

PORSCHE

MOTORSPORT



911 GT3 R

**Technical Manual
Model 2010**



Preface

This technical information will give you the possibility to reference data, adjustment values and working procedures and make the maintenance and repair work on the vehicle easier.

We wish you every success with your GT3 R

Dr. Ing. h.c. F. Porsche

Aktiengesellschaft

Vertrieb Sonder- und Rennfahrzeuge

Race car 911 GT3 R Model 2010

This car is specifically designed for participation in racing competitions.

For obvious reasons, measurements referring to bodywork dimensions of the production cars cannot be used as reference.

Porsche accepts no guarantee that the vehicle conforms to the regulations.

The car can not be registered for road use and does not comply with German road traffic regulations.

Illustrations, descriptions and schematic drawings serve exclusively as presentation for the text. Porsche Motorsport accepts no liability for the completeness and conformity of the contents of this brochure with respect to the legality of the current regulations.

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2. General technical data

Engine type	M 97/79
Gearbox type	G 97/71
Numbers of gears	sequential 6

2.1. Dimensions

Length (w/o spoiler edge)	[mm]	see homologation papers
Width across front axle	[mm]	see homologation papers
Width across rear axle	[mm]	see homologation papers
Wheelbase	[mm]	see homologation papers

2.2. Weight

Dry weight	[kg]	see homologation papers
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3. Engine

