be filled.

Venting should be performed by two persons.

For filling the entire system, e.g. after replacing the steering system, lines or a high loss of fluid, start the engine and stop it again immediately. The fluid level in the container drops rapidly and it should be ensured that “Pentosin” is continuously replenished while the engine is running. During this procedure, the reservoir should never run dry.

The electric hydraulic pump operates only while the engine is running. The compensating tank must be filled before starting the engine to vent the system. Check the fluid level in the tank immediately after starting the engine.

Turn the steering wheel quickly from one stop to the other, allowing the air in the cylinders to escape. Do not turn the steering wheel with increased force against the end stop, in order to prevent unnecessary pressure peaks in the system.

The fluid level should be constantly monitored during venting. If the fluid level drops, "Pentosin" has to be replenished until the level no longer changes and no air bubbles are visible on the surface of the fluid when setting the steering.

Checking the fluid level

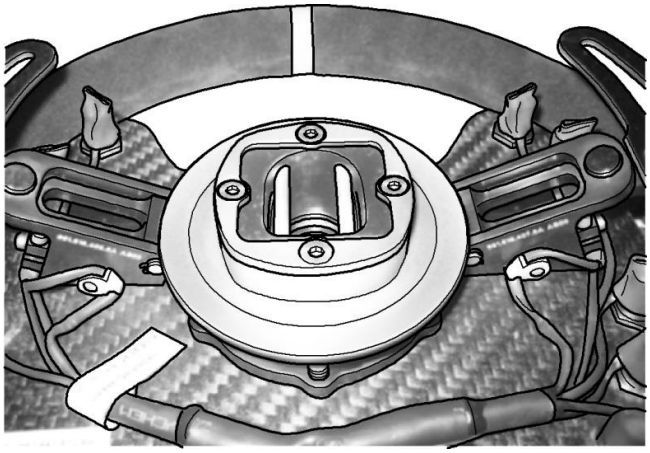
The fluid level is checked with the dipstick located in the container lid, while the pump is running.

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Quick release coupling

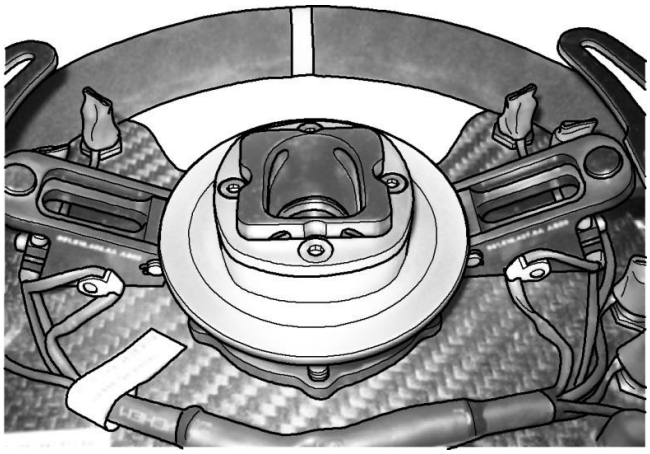
- Check the steering wheel for play
- Clean and grease the mounting points of the quick release coupling

The picture (7.4.10.1) shows the locking pins of the quick release coupling.



7.4.11.1

The picture (7.4.10.2) shows the open quick release coupling (coupling ring pulled out).
Clean and grease the lateral sliding surfaces.



7.4.11.2

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7.5 Body

- Check the body for cracks and damage near the suspension and engine/gearbox mounting points
- Check wing support brackets for cracks and damage
- Check seat and seat rail for damage, tightness and function

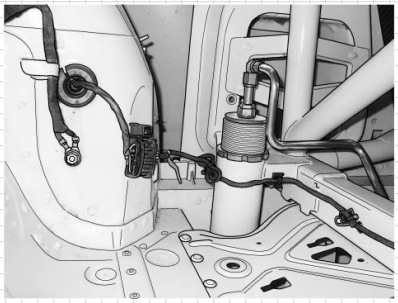
7.5.1 Airjack system

Caution

Extending the air jacks

Risk of crush injuries

- The system must be depressurized before working on it



7.5.1.1

Porsche Motorsport recommends overhauling after two years or 2,000 strokes.

- Only clean air jack piston with silicone grease or spray
- Regularly check the air jacks for mechanical damage

Other maintenance work is only to be performed by the manufacturer! Refer to the appendix for the manufacturer's detailed information material.

7.6 Electrical system

- Regularly check connectors for tight fit and corrosion

7.6.1 Checks after wet races

- Remove moisture from the interior
- Check electrical connectors for moisture, remove if required

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7.7 Maintenance intervals

7.7.1 After 200 km (124 mi) or first test drive

- Visual inspection of all systems, lines, etc. for leaks, damage or chafing
- Check the specified tightening torque of all safety critical bolts
- Check all wheel suspension bolts
- Check the drive shafts
- Check the engine suspension
- Check the gearbox suspension

7.7.2 After each session

- Visual inspection of all systems, lines, etc. for leaks, damage or chafing
- Check the specified tightening torque of all safety critical bolts
- Check the shock absorbers for leaks
- Fuel extraction and determination of fuel consumption
- Check all wheel suspension joints for play
- Clean the radiators
- Remove dust and rubber abrasion from the brake disks and calipers
- Vent the brake system
- Vent the clutch (1x per race weekend)
- Clean driver's foot space and check for functionality
- Clean and check wheel nut lock
- Check the oil level
- Check drive shaft sleeve for damage
- Check steering system sleeve for damage
- Check all systems for leaks

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7.7.3 After each weekend (sprint race)

In addition to 7.7.2:

- Engine oil and filter change (after „heat race“ engine oil temperature > 140 °C (284 °F))
- Clean/replace air filter
- Change brake fluid
- Check balance beam setting
- Clean balance beam system
- Change clutch fluid
- Check clutch wear
- Check wheel bearing clearance
- Check air jacks for tightness and leaks
- Check seats and seat belt
- Check fire extinguishing system
- Check Simmerring seal for leaks on flywheel and pulley side
- Check the wiring loom for chafing
- Check routing of the wiring loom

7.7.4 After 3 – 4 race weekends (sprint races)

- Revise calipers
- Replace fuel filter and pump
- Have the shock absorbers overhauled
- Check drive shaft joints

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Runtime

Designation	Runtime in hours
Overhauling gearbox	60
Cross shaft	30
Overhauling engine	100
Stop-Choc elements exhaust system	60
Master brake cylinder	30
Seal ring brake caliper	60 (if necessary earlier)
Drive shaft	20 standing starts/30 endurance
Steering gear	50

7.8 Special tools 911 GT3 Cup (991)

Designation	Use	Company	Part number
Motor			
Angle-controlled wrench 3-60 Nm (2.2 – 44.25 lb-ft)		Stahlwille	96501606
Angle-controlled wrench 20-200 Nm (14.75 – 147.5 lb-ft)		Hazet	7292-2eTAC
Angle-controlled wrench 40-400 Nm (29.5 -295 lb-ft)		Hazet	7294-2eTAC
Cooling system adapter	Cooling system checking	Hazet	4800-12A
Chassis			
Axle shaft pressing-off tool 9454		PAG	000.721.947.00
Axle shaft nut wrench socket 9471		PAG	000.721.947.10

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Designation	Use	Company	Part number
Fork ring wrench ¼“	Brake nipple	Hazet	
Polygon head socket ¼“	Brake disk chamber	Hazet	
Unlock plier T40024	Brake pedal linkage	Matra	T40024
Hook wrench	Shocks	Sachs	00 1795 000 149
Hook wrench	Shocks	Sachs	00 1795 00 150
Exterior car body			
Air jack lock, front axle	Locking	Krontec	LL-91
Air jack lock, rear axle	Locking	Krontec	LL-90
Front axle Carlift	Vehicle lifting	Krontec	LL-30_CL_PP
Rear axle Carlift	Vehicle lifting	Krontec	LL-20_CL
Air gun		Krontec	LL-03
Tank filler neck		Sobek	
Fuel bottle		Krontec	
Windshield cutting tool KSA		KSA Toolsystems	SCS-500
Riveting tongs M5 + M6	Threaded nuts, threaded pins	Förch	
Rivet tongs 9399/1 threaded bolt, rough		PAG	000.721.939.91
Mouthpiece + threaded mandrel 9399/2		PAG	000.721.939.92
Rep. Tool for threaded bushes M12 x 1.25		PAG	000.721.984.33
Rep. Tool for threaded bushes M14 x 1.5		PAG	000.721.984.31
Rep. Tool for threaded bushes M14 x 1.5 10 mm deep		PAG	000.721.984.32
Rep. Tool for threaded bushes M16 x 1.5		PAG	000.721.984.30

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7.9 Partner contacts

EDUARD WILLE GmbH & Co.KG

Lindenallee 27

42349 Wuppertal

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Fax: +49 (0)202-47 91-200

E-Mail: info@stahlwille.de

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Postfach 100461

42804 Remscheid

Phone: +49 (0)21 91-79 23 75

E-Mail: info@hazet.de

SOBEK Motorsporttechnik GmbH & Co.KG

Industriestraße 8

68542 Heddesheim

Phone: +49 (0)62 03-40 43 90 0

Fax: +49 (0)62 03-40 43 91 8

E-Mail: info@sobek-motorsporttechnik.de

MATRA-Werke GmbH

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63512 Hainburg

Phone: +49 (0)61 82-78 33-55 24

Fax: +49 (0)61 82-78 33-55 07

E-Mail: nicole.vinson@matra.de

Krontec Maschinenbau GmbH

Pommernstraße 33

93073 Neutraubling

www.krontec.de

Sachs

ZF Friedrichshafen AG

Röntgenstraße 2

97424 Schweinfurt

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KSA Toolsystems GmbH

Werkstr. 14

77815 Bühl

Phone: +49 (0)72 23-28 18 24 7

Fax: +49 (0)72 23-28 18 24 6

E-Mail: info@ksa-toolsystems.de

Theo Förch GmbH & Co. KG

Theo-Förch-Straße 11-15

74196 NEUENSTADT

Phone: +49 71 39 95 18 0

Fax: +49 80 0-36 37 24 6

Internet www.foerch.com

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Brookfield Technology Centre

Twentypence Road (Cottenham)

Cambridge

CB24 8PS - United Kingdom

Porsche UK Support (Mobil Team): +44 1604 598814

Porsche UK Support (Non Business Hours): +44 1604 598809

Porsche US Support: +1 (424) 250-1290 X 1290

Fax: +44 (0)19 54-25 36 01

E-Mail: Porsche.support@cosworth.com

MEGA-Line Racing ELECTRONIC GmbH

Haunersdorf Str. 3

D-93342 Saal a.d. Donau

Phone: +49 9441 6866-0

Fax: +49 9441 6866-11

E-Mail: info@mega-line.de

GKN Service International GmbH

Mühlheimer Str. 163

63075 Offenbach am Main ; Germany

Ansprechpartner / Contact person:

Gerd Kraehe

Engineering Motorsport

Telefon +49 69 8904 2011

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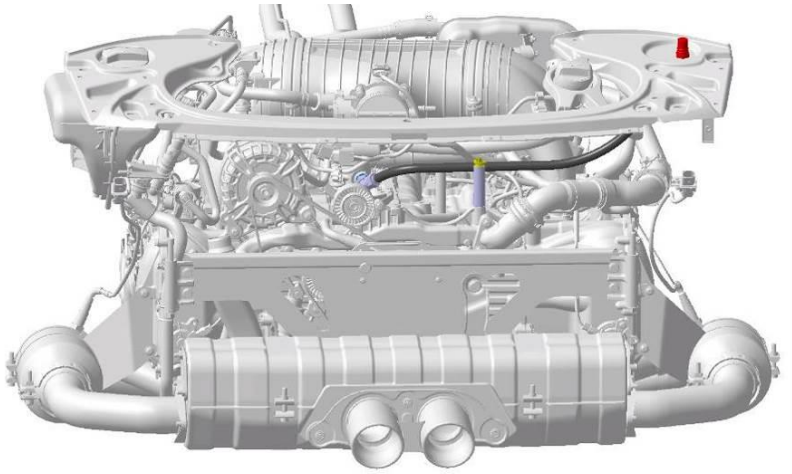


8. After Sales

The After Sales chapter contains information on all the accessories offered by Porsche Motorsport for the vehicle.

8.1 Engine oil rapid filling system

The engine oil rapid filling system allows engine oil to be refilled with the rear lid closed. Up to 1.0 liter (approx. 1 quart) of oil can be refilled. The oil is pressed into the oil circuit by an air pressure of max. 2 bar (29 psi) in the filler bottle. Spill-free filling is realized via the clean-break coupling.



8.1.1

Installation of rapid filling system:

⚠ WARNING

Flying foreign bodies during grinding, drilling, and milling

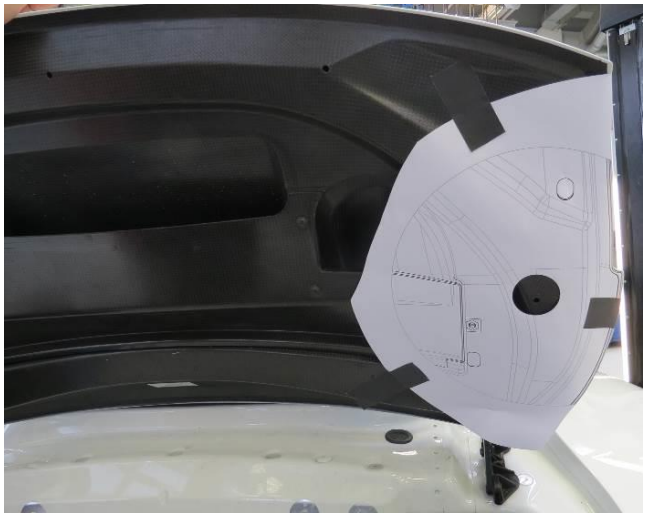
Risk of eye injuries

- Wear safety glasses.

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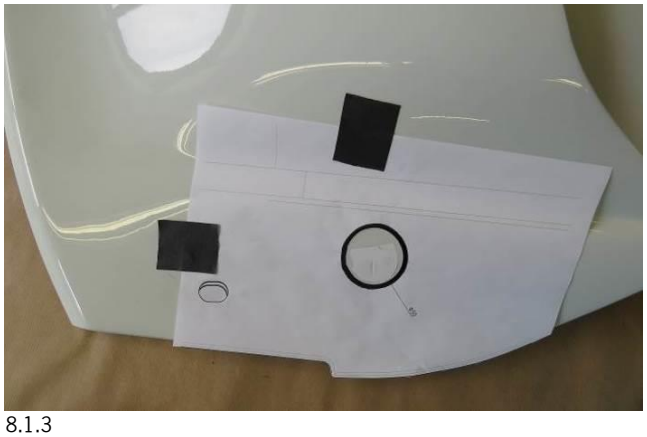
- Remove rear lid
- Attach template to the inside of the lid (Figure 8.1.2), making sure that the contour of the template and lid are flush

Information You can find the templates in chapter 8.1.1 or contact your technical customer support.



8.1.2

- Produce hole (filler neck) with corresponding dimensions by drilling and grinding
- Extract swarf and grinding dust
- Attach template to the outside of the lid (Figure 8.1.3), making sure that the contour of the template and lid are flush

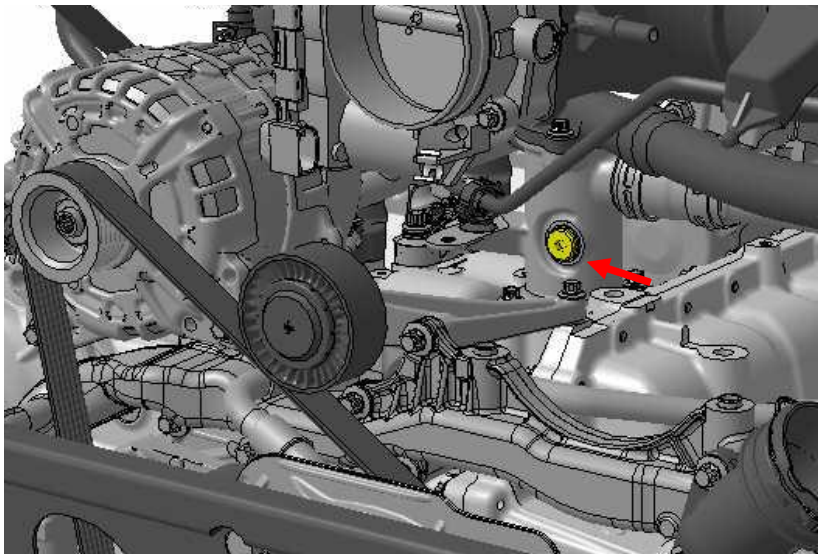


8.1.3

- Produce hole (filler neck) with corresponding dimensions by drilling and grinding
- Extract swarf and grinding dust

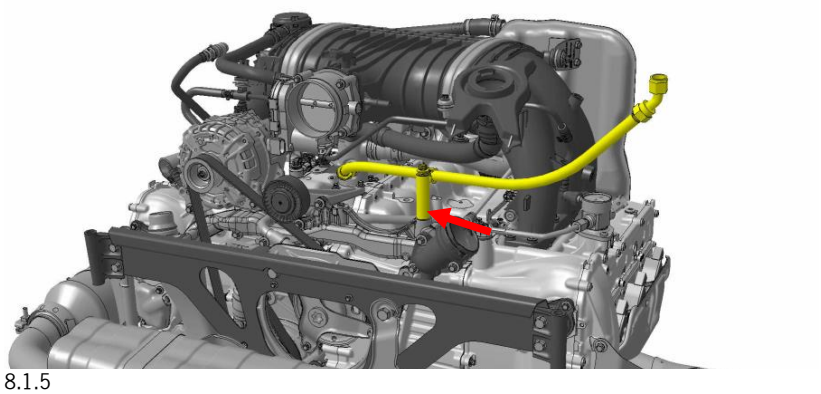
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- Remove screw plug (arrow) (hexagon socket 6)



8.1.4

- Screw on double union 14x1.5-8D on engine side, torque: **35 Nm** (26 ft-lb)
- Screw on line holder, torque: **23 Nm** (17 ft-lb)

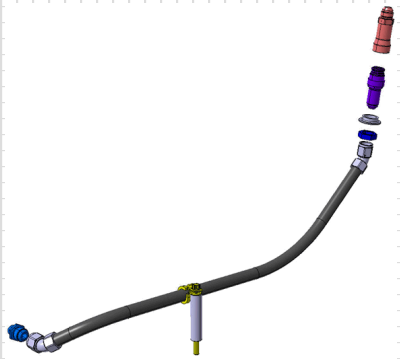


8.1.5

- Screw quick-action coupling onto mounting bracket via flat nut D-8, spacer ring, torque: **35 Nm** (26 ft-lb)
- Check system for leaks

Information

Porsche Motorsport recommends sealing the opening in the rear lid with helitape to prevent foreign bodies and water entering the engine compartment through the opening. This also improves aerodynamics.

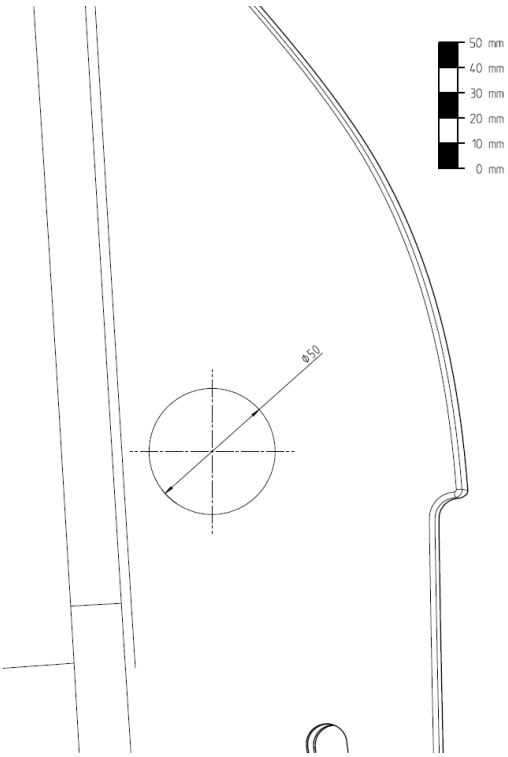


8.1.6

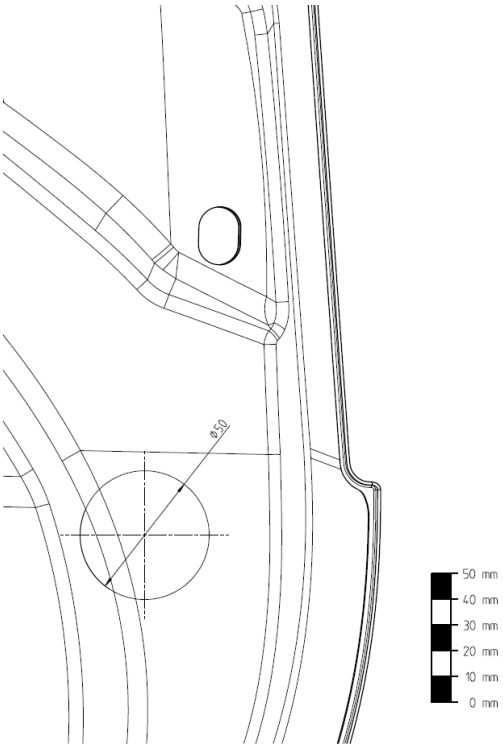
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8.1.1 Templates



Rear lid from above 8.1.1.1



Rear lid from below 8.1.1.2

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8.2 LED oil level display

The oil level display is screwed onto the body via a holder behind the rear side window (Figure 8.2.2).

The plug connection to the main wiring harness is located on the right B-pillar



8.2.1



8.2.2

Display logic of the LEDs:

LED	Oil level in %
1	10
1+2	20
1+2+3	40
1+2+3+4	60
1+2+3+4+5	80
1+2+3+4+5+6	100
1+2+3+4+5+6+7+8	Oil level too high

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8.3 Safety Nets

⚠ WARNING

Incorrectly installed safety nets

Vision impeded

- The driver must be positioned in the seat so that the eye line is in the corridor – see image 8.3.1. The eye line of every driver must be marked on the head rest!
- When viewed from the side, the upper net strap must be located in z at a maximum of 15 mm below and a maximum of 80 mm above the eye. See image 8.3.2.
- The net must rest on the side of the seat. A minimum of 2 of the vertical straps must cover the headrest. See image 8.3.2.

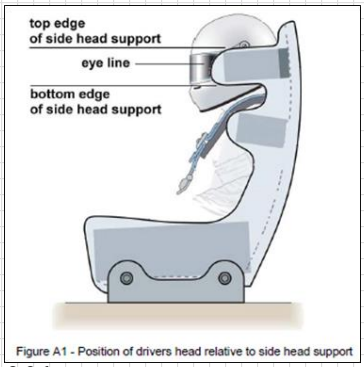


Figure A1 - Position of drivers head relative to side head support

8.3.1

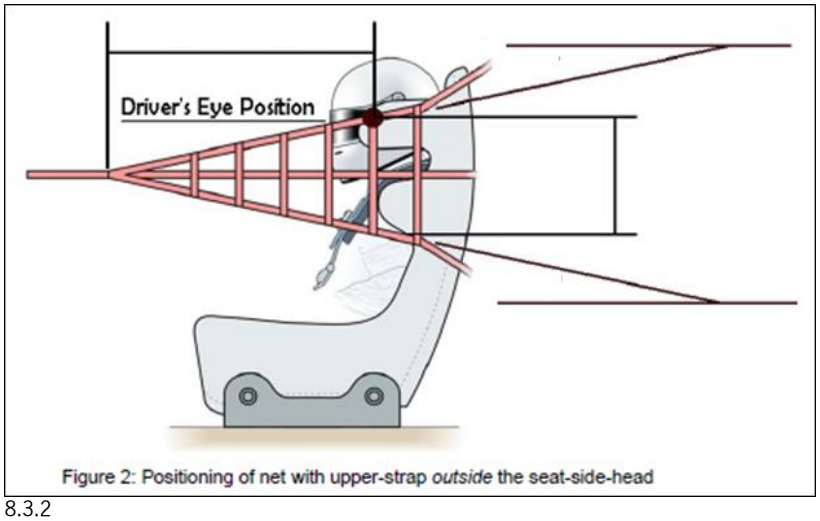


Figure 2: Positioning of net with upper-strap *outside* the seat-side-head

8.3.2

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WARNING

Loose safety net

Head or neck injury

The net must be tensioned in such a way that when a force of 50 N, which originates laterally from the driver, is applied at every point on the longitudinally running straps, the net deforms less than 50 mm.

- Tightly tension the inner net using the ratchet.
- Tension the outer net so tightly that physical effort is required to latch the net in position.

WARNING

Non-functioning safety net release mechanism

Climbing out of car more difficult

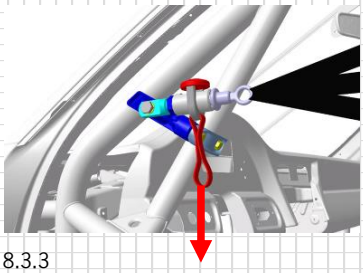
Every time before running the car, it must be checked that the safety net release mechanism functions correctly.

Release driver door side net:

- Pull release strap downwards (image 8.3.3)

Release inner net:

- Pull release strap downwards (image 8.3.4)



8.3.3



8.3.4

WARNING

Unintentional release of safety net

Release by foreign objects

- Push button for outer net must point upwards (image 8.3.3)

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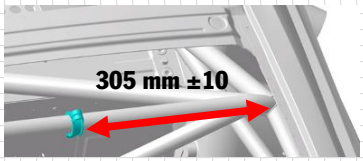


Information

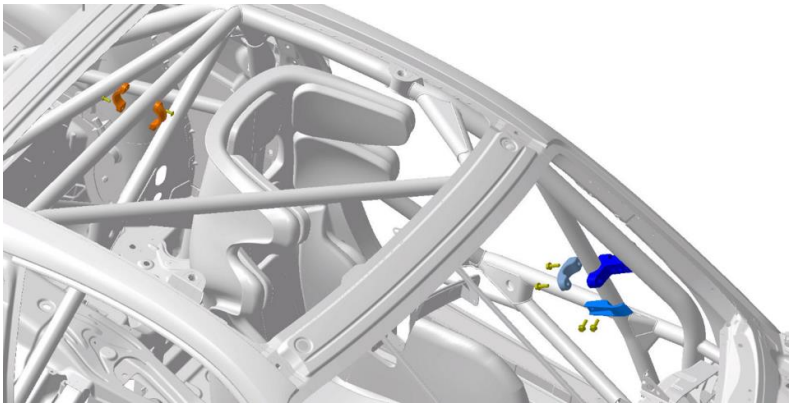
After completing the installation, the team is responsible to ensure that the installation complies with the FIA 'Racing Nets Installation Specification'!

Installation Safety Net (outer net / driver's door net)

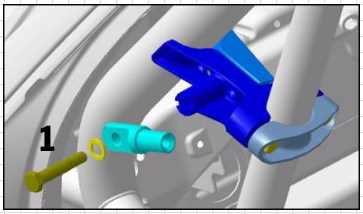
- Remove the cage padding to position the strap mounting (for upper strap inner net) and tighten the bolts to **10 Nm** (7.4 ft-lb) torque (image 8.3.5).



8.3.5

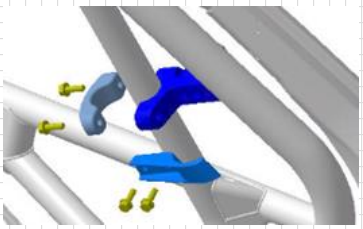


8.3.6



8.3.7

- Fit the strap mounting to the A-pillar (image 8.3.7). Tighten the M10x60 bolt pos. 1 to **46 Nm** (34 ft-lb). The clamping surface of the mounting must completely encompass the front tube of the roll-cage in the area of the A-pillar.
- Tighten M8x25 bolt (image 8.3.8) to **23 Nm** (17 ft-lb)



8.3.8

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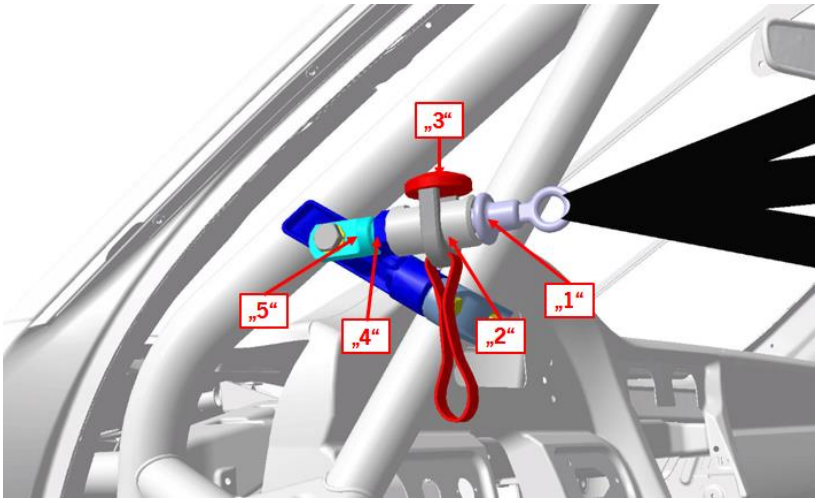
Installation Outer Net

WARNING

Unintentional release of safety net

Release by foreign objects

- Push button for outer net must point upwards (image 8.3.9)

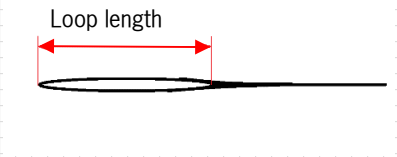


8.3.9

1. Insert “1” into “2” until the mechanism engages
2. Screw the nut “4” to the end stop on the outer thread
3. Screw “2” to the end stop on the outer thread. Afterwards, unscrew until “3” points upwards.
4. Tighten the lock nut “4”

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8.3.11

Loop length upper <125mm

Loop length middle <100mm

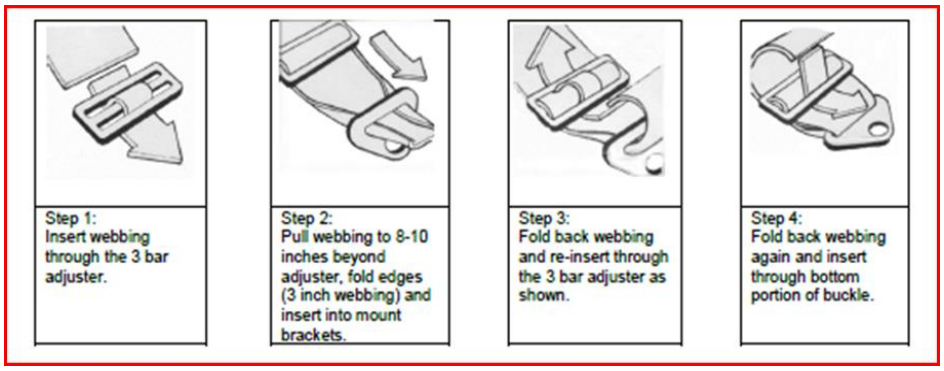
Loop length lower <125mm



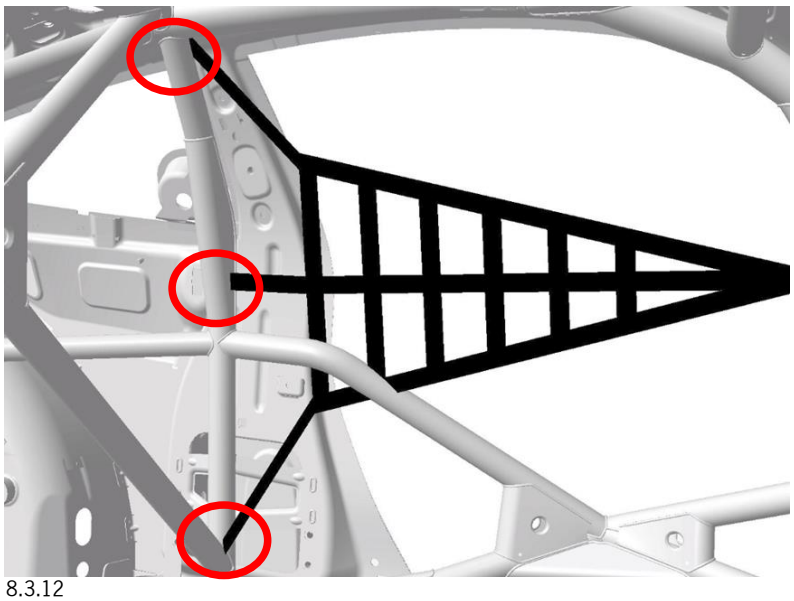
8.3.13

Mounting points for the three rear straps on the roll-cage

Pay attention that the straps are correctly inserted into the adjuster brackets and the distance to the roll-cage tube!



8.3.10



8.3.12

Figur 8.3.13 shows the fixation below

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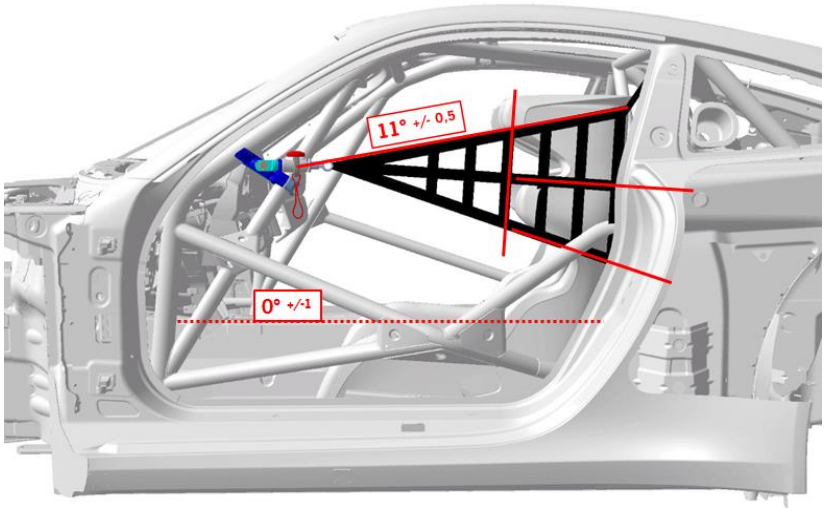


Adjusting the Outer Net

Adjust the net based on the angle as well as in relation to head and shoulder support on the seat. In doing so, the net must rest on the side of the seat and the net must remain tensioned or be re-tensioned.

- Slide the seat into the rearmost position
- Tension the net using the fittings

When adjusting the net, the reference plane (zero position) is the centre tunnel. The net is adjusted on the three rear loops. Use an electronic spirit level with tare function.



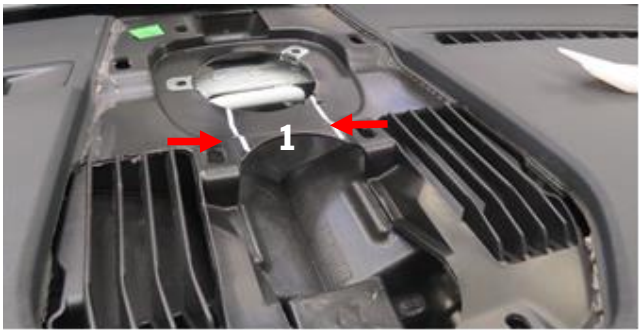
8.3.14

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Installation Inner Net

- Unclip and remove the dashboard cover (image 8.3.16), the red arrows indicate the mounting points
- Mark the trim line (image 8.3.15 arrows) and remove the stay pos. 1



8.3.15

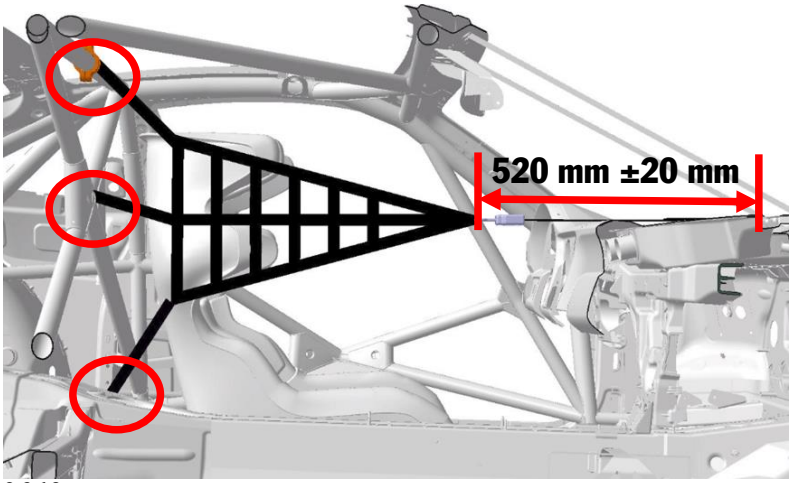


8.3.16

- Mount the forward strap onto the chassis (image 8.3.17)
- Set the length of the strap to 520 mm ± 20 mm using the fittings and adjuster ratchet (image 8.3.18)



8.3.17



8.3.18



8.3.19

- Mount the three rear straps to the roll-cage (image 8.3.18.
- Figur 8.3.19 shows the fixation below
- Pay attention that the straps are correctly inserted into the adjuster brackets and the distance to the roll-cage tube (image 8.3.20)!