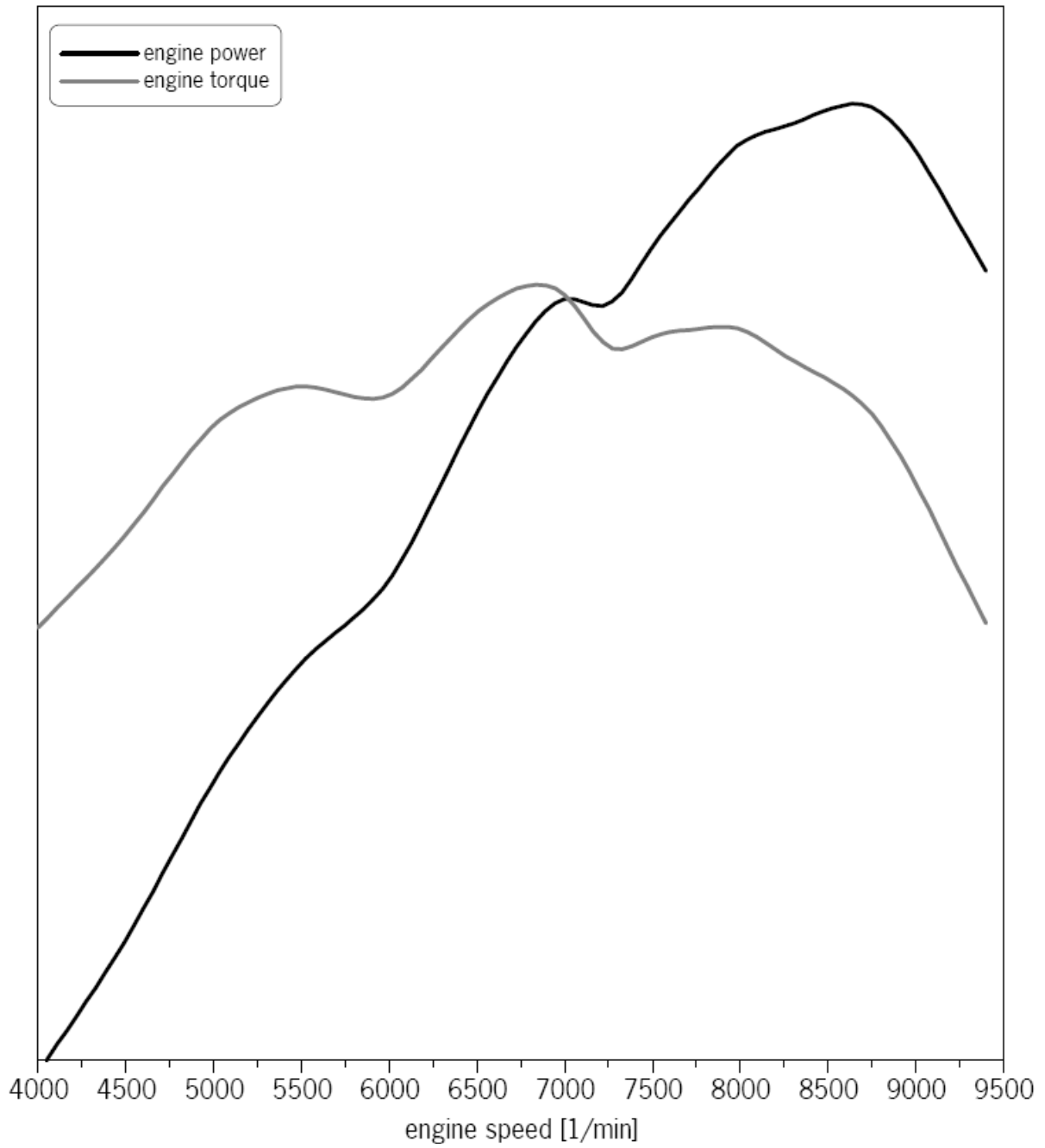
3.1. Engine technical data

Engine type		M97/79
Design		Six-cylinder boxer
Cylinders		6
Bore	[mm]	102.7
Stroke	[mm]	80.4
Cubic capacity	[cm ³]	3996
Compression ratio		approx. 14.5
Maximum revs	[rpm]	9,400
Inlet valve diameter	[mm]	41
Inlet valve lift	[mm]	14
Point of maximum inlet valve lift	[°]	after TDC
Exhaust valve diameter	[mm]	35.5
Exhaust valve lift	[mm]	13.5
Point of maximum exhaust valve lift	[°]	before TDC
Cooling media		Water cooled
Lubrication		Dry sump lubrication Oil-water heat-exchanger

3.2. Fuel specs

98 ROZ

3.3. Engine power and torque curves



3.4. Engine lubrication

The 911 GT3 R is equipped with a dry sump lubrication system. The oil tank is mounted to the engine.