8.3.20

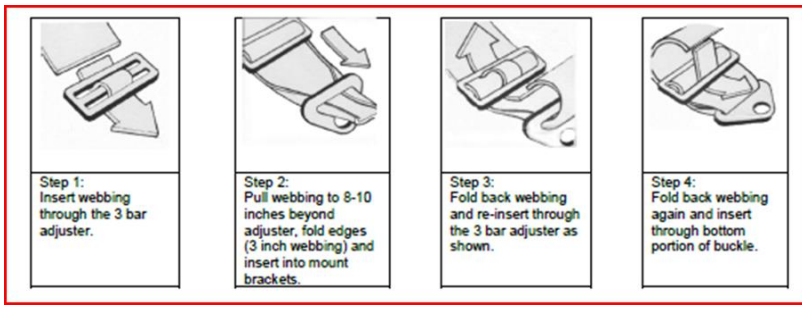
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Loop length upper <100mm

Loop length middle <100mm

Loop length lower <125mm



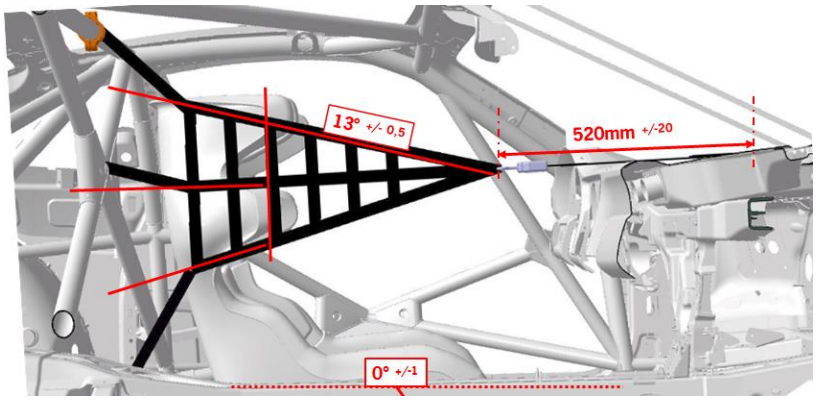


8.3.21

Adjusting Inner Net

The car must be positioned on a level surface. The net must be secured in the positions shown in image 8.3.21. Adjust the net based on the angle as well as in relation to head and shoulder support on the seat. In doing so, the net must rest on the side of the seat and the net must remain tensioned or be re-tensioned.

When adjusting the net, the reference plane (zero position) is the centre tunnel. The net is adjusted on the three rear loops. Use an electronic spirit level with tare function.

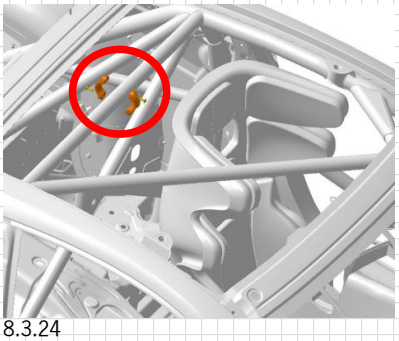


8.3.22

- Slide the seat into the rearmost position
- Tension the net using the fittings and ratchet mechanism

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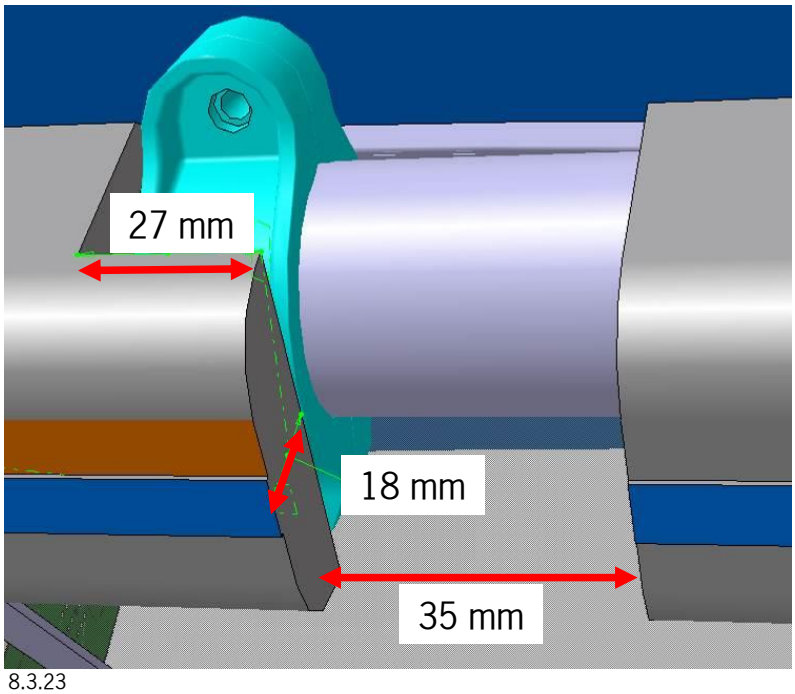




8.3.24

Trimming the Roll-Cage Padding

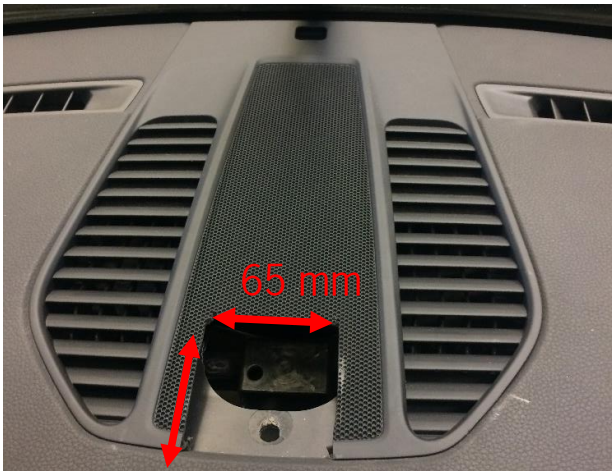
By fitting the bracket for the upper strap of the inner net, the roll-cage padding must be trimmed at this position. Refer to the dimensions in image 8.3.23. Two cable ties are also required.



8.3.23

Trimming the Speaker cover

- Cut recess 65 mm/65 mm (figure 8.3.25)
- Insert cover into dashboard



8.3.25

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8.4 Endurance tank

Since there is different vehicle build statuses, the required parts must be ordered individually on the basis of a list.

⚠ WARNING

Flammable or explosive materials

Fire or explosion

- Avoid contact with hot parts or sources of ignition.
- Use extractor to remove ignitable vapors.
- Attach a warning sign in a clearly visible position.

⚠ WARNING

Corrosive fluids

Danger of chemical burns

- Wear personal protective equipment.
- Ensure good ventilation.
- Avoid contact with corrosive fluid.
- If you do come into contact, wash off immediately with plenty of warm water and contact a doctor if necessary.

⚠ WARNUNG

Leaking fuel-carrying lines

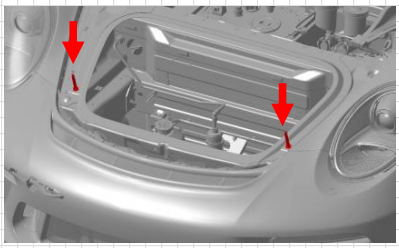
Escaping fuel

Fire

- Carry out leak test

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8.4.1

Preliminary work:

- System must be de-energized

WARNING

Flammable or explosive materials

Fire or explosion

- When filling and emptying the tank, establish equipotential bonding between the vehicle and fuel installation
- Carry out vehicle-side equipotential bonding via hood pin (arrow, Figure 8.4.1)

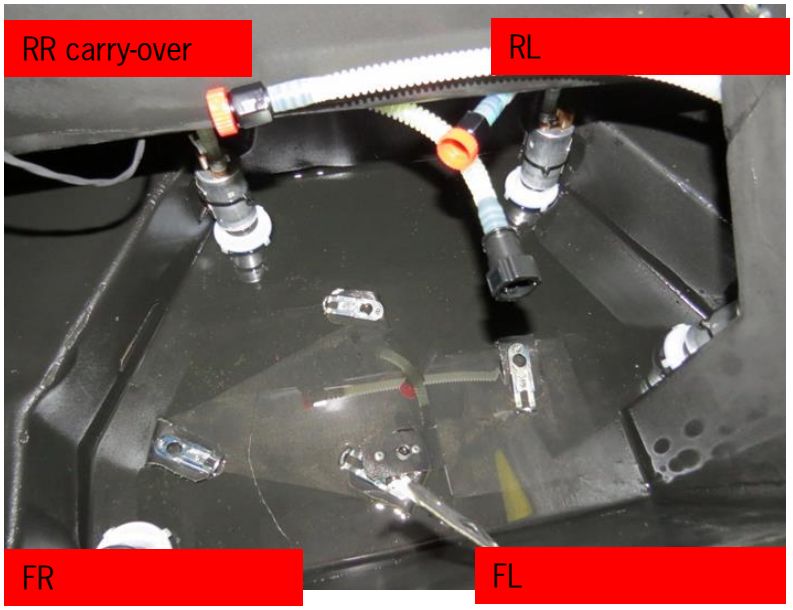
- Drain tank
- Remove connections at tank cap
- Remove fuel line at tank cap
- Filler neck, roll-over valve (carry-over part); the sealing ring of the ROV is not used again! Remove level sensor and seal
- Remove tank plate
- Remove tank foam part
- Remove wiring harness
- Remove fuel pump
- Remove catch tank
- Remove fuel pump holder
- Halterung der Kraftstoffpumpe entfernen

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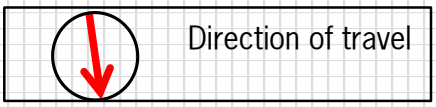


Installing in-tank pumps

- Fix in-tank pumps and filter with cable ties
- Connect fuel lines
- Connect wiring harness to in-tank pumps



8.4.2

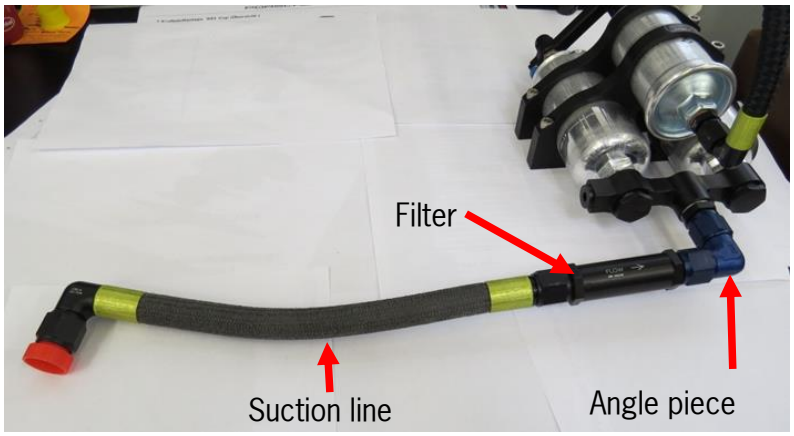


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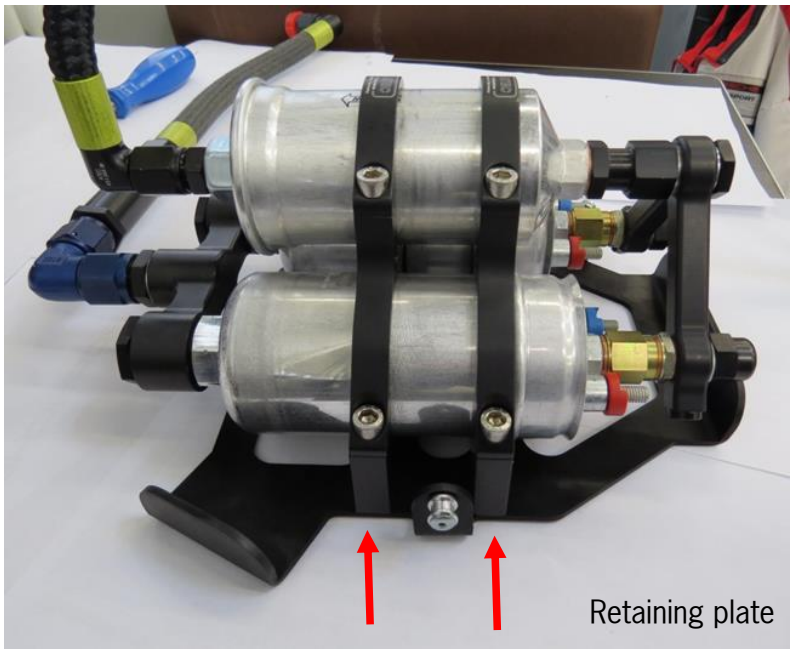
Pre-assembly of pump module, 8 bar (116 psi)

- Mount suction line with filter (pay attention to installation position!) and angle piece on pump unit



8.4.3

- Mount retaining plate on pump module with black screws + washers (arrows, Figure 8.4.4)
- Connect fuel pumps with wiring harness
- Mount fuel line (filter to tank plate) on filter side

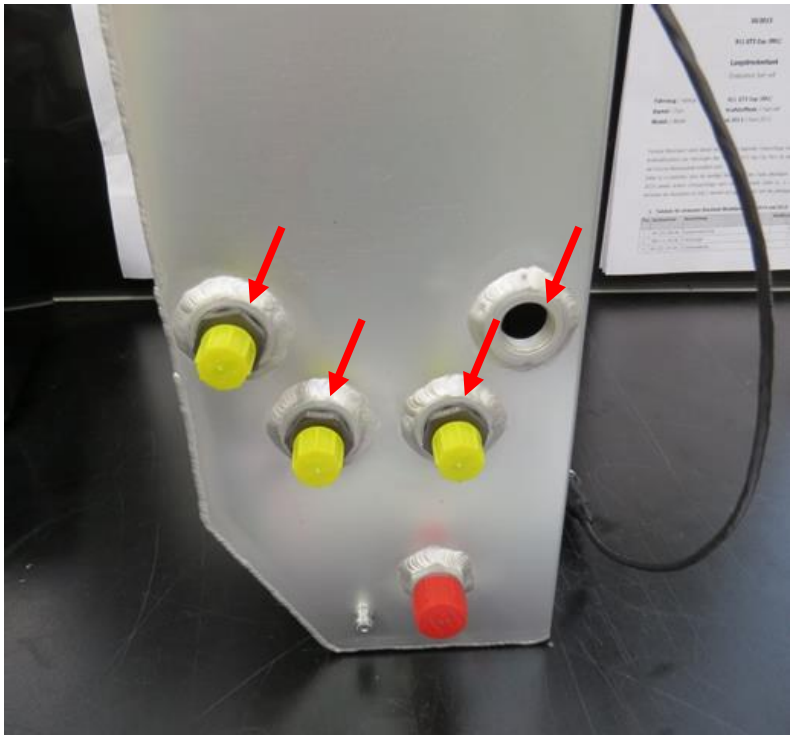


8.4.4

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Pre-assembly of catch tank

- Mount 4 check valves on 7 l catch tank using supplied sealing ring

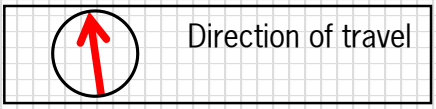


8.4.5

- Mount level sensor with seal and screws M5 x 16
- Mounting return line union

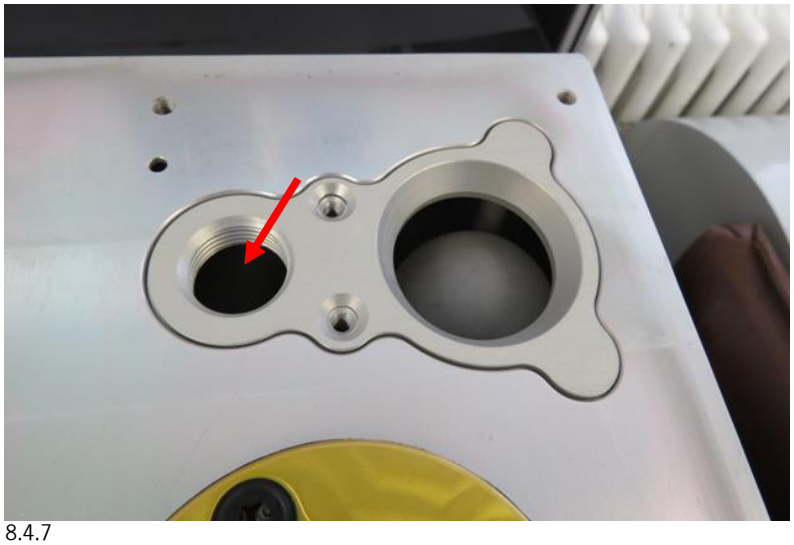


8.4.6



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- Mount valve plate with supplied screws
- Screw sealing cap into thread (arrow)



8.4.7

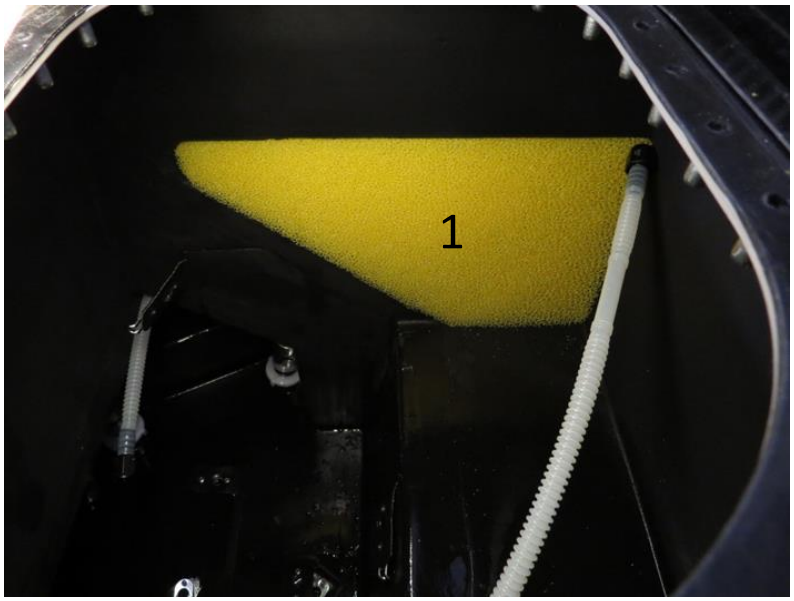
Assembly/tank foam part

- Foam part set, complete
- Insert foam block no. 1 on right



8.4.8



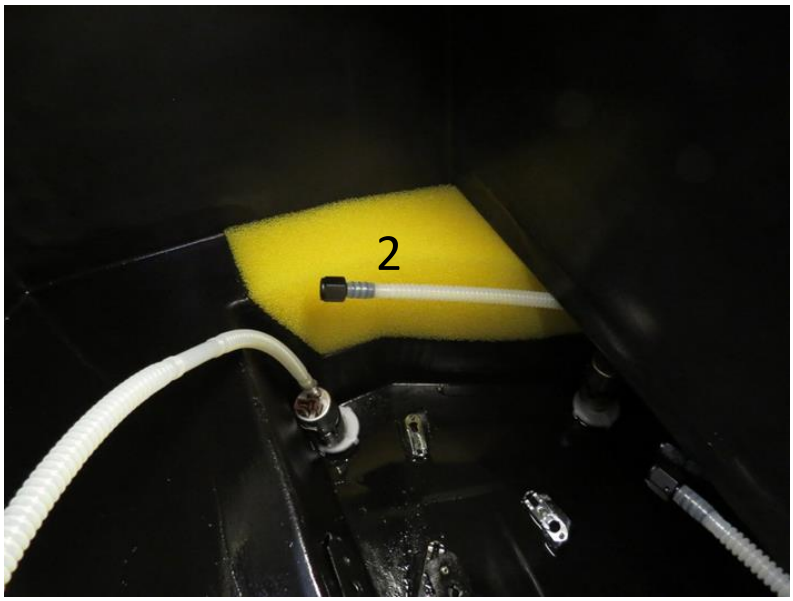


8.4.9

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- Insert foam block no. 2 on right



8.4.11



8.4.10

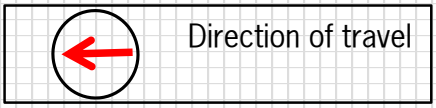
- Insert foam block no. 3 on right

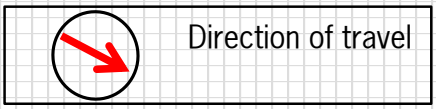


8.4.13



8.4.12





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8.4.14

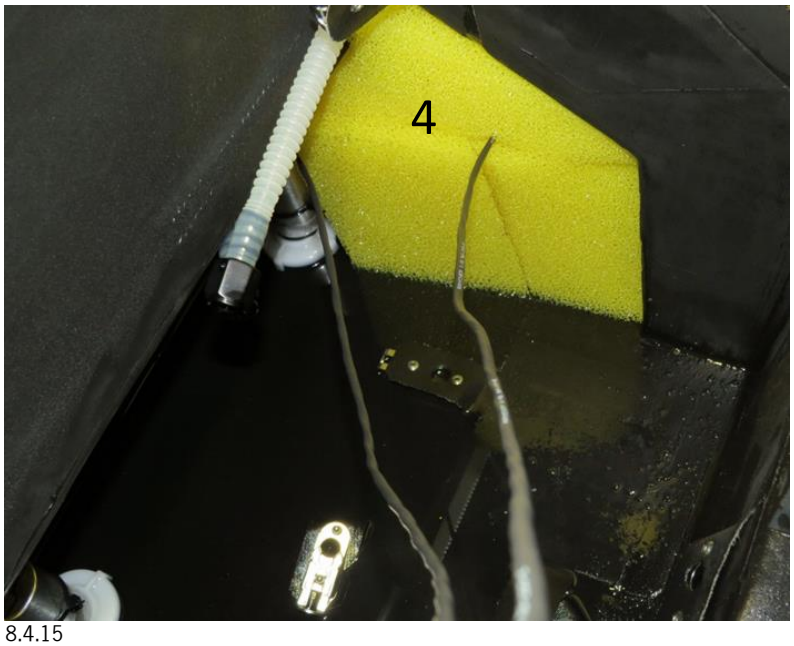
Direction of travel



8.4.16

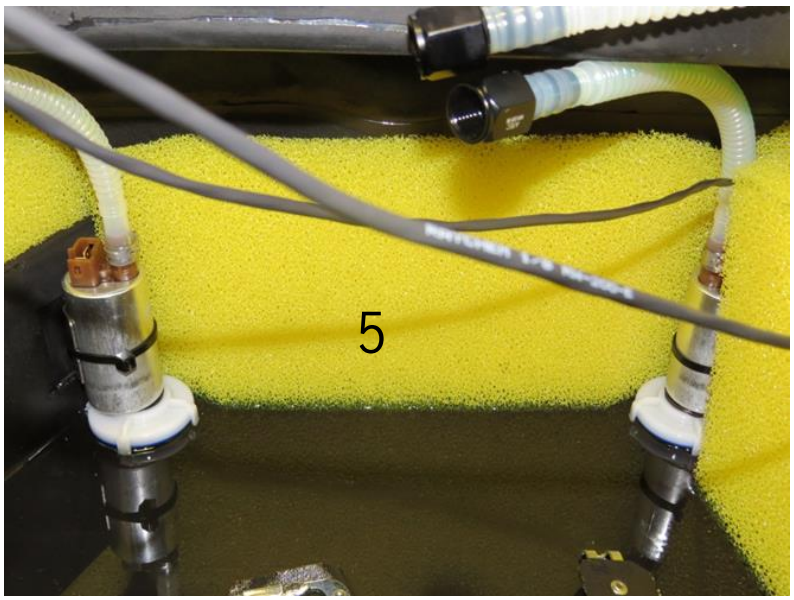
Direction of travel

- Insert foam block no. 4 on right



8.4.15

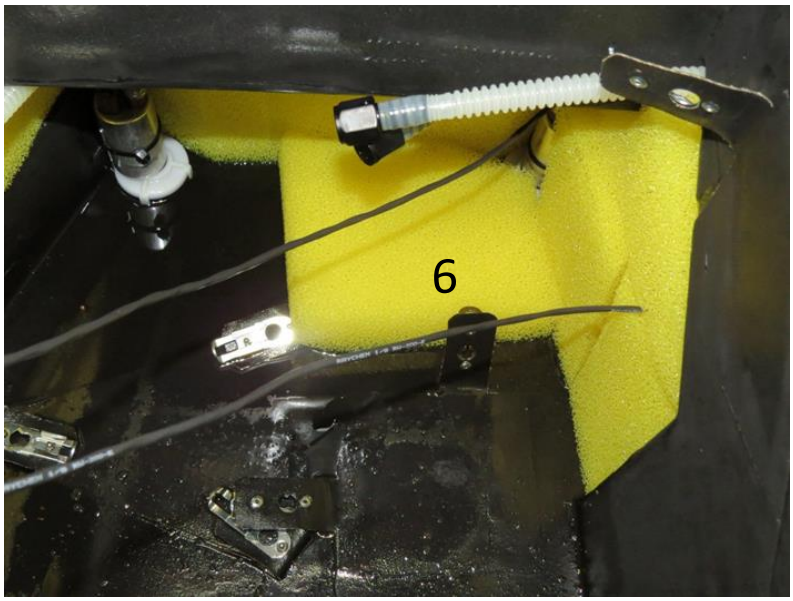
- Insert foam block no. 5 on right



8.4.17

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- Insert foam block no. 6 on right



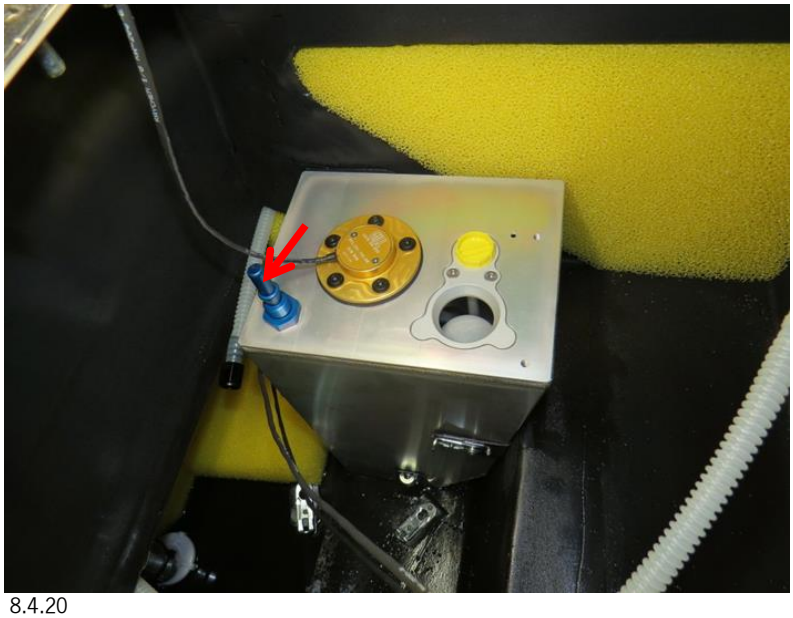
8.4.19



8.4.18

Direction of travel

- Put pre-assembled catch tank into position and fix at 4 tabs
- Plug fuel return line onto union (arrow)

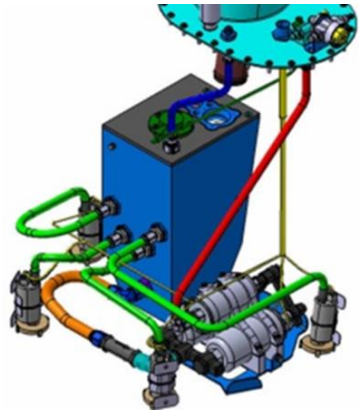


8.4.20

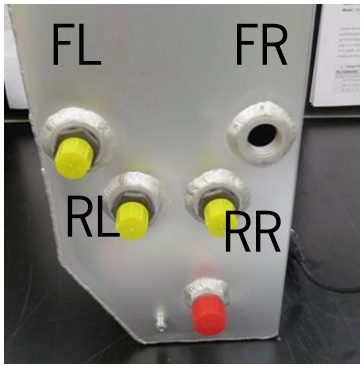
Direction of travel

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- Connect the fuel lines (green) of the in-tank pumps to the catch tank as shown in the graphic



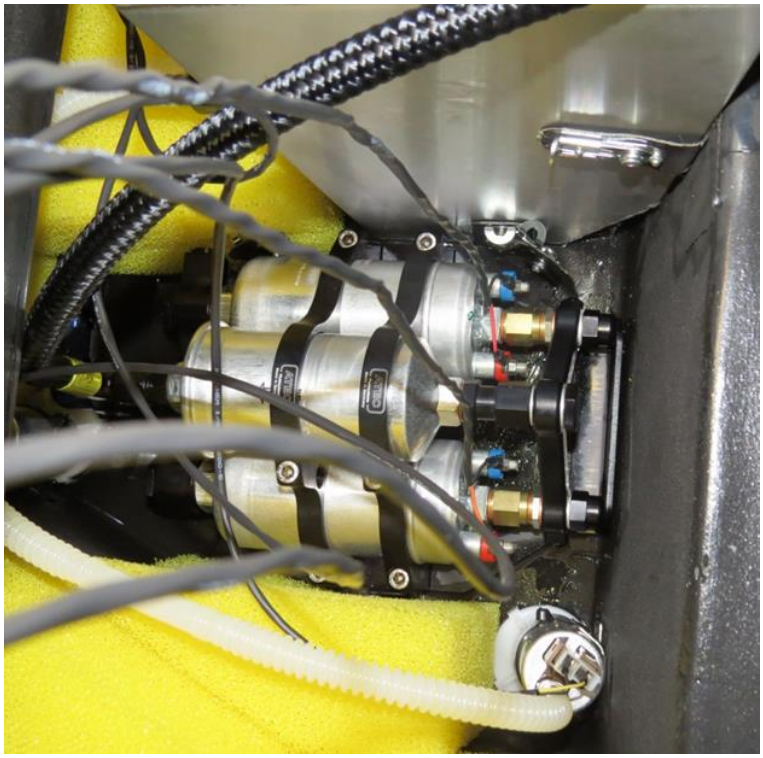
8.4.22



8.4.21

Connection of main pumps

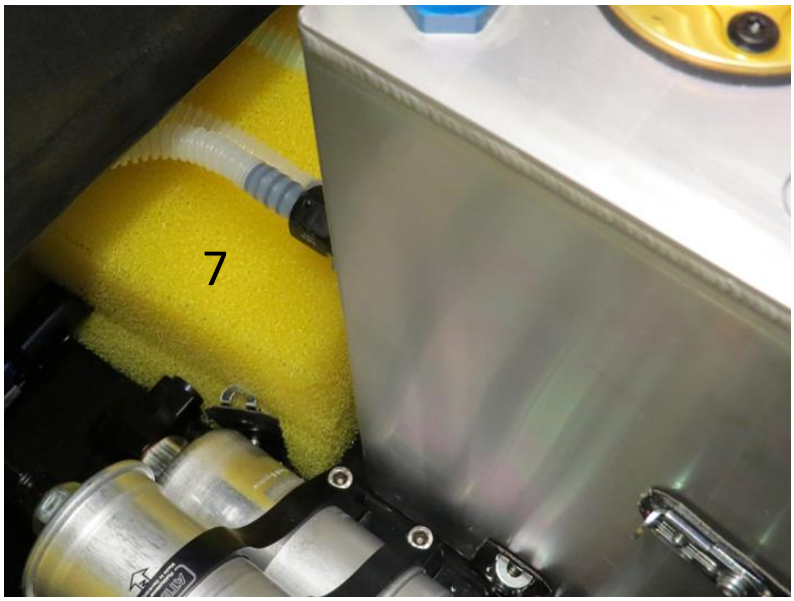
- Put pump unit into position and secure at the three mounting points
- Connect suction line to the main pumps at catch tank



8.4.23

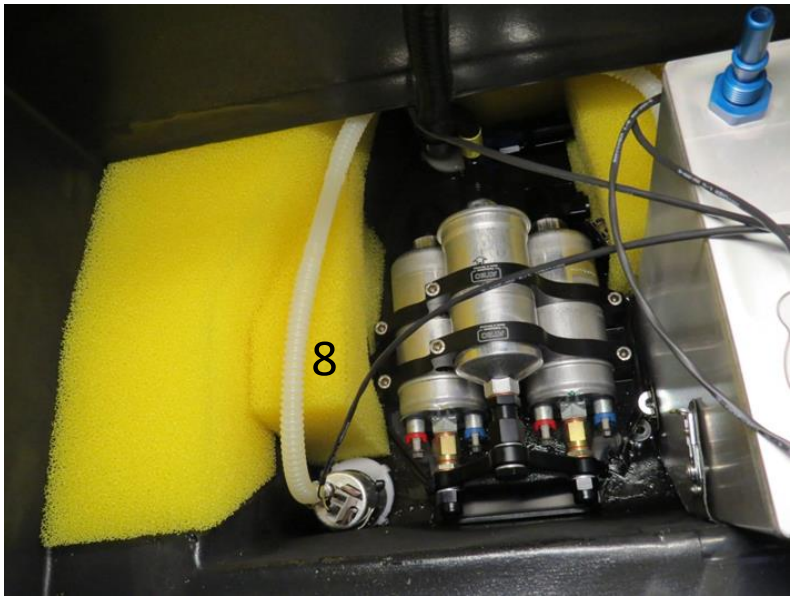
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- Insert foam block no. 7 on right



8.4.25

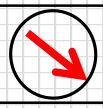
- Insert foam block no. 8 on right



8.4.27

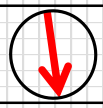


8.4.24

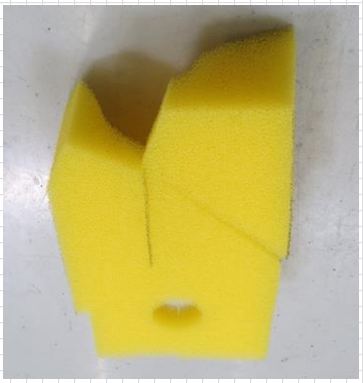




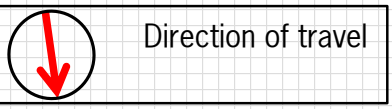
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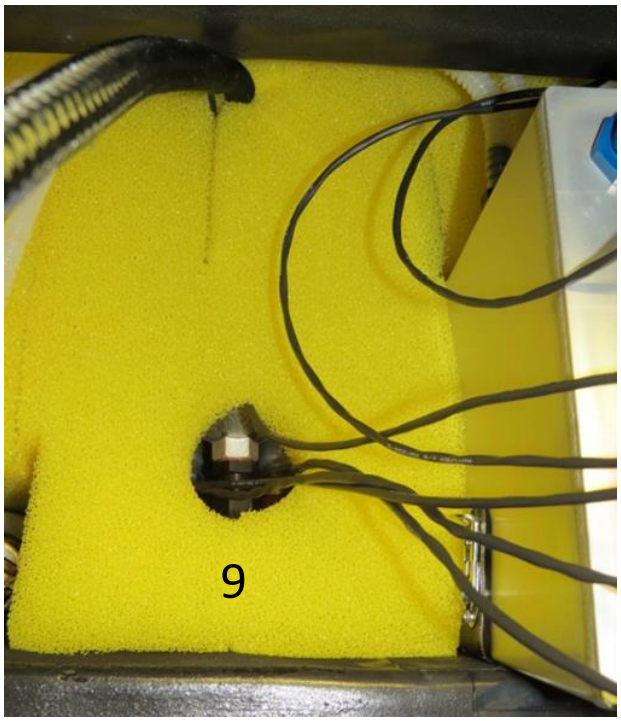
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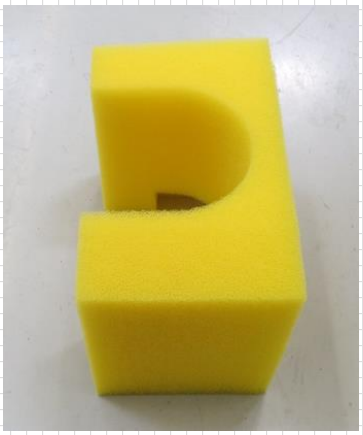
8.4.28



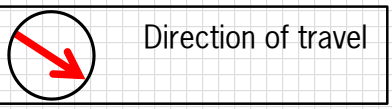
- Insert foam block no. 9 on right



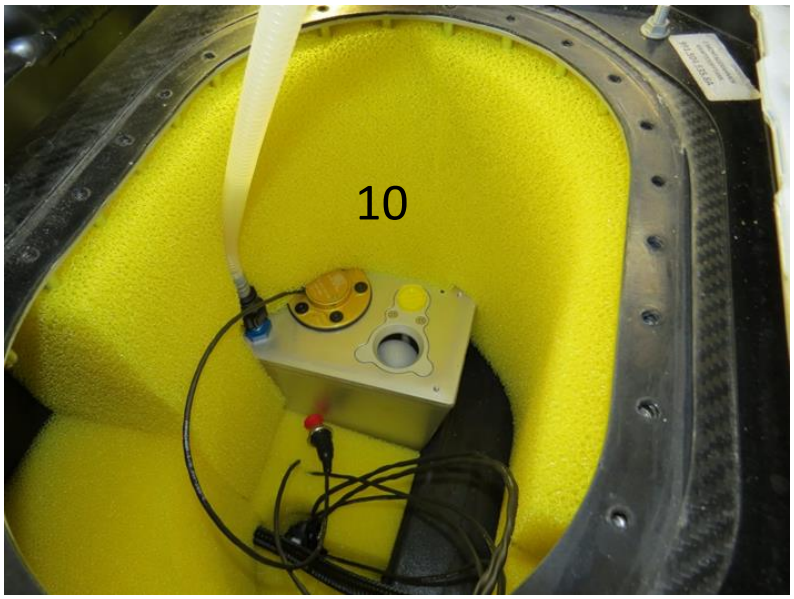
8.4.29



8.4.30



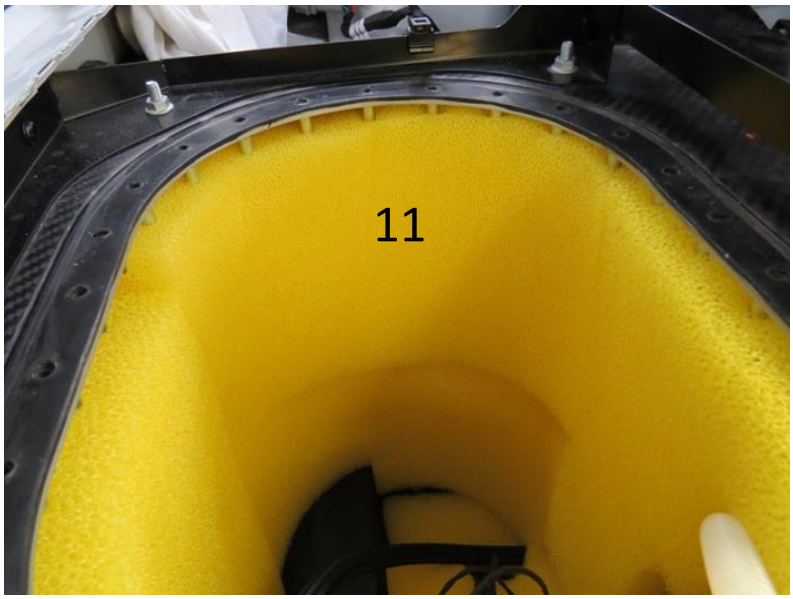
- Insert foam block no. 10 on right



8.4.31

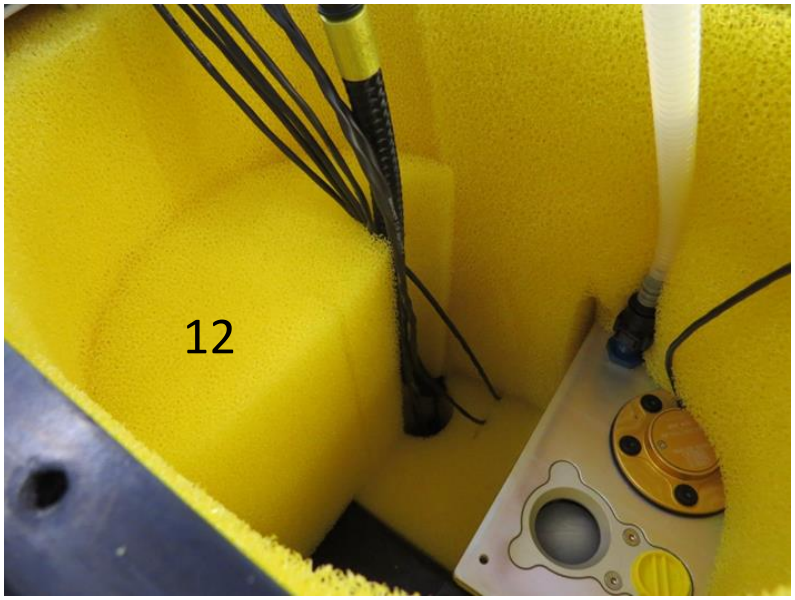
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- Insert foam block no. 11 on right

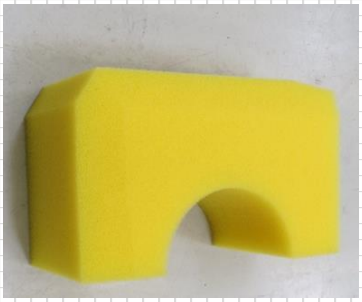


8.4.33

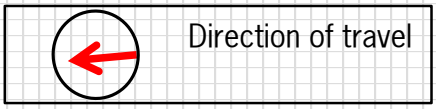
- Insert foam block no. 12 on right



8.4.35



8.4.32

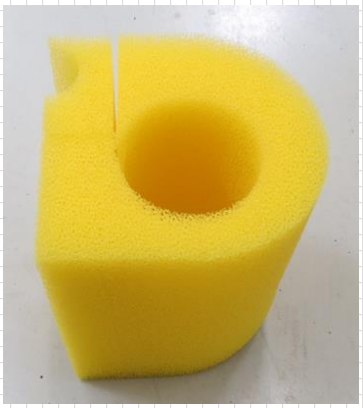




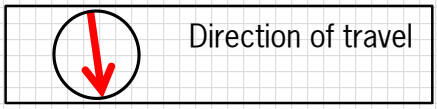
8.4.34

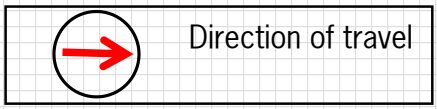


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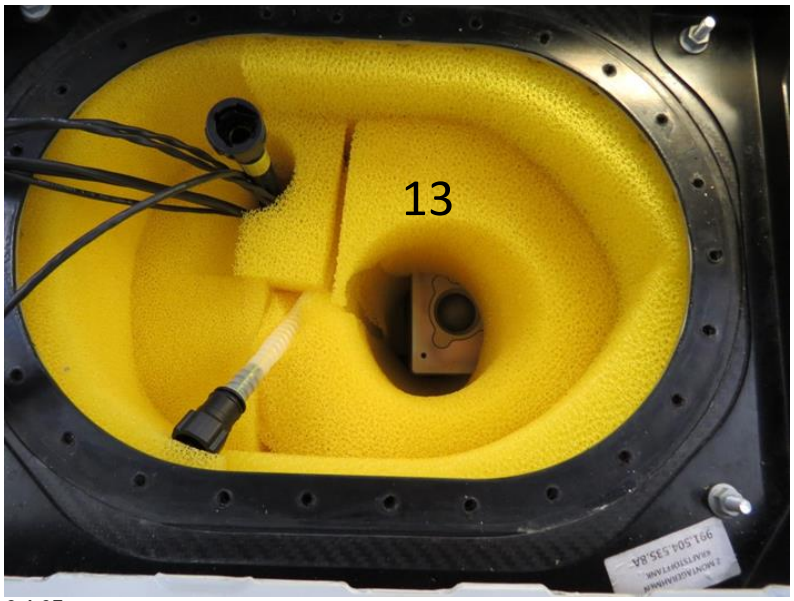


8.4.36





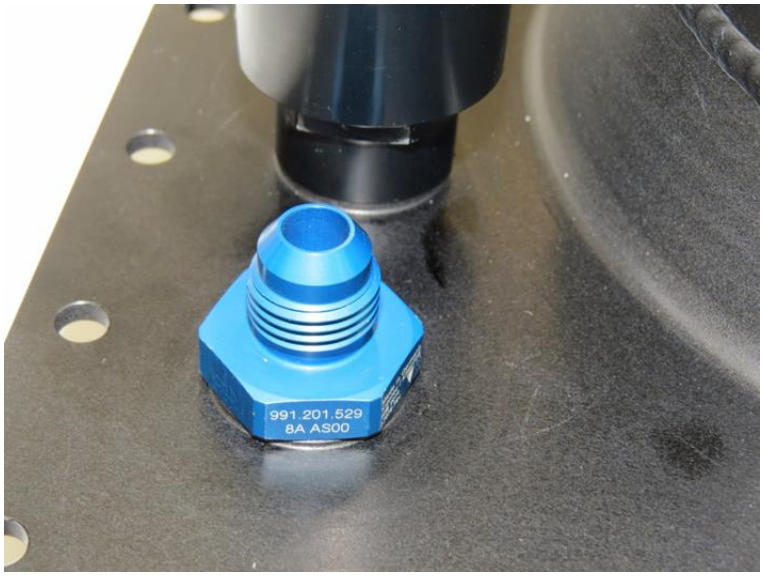
- Insert foam block no. 13 on right



8.4.37

Tank plate assembly

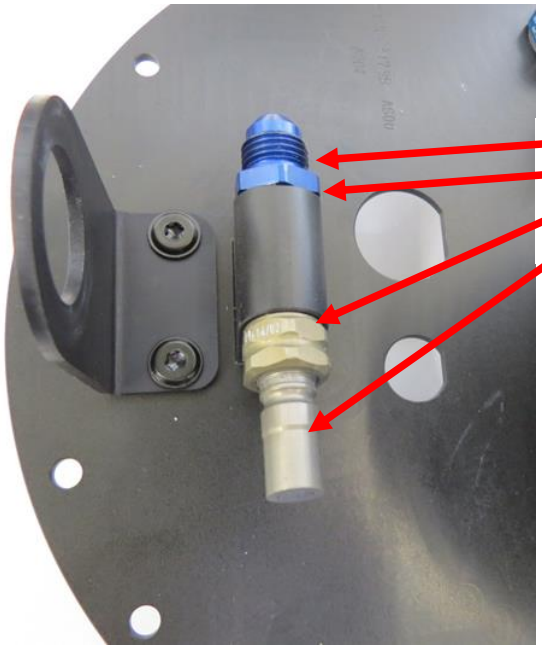
- Mount roll-over valve (carry-over part) on tank plate 991.201.317.9B with O-ring 13x2 (999.707.146.40); the O-ring is not a carry-over part!
- Mount return line union 991.201.529.8A and O-ring 13x2 (999.707.146.40) on tank plate



8.4.38

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- Mount retaining plate 991.201.573.8B for fuel pressure regulator, screws M5 x 12



- Union D06 M12x1.5
- O-ring 9x2
- O-ring 7x2
- Drain coupling

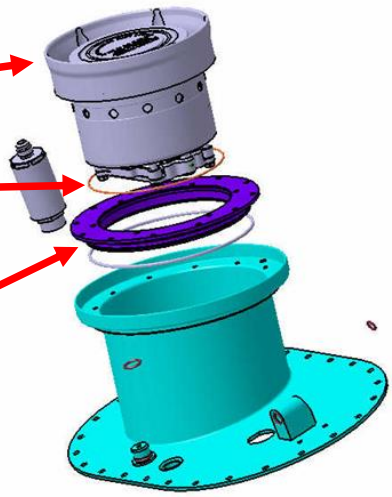
Direction of travel

8.4.39

- Assembly kit includes:

Hexagon socket screw M6x16

O-ring 120x2



- Mount adapter on tank plate with O-ring 146x3 and screw M5x16
- Connect filler neck with adapter

- Fit O-ring 120x2.5 on downpipe
- Connect filler neck with downpipe, tighten screws uniformly and hand-tight



8.4.40

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Connect the fuel return and flow lines to the tank plate

- Connect wiring harness to tank plate
- Screw tank plate together with seal, screws are carry-over parts M5x16 (26 ea.)



8.4.41

Pre-assembly of fuel pressure regulator

- Lightly grease O-ring and insert fuel pressure regulator with spacer ring together into housing

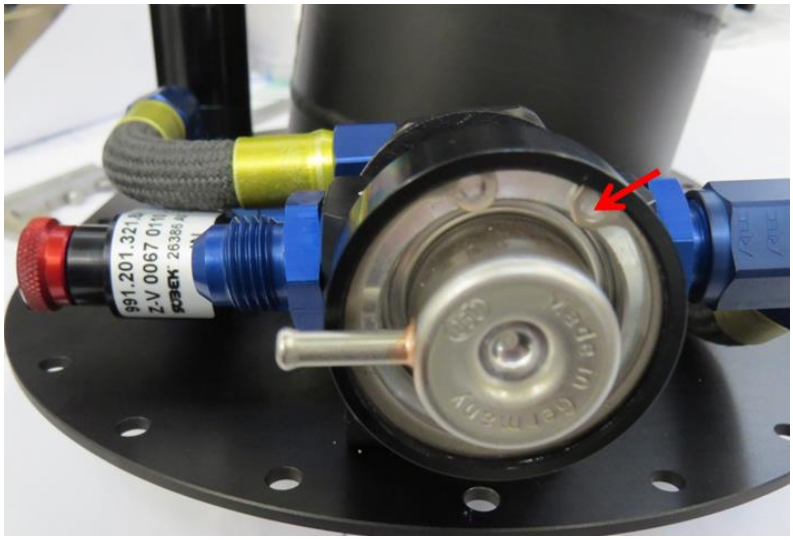


8.4.42

Direction of travel

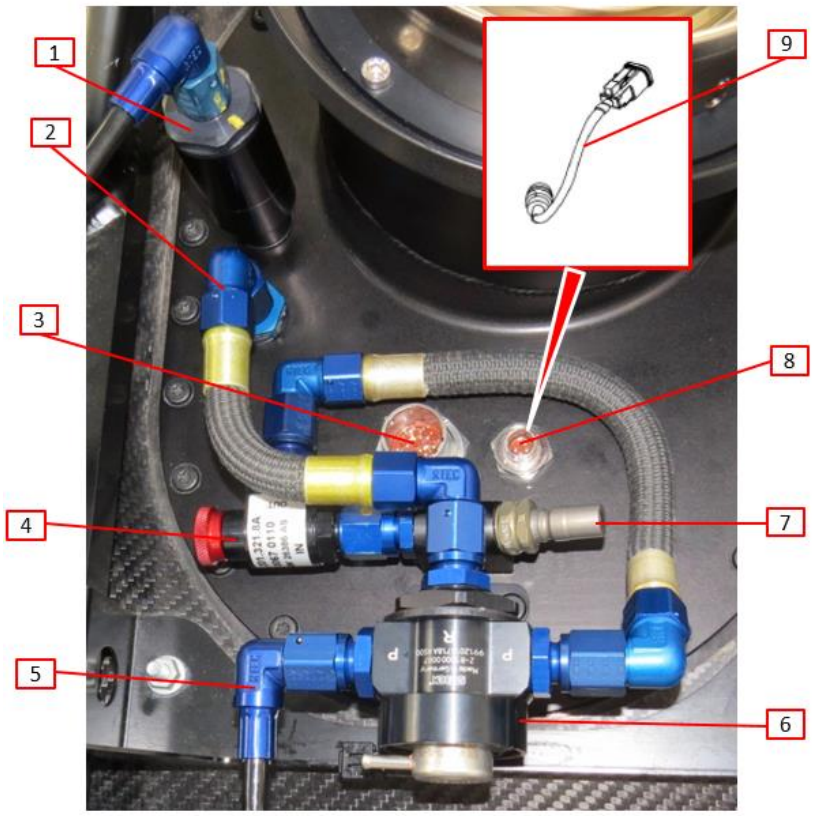
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- Insert circlip in housing (arrow)
- The vacuum connection on the pressure regulator must face in the direction of the cut-off valve; no vacuum hose is connected!



8.4.43

Tank plate connection layout



8.4.44

1. ROV valve
2. Return line
3. Wiring harness connection
4. Cut off valve
5. Supply line to rail
6. Fuel pressure regulator (5bar/72,5 psi)
7. Drain coupling
8. Gill sensor connection via adapter cable
9. Adapter cable

- Check system for leaks!

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8.4.1 8.4.1 Tank opening in front lid

WARNING Flying foreign bodies during grinding, drilling, and milling

Risk of eye injuries

- Wear safety glasses.

Caution Pointed or sharp objects

Risk of lacerations, puncture injuries or cuts

- Wear personal protective equipment.

Information The templates are available from your technical customer support

An opening is provided in the front lid for rapid refueling of the vehicle. A ring reinforces the opening.

- Align and attach template on front lid (Figure 8.4.1.1)



8.4.1.1

- Unscrew front lid
- Mark cut line
- Produce outer opening with vibro-saw
- Deburr chamfers and edges

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- Remove cathodic dip coating on the outer skin from inside at the bonding surface (Figure 8.4.1.2)
- Roughen/grind bonding surface at carbon ring with air grinder
- Apply adhesive bead to carbon ring (Figure 8.4.1.3), adhesive: DP 490

Information Curing time 6 hours



8.4.1.2



8.4.1.3

- Carefully position the ring on the inner side of the lid and fix in position with screw clamps (Figure 8.4.14)
- Immediately remove any adhesive which emerges on the outside

Information Do not tighten the screw clamps too tightly; the ring and outer skin must be flush



8.4.1.4

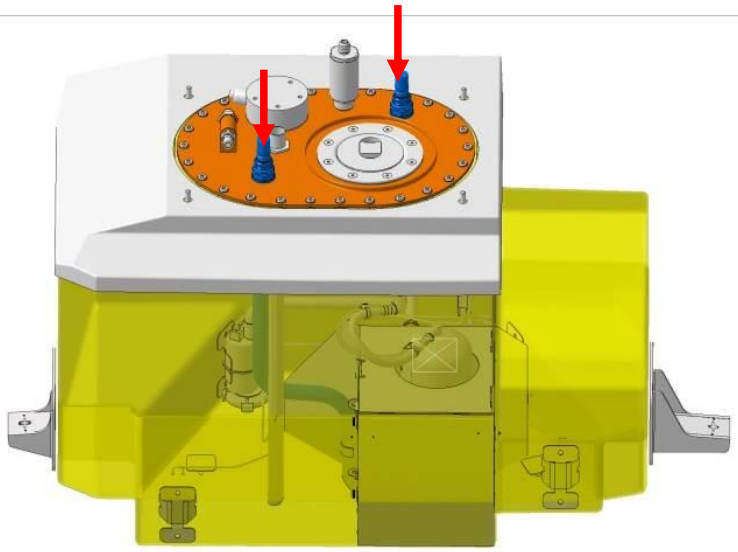
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8.4.2 8.4.2 Fuel draining system

Porsche Motorsport offers a gas-tight fuel draining and filling system for the FT3 tank. It consists of two-quick-action couplings which are mounted on the tank plate and of corresponding in-tank tubes.

Fuel filling is also possible with the fuel draining system using a corresponding system (e.g. BREDA system). A closed system is realized by means of the gas-tight connecting couplings. Fuel vapors therefore do not enter the atmosphere and surroundings.



8.4.2.1

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Preliminary work

WARNING

Flammable or explosive substances

Fire or explosion

- Avoid contact with hot parts or sources of ignition.
- Collect flammable fumes.
- Place the warning sign in a clearly visible position.

WARNING

Corrosive liquids

Acid burns

- Wear protective equipment.
- Ensure good ventilation.
- Avoid contact with corrosive liquid.
- In case of contact, wash immediately with plenty of warm water, if necessary seek medical advice.

NOTE

All components which are fitted with seals must be fitted with new seals after disassembly. All dismantled seals must be replaced.

- Disconnect power supply
- Refuel fuel and store in appropriate container
- Disconnect the plug connections and the lines on the tank plate
- Remove the tank plate

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Removing tank plate

WARNING

Rotating foreign bodies during grinding, drilling and milling

Eye injuries

- Wear safety glasses.

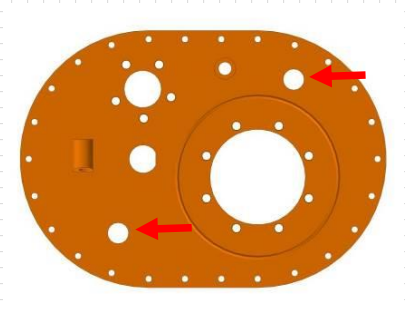
Caution

Sharp or sharp-edged objects

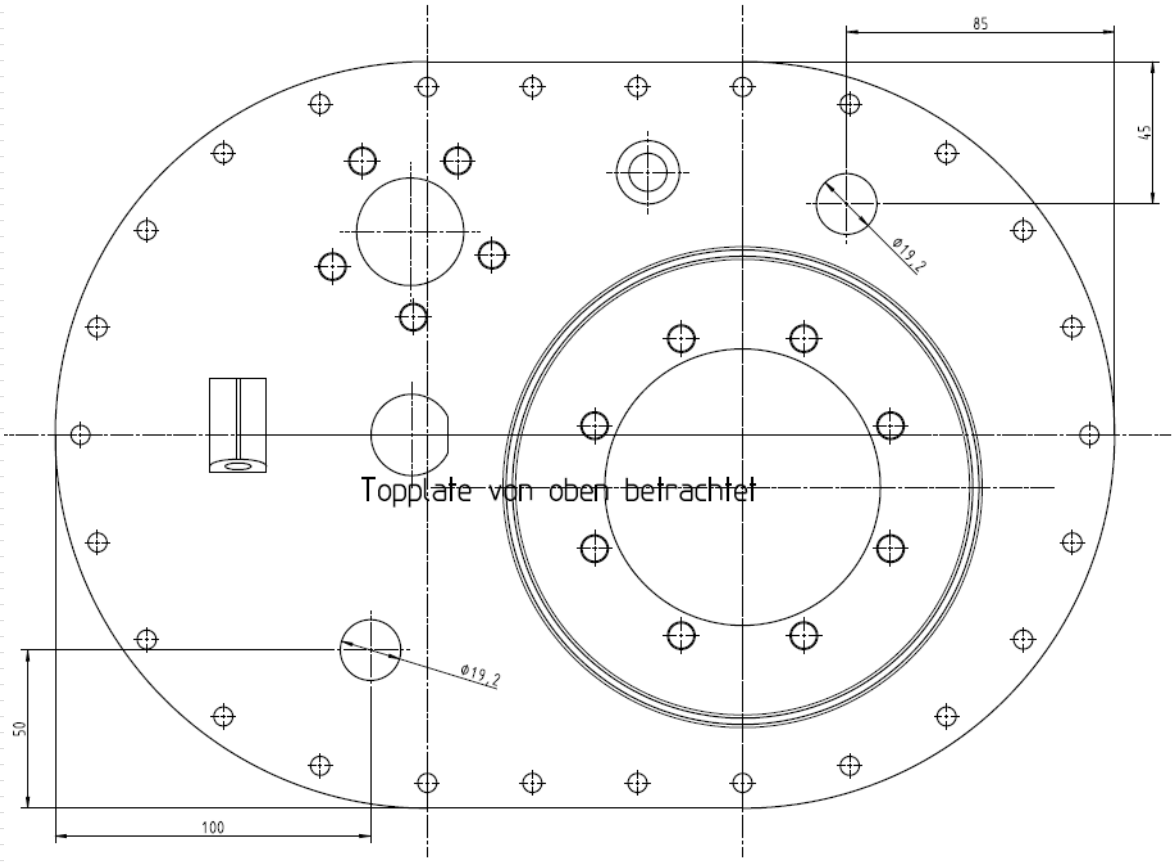
Crack-, stitch- or cuts injury

- Wear protective equipment.

- 2 Drill the passages for the couplings, Ø 19.2 mm (arrows Figure 8.4.2.2) Use the drilling template!
- Deburr the chamfer



8.4.2.2

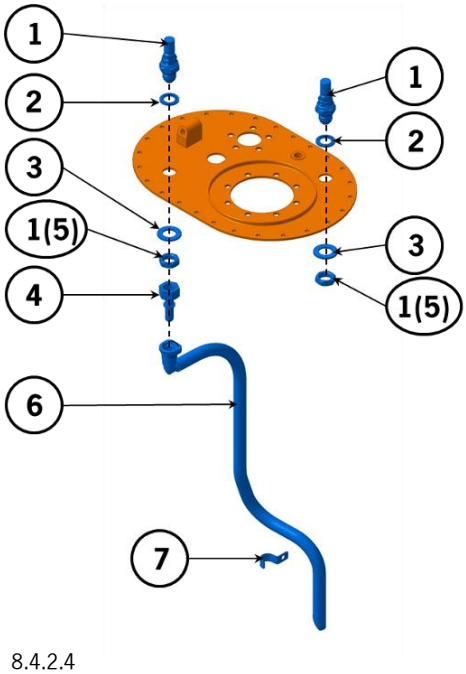


8.4.2.3

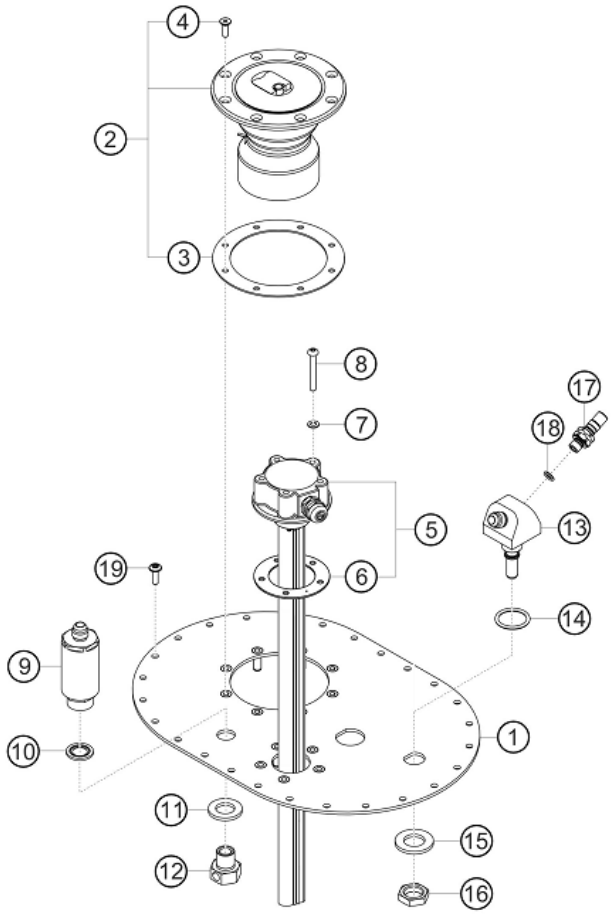
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Assembly of couplings / hose

- The assembly is carried out as shown in the following diagram:
- Pos. 2 Sealing ring, pos. 3 Washer
- Torque Pos. 1 (5): **34 Nm**



8.4.2.4



8.4.2.5

Torque table (Figure 8.4.2.5)

Component/Position	Dimension	Torque (Nm)
4	M5x16 SENK-SHR	3,0 Nm ±0,2 Nm
8	M5x40 LI-SHR	3,0 Nm ±0,2 Nm
9	Dash 6	19 Nm
16	M18x1,5	30 Nm ± 2 Nm
17	M10x1	12 Nm ± 2 Nm
19	M5x16 LI-SHR	3,0 Nm ±0,2 Nm

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Installation from the hose

- Screw the hose with the clamp to the Catchtank, torque: **9 Nm**

Information

To insert the hose into the tank, some foam blocks must be removed from the tank.

The installation of the removed components takes place in the reverse order.

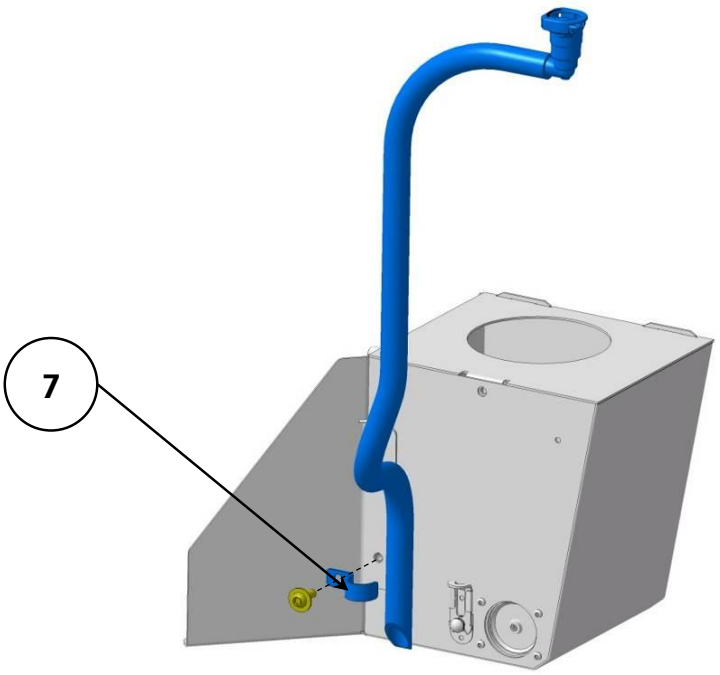
WARNING

Leaking fuel-carrying pipes

Leaking fuel

fire

- Carry out leak test.



8.4.2.6

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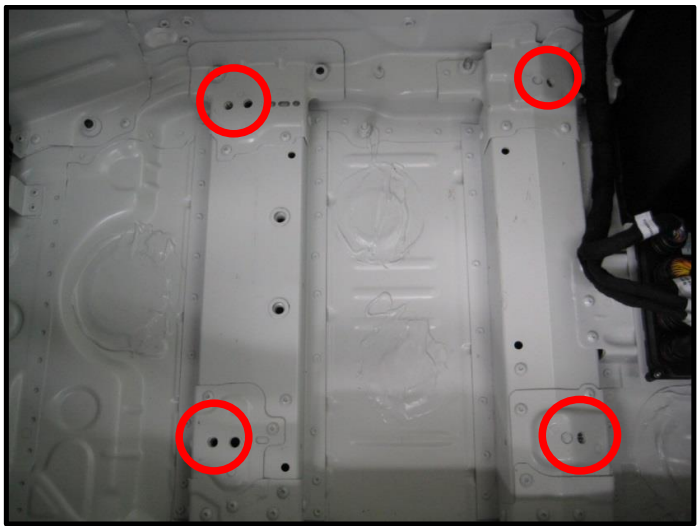
8.5 Taxi seat

8.5.1 8.5.1 Chassis preparation for console fixation

NOTE

Risk of damage to the threads.

➢ Make sure the self-tapping drill screws are proper centered and aligned!



8.5.1.1

- It´s necessary to install threads into the four console fixation points on the chassis floor.
- A conventional thread cutter must not be used.
- The threads will be created by using self-tapping drill screws.

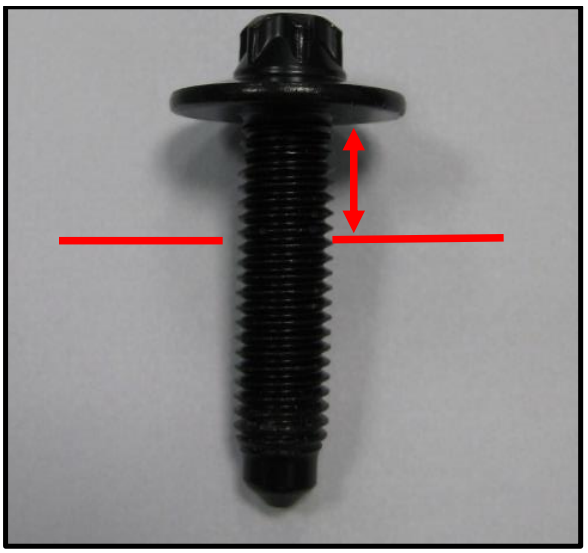
NOTE

Risk of damage to the threads.

➢ The impact wrench should only be used for the thread creation.
➢ As soon as the self-tapping drill screw created the thread, the screw should remove again from the bush

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8.5.1.2

- Leave some gap between the screw head and the mounting surface.

Caution

High torques

Risk of injury from flying metal spurs

Use safety glasses and gloves to prevent injuries.



8.5.1.3

- Insert the self-tapping drill screw into the console fixation holes in the chassis. The screw will align itself due to the tip guiding „pin“.
- Apply some vertical force and use an impact wrench to create the thread.

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8.5.2 8.5.2 Fixation six-point safety belt

WARNING

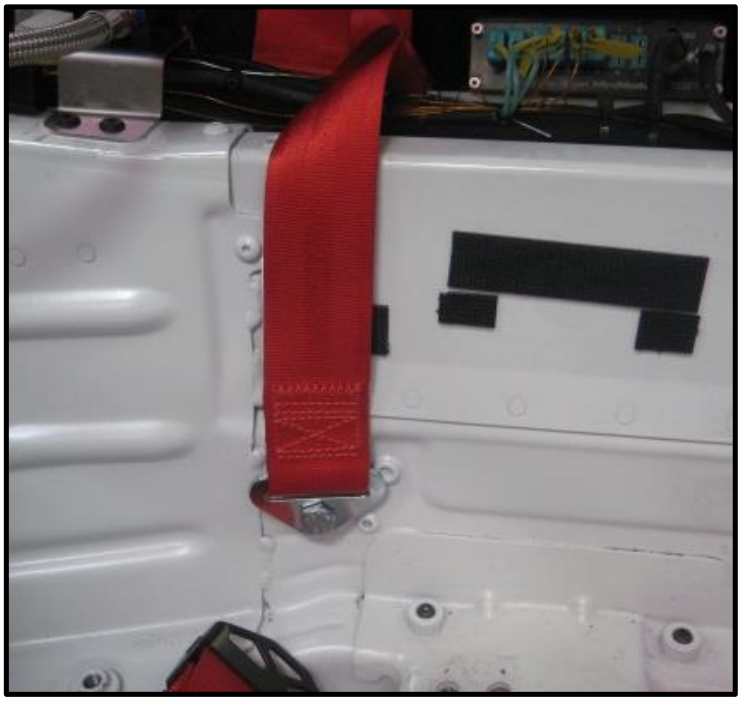
Severe injuries or death may occur

Risk of injury due to failure of the screws

- Always tighten bolts with the proper torque. Improperly tightened bolts may loosen during harness belt use and may become separated during a crash.
- Never over-tighten bolts. Over-tightening bolts may destroy the thread and allow the bolt to separate during a crash.
- Always tighten bolts with the proper torque. Improperly tightened bolts may loosen during harness belt use and may become separated during a crash.
- Never over-tighten bolts. Over-tightening bolts may destroy the thread and allow the bolt to separate during a crash.

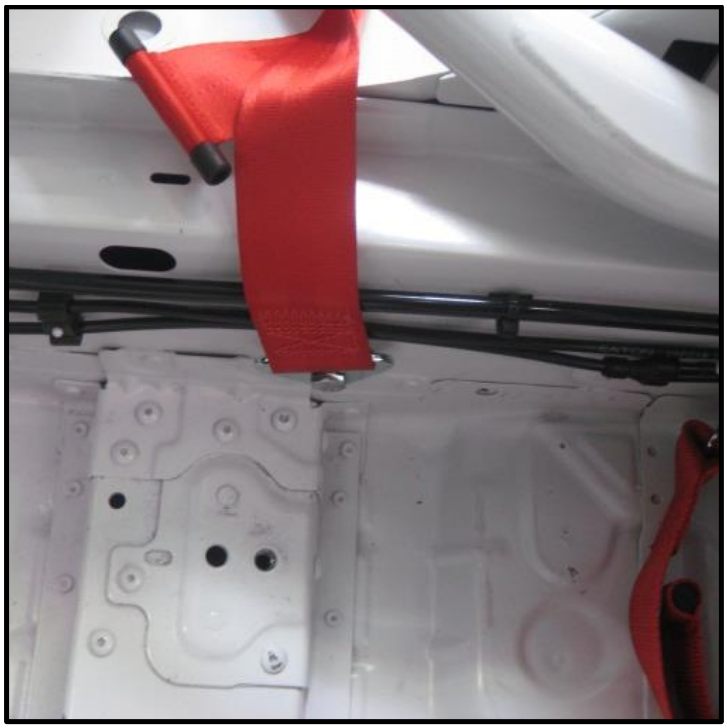
Information

- For general safety harness fixation please refer to the “Restraint Installation” manual of the safety harness manufacturer.
- The below mentioned installation instructions doesn´t replace the manufacturer installation requirements!



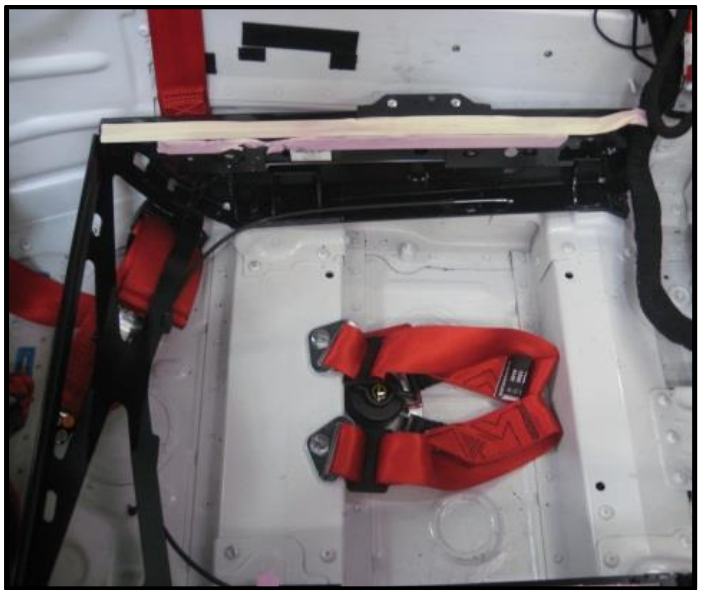
8.5.2.1

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8.5.2.2

- Mount the side straps with screws and associated sleeves. The straps need to remain moveable on the sleeve. Torque: **50 Nm**



8.5.2.3

- The crotch straps have to be mounted as shown in the picture below. Torque: **50 Nm**

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WARNING

Severe injuries or death may occur

Verletzungsgefahr durch falsche Montage

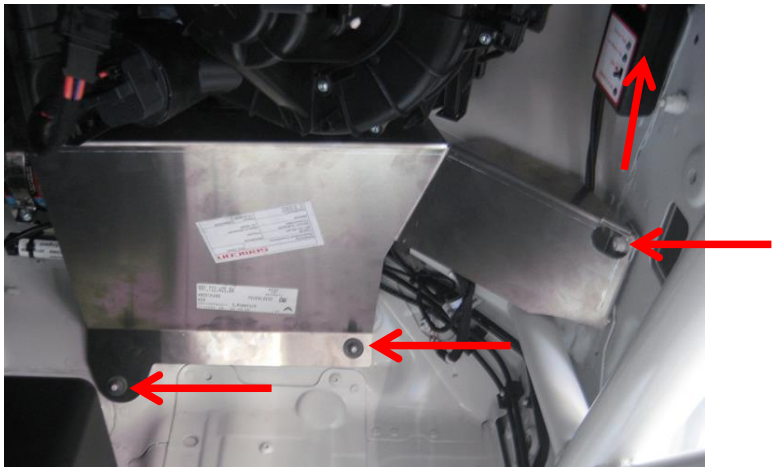
- Incorrect wrapping or 3-bar slides wrapped too far away from the roll cage bar or from any bracket may allow webbing to slide during an accident



8.5.2.4

- Mount the shoulder straps in the same way as the shoulder straps of the driver on the harness bar of the safety cage.

8.5.3 8.5.3 Assembling the footwell cover



8.5.3.1

- Relocate the fire extinguisher control unit as shown in the picture below and mount it in its new position with “Velcro” tape.
- Attach the footwell cover to the chassis on the existing tucker bolts with plastic nuts.
- Use the ground bolt on the right side as additional fixation.

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8.5.4 8.5.4 Repositioning vehicle electrical system control unit (IPS)

Information

- Parts will be used again after removal of passenger seat





8.5.4.1

- Remove the four fixation „K-nuts M4“ from the IPS.
- Remove the damping elements and store the dismantled parts.

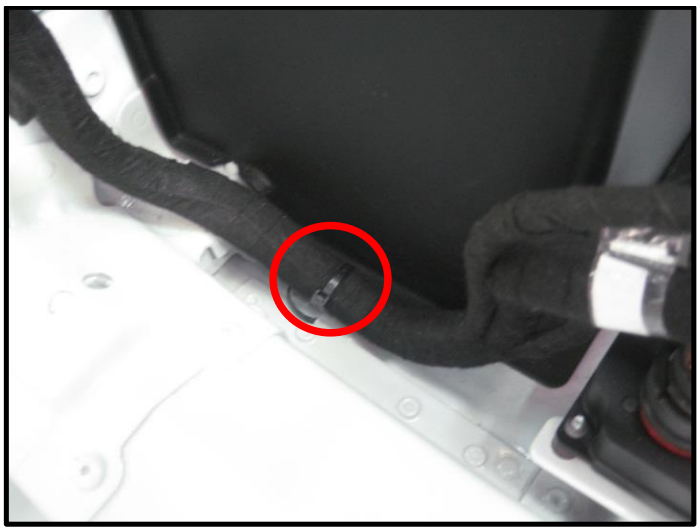
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NOTE

Risk of damage to the wiring harness.

- Be careful when cutting / removing the cable tie and bracket.
- Don´t cut the cable loom.
- Damage of the loom can cause malfunction of the whole car electronics!





8.5.4.2

- Remove the cable tie on the wiring harness behind the battery cover.
- Remove the cable bracket on the center tunnel.

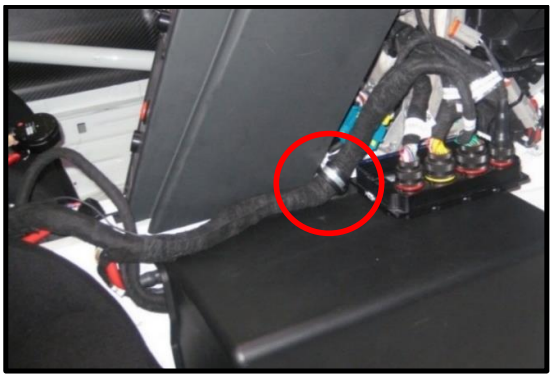
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NOTE

Risk of damage to the IPS.

- A proper IPS fixation has to be ensured to prevent damage during car operation.
- A loose ECU may cause malfunction of the whole car electronics!



8.5.4.3

- Mount the harness to the top fixation point of the battery cover using the rubberized clamp and TORX screw.
- Attach the IPS to the top of the battery cover using „VELCRO“. The new position of the IPS is shown in the picture below.

8.5.5 8.5.5 Position the seat bracket at the rear position.

⚠ Caution

Moving parts

Risk of injury when adjusting the console

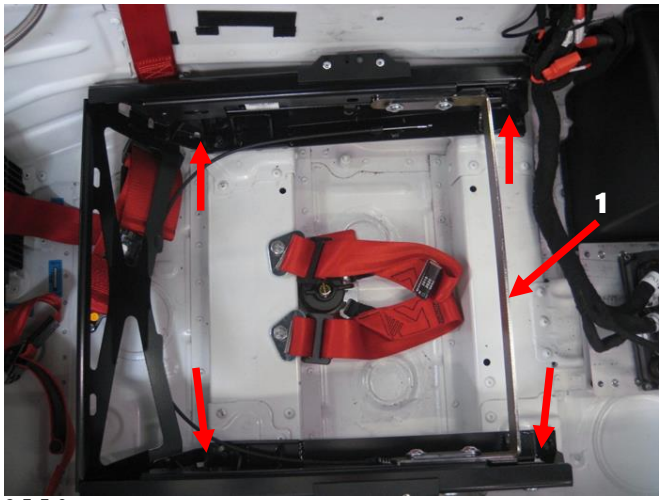
Be careful with your hands when adjusting the console



8.5.5.1

- Remove the adjusting lever with linkage (arrow).
- Remove the transport strut only when the seat bracket is mounted on the body.

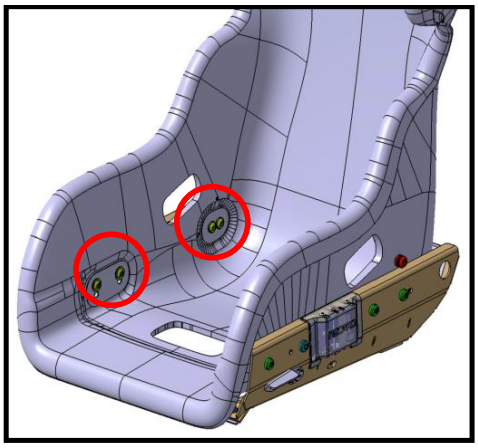
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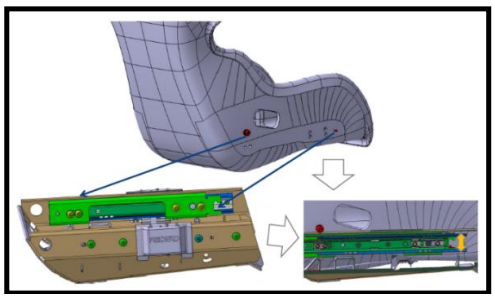


8.5.5.2

- Screw the seat bracket to the body with the TORX screws, **50 Nm** (37 ft-lb).
- Remove the transport strut after screwing the seat bracket into position, Item 1.

8.5.6 8.5.6 Installing the seat shell

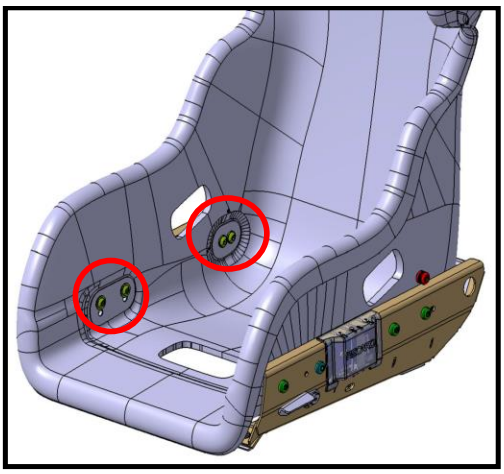


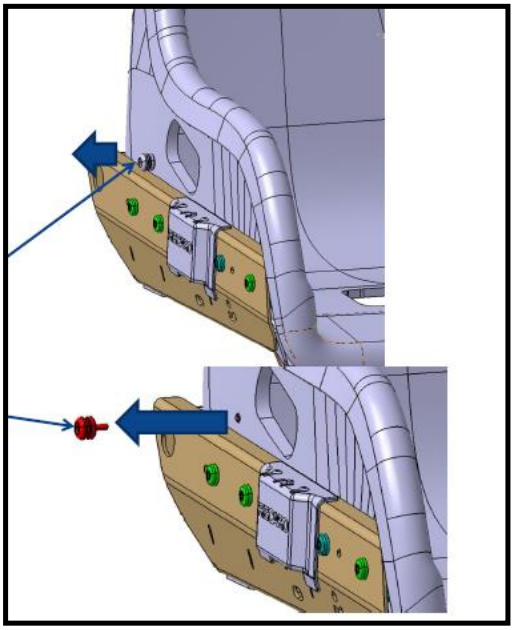


8.5.6.1

- Remove the cushion on the inside of the seat to get access to the seat fixation holes.
- Insert the rear installation aid pins into the designated holes.

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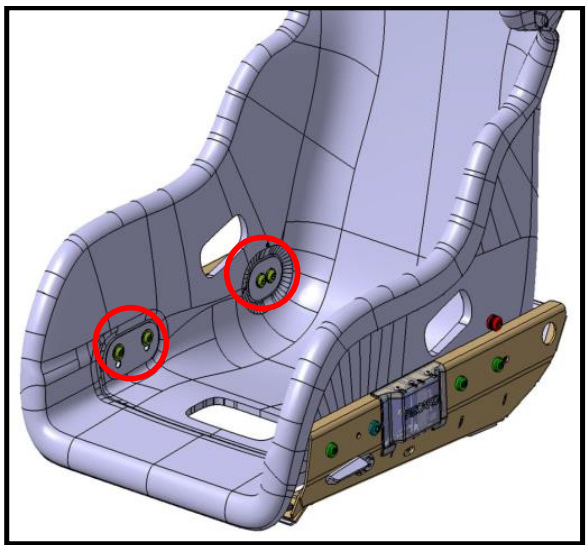


8.5.6.2

- Guide the safety harness through the designated holes in the seat while positioning the seat on the console.
- Slightly tighten the four rear screws M8X25 of the seat fixation by hand.
- Remove the rear installation aid pins.

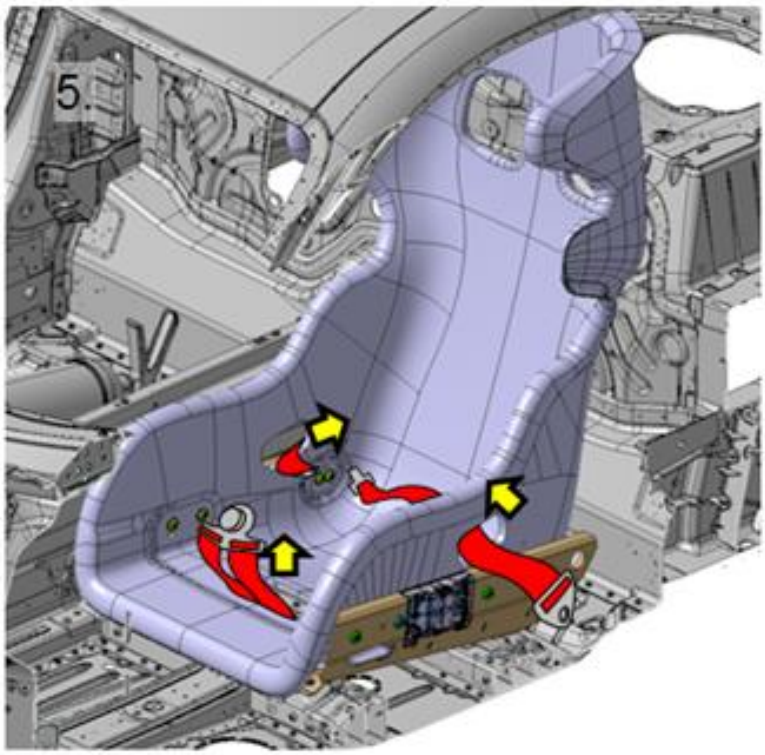
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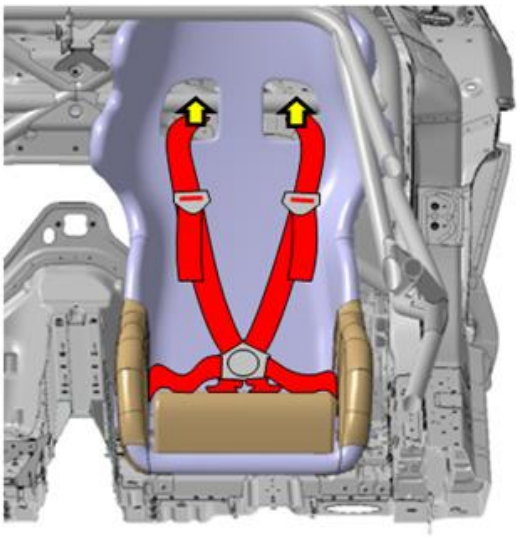


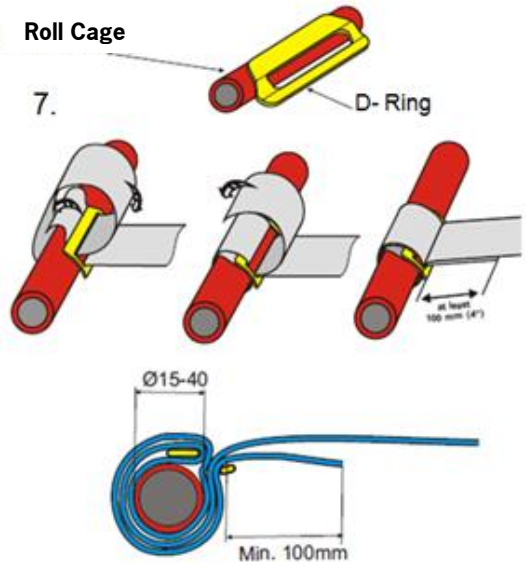
8.5.6.3

- Slightly tighten the four front screws M10X20 of the seat fixation by hand.
- All screws must be tighten to their designated tightening torque values. Note list beside!
- Seat screw front: **23 ± 2 Nm**
- Seat screw rear: **23 ± 2 Nm**



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8.5.6.4

- Feed in the crotch belt and lap belts through the seat openings
- Feed in the upper belts through the upper seat openings
- Attach belts to cage by means of D-ring as in the instructions

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8.5.7 8.5.7 Using the passenger seat

DANGER

Use of the Recaro seat without HANS system

Serious injury

- Use the Recaro seat only in combination with the HANS system.

- Route shoulder belts behind the seat diagonally to the front.
- Also use the “HANS” system for the passenger.



8.5.7.1

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8.6 Fitting the base plate and additional weights

8.6.1 Preparation of the bodyshell for the base plate and additional weights

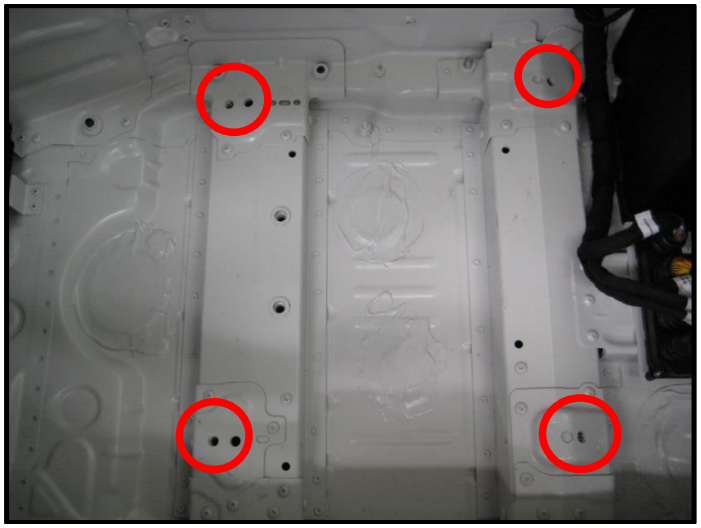
NOTE

Risk of damage to the threads

➢ Make sure the self-tapping drill screws are proper centered and aligned!

Information

The following work must only be performed if no taxi seat was previously installed



8.6.1.1

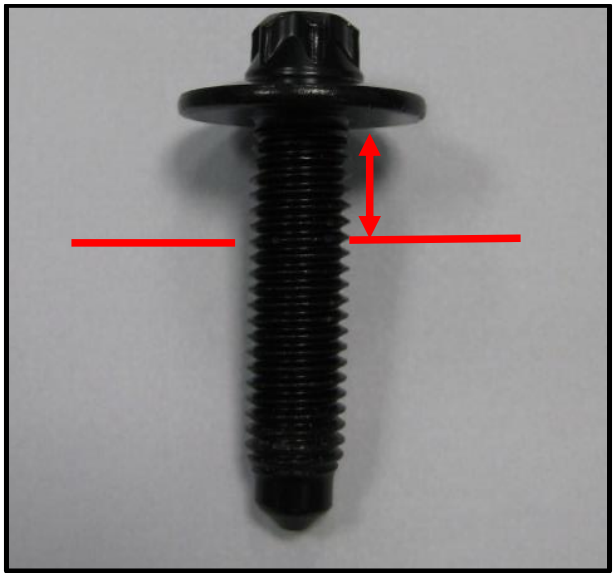
- It´s necessary to install threads into the four console fixation points on the chassis floor.
- A conventional thread cutter must not be used.
- The threads will be created by using self-tapping drill screws.

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NOTE

Risk of damage to the threads

- ➢ The impact wrench should only be used for the thread creation.
- ➢ As soon as the self-tapping drill screw created the thread, the screw should remove again from the bush.



8.6.1.2

- Leave some gap between the screw head and the mounting surface.

⚠ Caution

High torques

Risk of injury from flying metal spurs

- ➢ Use safety glasses and gloves to prevent injuries.



8.5.1.3

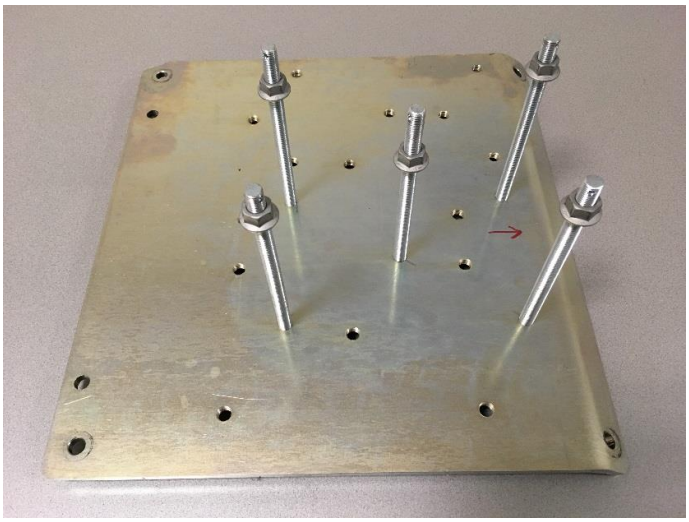
- Insert the self-tapping drill screw into the console fixation holes in the chassis. The screw will align itself due to the tip guiding „pin“.
- Apply some vertical force and use an impact wrench to create the thread.

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8.6.2 Fitting the base plate and weights

Information

- The base plate and additional weights are made of steel.
- Maximum permissible load increase 108 kg.



8.6.2.1

1. 5x retaining nuts 6KT-MU M12x1.5. Torque: **85 Nm**
   (Do not grease)
2. 5x retaining nuts 6KT-MU M12x1.5. Torque: **85 Nm**
   (Do not grease)
   5x washers 13x24x2.5
3. 4x retaining bolts 6RD-SHR M10x40. Torque **50 Nm**
   4x washers 10.5x25

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8.7 Heated windshield

Secure ribbon cable at the A-pillar using helitape. The plug connection to the main wiring harness is located in the right footwell under the heater box (arrow, Figure 8.7.1), label: windshield heater 1

Reference to window assembly/wiring harness labeling


8.7.1


8.7.2

- Drill opening for switch on the center console, dia. 11 mm (0.43 inch) (Figure 8.7.3)
- Fit switch on center console and connect with wiring harness


8.7.3

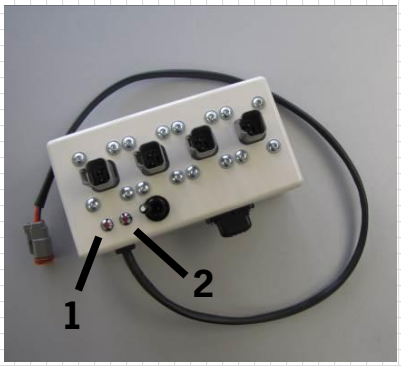
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8.8 Power box

Power box

Porsche offers a power box (Figure 8.8.1) in order to permit operation of additional consumers in the vehicle. The power box is connected to the free voltage supply XX Option Powervia a DT04-2P connector. A maximum of two power boxes can be connected per vehicle. Each box can supply a current of up to 15 A; any allocation to the four connections is possible. The consumers are connected to the box via DT06-2S connectors. The box can be switched on and off via a toggle switch. The box is fused with a 15-amp fuse. The fuse is located at the side of the box.



8.8.1

The LED (Figure 8.8.1, Item 1) lights up as soon as the box is connected to the vehicle electrical system.

The LED (Figure 8.8.1 Item 2) lights up when the box is switched on and the box fuse is intact.

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8.9 Cockpit light

The switch labeling in the center console is fluorescent. This means that the labeling lights up in darkness when illuminated by the cockpit light. The cockpit light is switched with the low beam headlamps.

- The roof bonding surface must be grease-free. Remove the protective film of the adhesive strips (Figure 8.9.1) and apply centrally on the inside of the roof at the position of the center console.
- Align the cockpit light so that one LED row points at the steering wheel and the other row towards the center console.
- Route connecting cable at the Y strut of the cage and fix with cable tie (Figure 8.9.2).
- The disconnection point to the main wiring harness is located on the right B-pillar Label: option light ID.



8.9.1



8.9.2

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8.10 Race number lighting

The race number lighting is realized by fluorescent films which are secured on the doors. The system includes a control unit per film which is located in the respective door. The control units are connected both with each other and with the main wiring harness.

Installation of race number lighting:

- Fit template (inner side of door) on the door (Figure 8.10.3). The contour of the template must be aligned with the door contour.

WARNING

Flying foreign bodies during grinding, drilling, and milling

Risk of eye injuries

- Wear safety glasses.

Caution

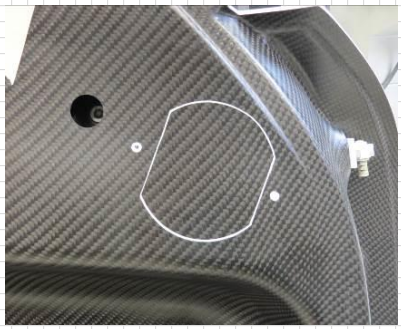
Pointed or sharp objects

Risk of lacerations, puncture injuries or cuts

- Wear personal protective equipment.

Information

The templates are available from your technical customer support.



8.10.1



8.10.2

- Transfer cutting lines and drilling points and carry out the respective work steps. Extract swarf and grinding dust when doing this.

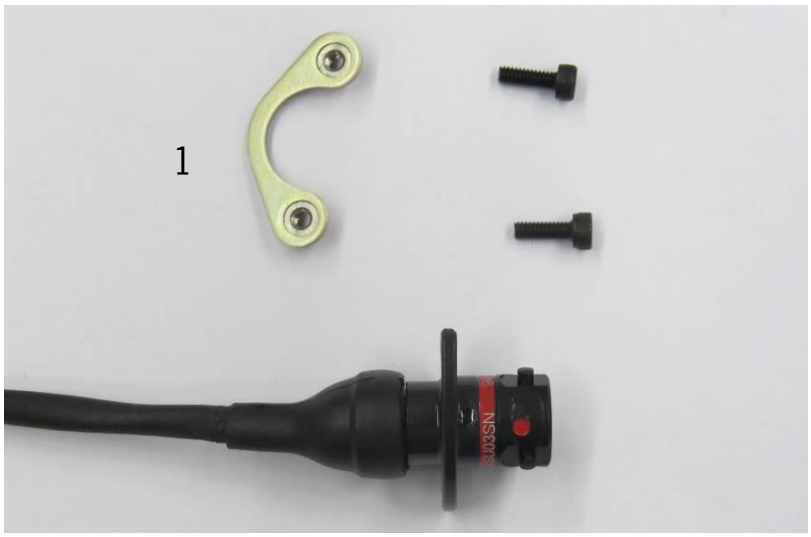


8.10.3

- Fit rivet nuts M5 (Figure 8.10.2)

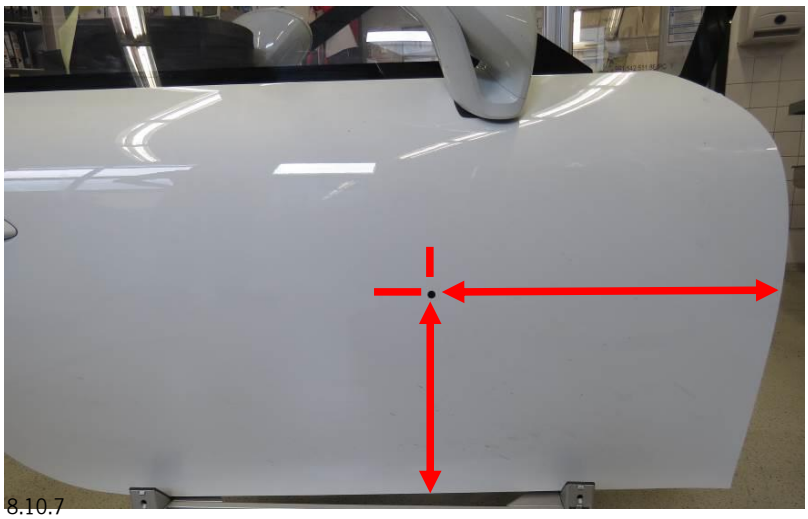
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- Draw the contour of the hinge on the door to ensure precise positioning for assembly
- Remove top hinge/door side
- Attach template (on hinge side for plug connector Deutsch) (Figure 8.10.4). The contour of the template must be aligned with the contour of the door
- Drill hole (dia. 11 mm (0.43 inch))



8.10.5

- Screw on plug connector (Figure 8.10.5); the threaded plate (Item 1) is located in the inner side of the door
- Screw control unit onto mounting plate. **3 Nm** (Figure 8.10.6)
- Drill a Ø 10 mm opening in the door outer skin depending on the positioning of the cable connector for the race number panel (Fig. 8.10.7)



8.10.7



8.10.4



8.10.6

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- Pull ribbon cable of the luminous film through the opening and connect with the door control unit
- Fix the luminous film on the door outer skin using double-sided adhesive tape
- Screw control unit with mounting plate onto inner side of door (Figure 8.10.8)
- Route connecting cables for door control units on left and right to main wiring harness under dashboard

NOTE

Blocked pedals

Loss of control over the vehicle

- Route the wiring harness in the area of the driver's footwell so it cannot be touched by the feet or pedals.



8.10.8

- Mount upper door hinge and hang the door
- Screw in locking screw on hinge and tighten. **27 Nm**
- Pull wiring harness through rubber grommet on the A-pillar and connect with door plug connector



8.10.9

- Drill opening for switch on the center console, dia. 11 mm (0.43 inch) (Figure 8.10.10)
- Fit switch on center console and connect with wiring harness

Information

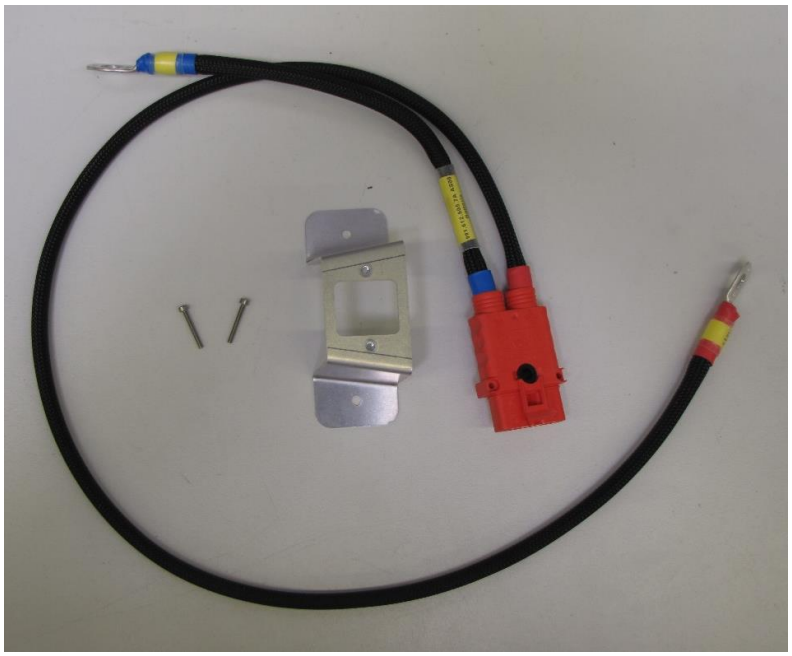
To hold the luminous film in position more securely, Porsche Motorsport recommends covering the film with a transparent film.



8.10.10

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8.11 Battery charging cable



8.11.1

The plug connector of the battery charging cable is screwed on to the right side sill close to the additional weight plate using a holder. The holder is riveted to the body in the area of the side sill on the passenger's side.

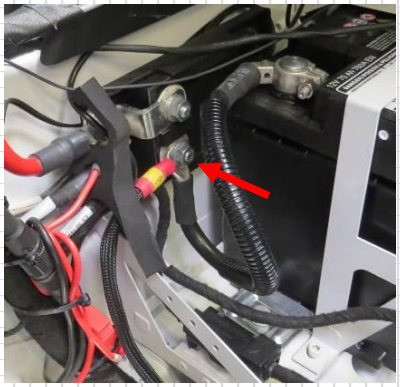
- Align the holder (Figure 8.11.2) and drill holes for the holder (dia. 5 mm (0.2 inch))
- Rivet on holder, 2x blind rivets d = 4.8 mm (0.19 inch) l = 8 mm (0.31 inch)
- The ground cable is secured using the front right securing screw of the additional weight plate (Figure 8.11.2), torque: **50 Nm** (37 ft-lb)
- The positive cable is routed to the battery disconnect switch (battery side, arrow, Figure 8.11.4), torque **24 Nm** (17.7 ft-lb)
- Plug connector to holder: **2 Nm** (1.5 ft-lb) (Figure 8.11.3)



8.11.2



8.11.3

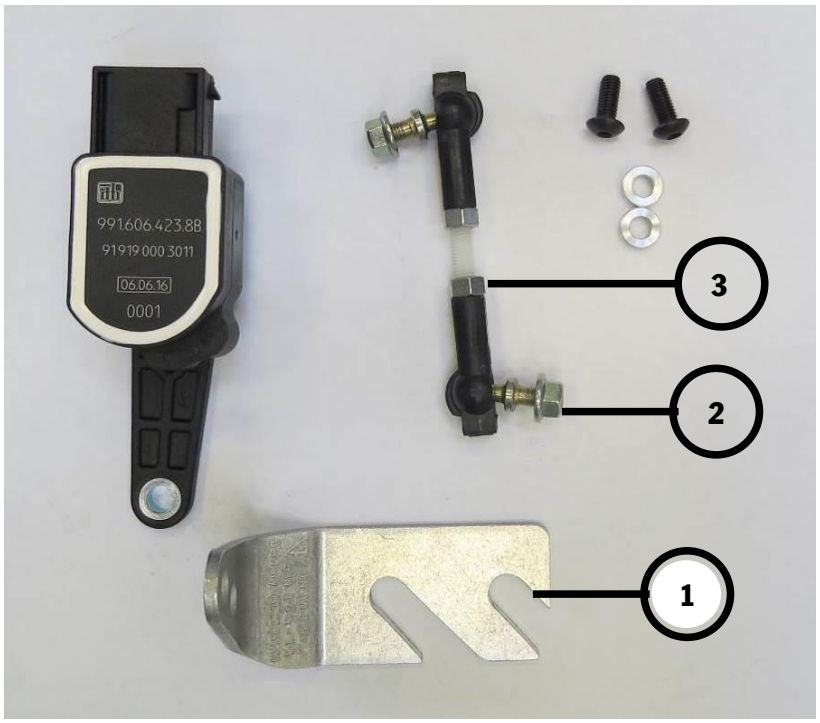


8.11.4

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8.12 Suspension travel sensor

The suspension travel sensors are installed in the wheel housing on the body side and are connected to the transverse link via a coupling rod.



8.12.1



8.12.2

Information The description of the installation is independent of wheel and axle.

Premounting sensor/coupling rod

- Screw the ball head (pos. 2) of the coupling rod (pos. 3) onto the sensor arm and hold the ball head with the water pump and tighten the nut (2) to **6 Nm** (Figure 8.12.1).
- Replace the adjusting plate on the crossbar against the holder (item 1) FA / RA. The holder replaces a 3.0 mm adjusting plate.

NOTE The maximum value on the adjusting plates must not be exceeded (see chapter Chassis). The camber values can change.

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Caution

Hot components

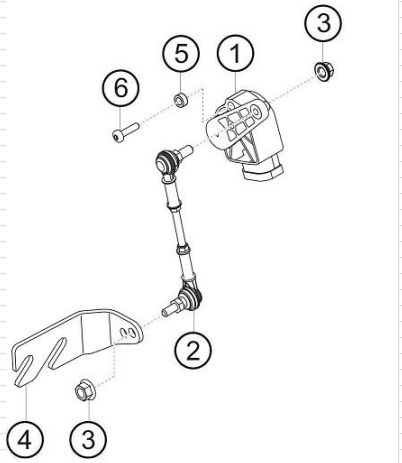
Risk of burns

- Allow hot components to cool down.
- Wear protective clothing.

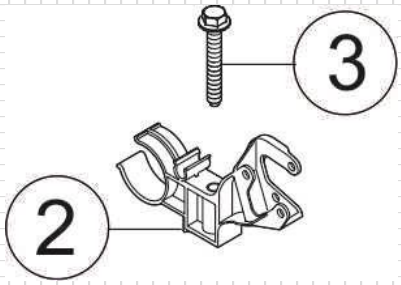
Sensor holder front axle

- Screw the sensor to the car body holder (pos. 2 Figure 8.12.5). Spacers (pos. 5 Figure 8.12.3)
- Attach the sensor/holder to the body/cross beam (2 Figure 8.12.5). The holder is clamped to the cooling water lines at the front axle.

Torque pos. 3: **6 Nm**



8.12.3



8.12.5

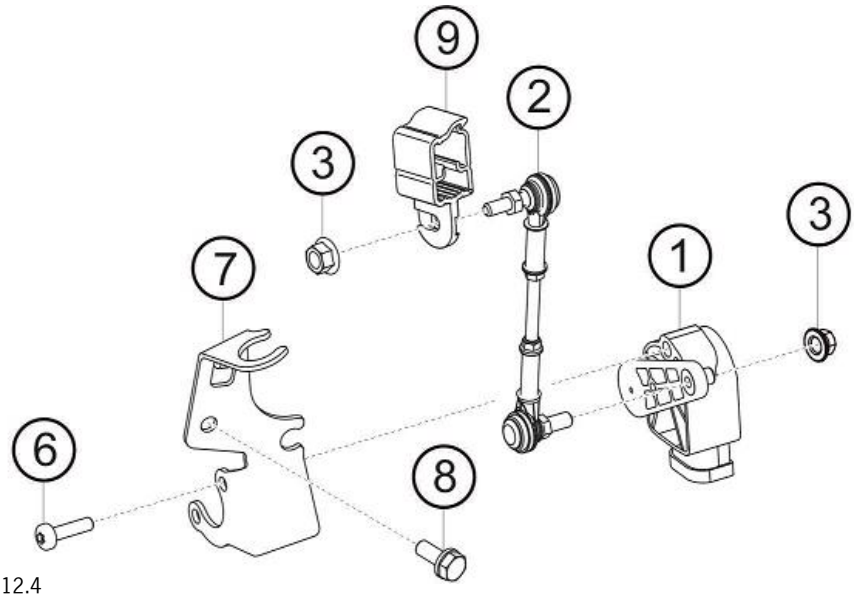
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Sensor holder rear axle

Torque screw M6x16 pos. 8 (Figure 8.12.4): **10 Nm**

Torque screw M5x12 pos. 6 (Figure 8.12.4): **8 Nm**



8.12.4

- Screw the coupling rod to the holder. (coupling rod/wishbone) (pos. 9 Figure 8.12.4).

- Connect the sensor to the cable harness. Fix cable harness with cable ties. Make sure that no contact with the chassis gear parts and the cable harness can occur.

Information Calibration of the sensor (see chapter Electrical systems)

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