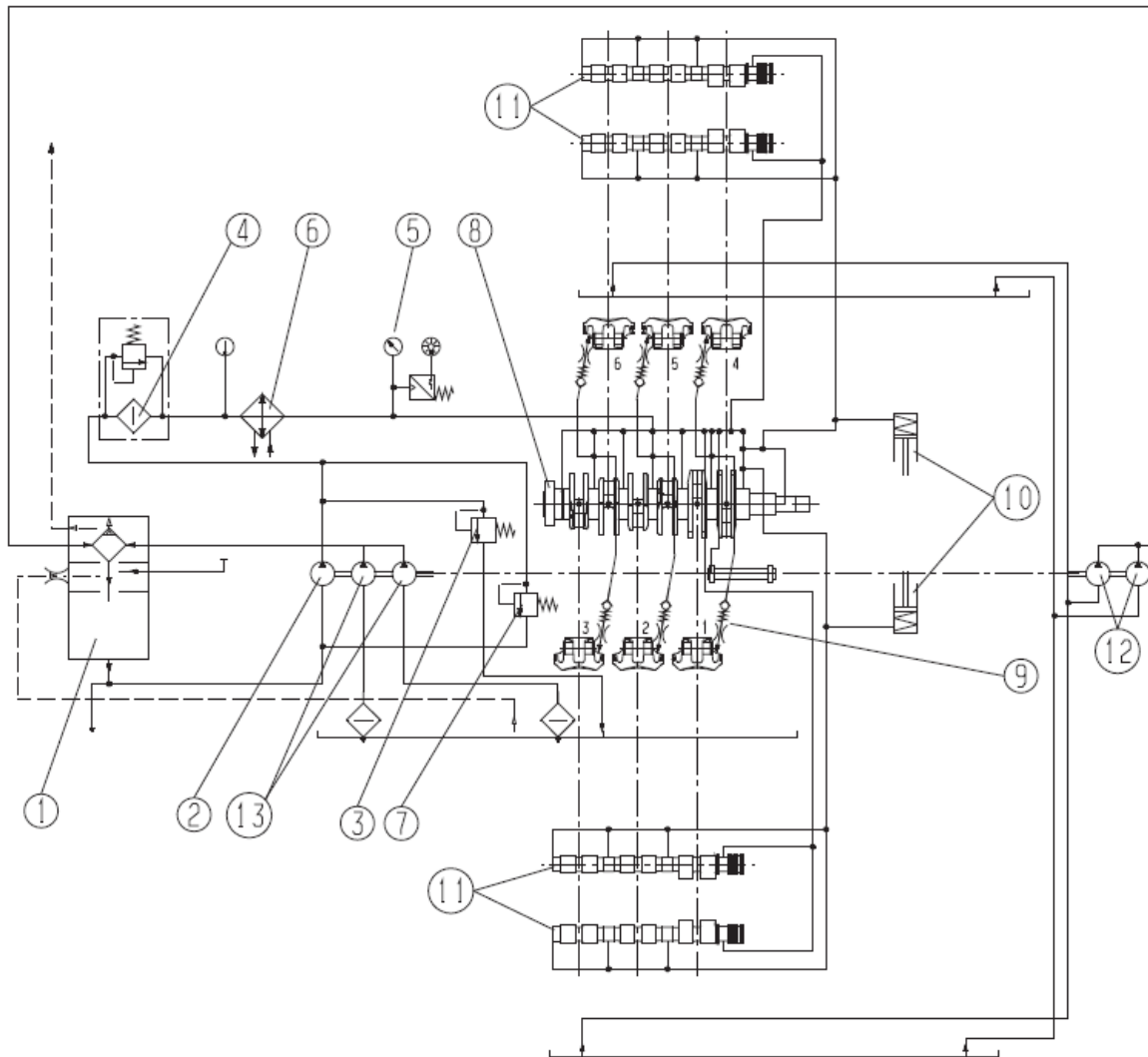
The engine oil is cooled by an oil-water heat-exchanger mounted on the engine.

3.4.1. Engine oil

Mobil 1 0W - 40

Mobil 1 5W - 40

3.4.2. Engine oil system



- | | |
|-------------------------------------|--|
| 1 – Oil tank | 9 – Piston cooling |
| 2 – Pressure pump | 10 – Timing chain tensioner |
| 3 – Safety valve | 11 – Camshaft |
| 4 – Oil filter | 12 – Camshaft housing scavenge pump |
| 5 – Pressure sensor | 13 – Crankcase scavenge pump |
| 6 – Oil-water heat-exchanger | |
| 7 – Pressure relief valve | |
| 8 – Crankshaft | |

3.4.3. Checking the oil level

The engine oil temperature must be over 80°C and the engine running at idle speed (approx 2,200 rpm) to measure the oil level correctly. The oil level must be between the two marks on the dip-stick. The distance between the two marks corresponds to 1 litre of engine oil.



An excessively high oil level can lead to oil entering the induction tract.

If engine oil is added it should be noted that this oil only flows slowly into the oil tank through the dip-stick guide sleeve. Therefore the oil level should only be measured again after waiting for a few minutes.



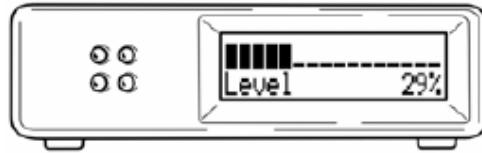
The engine oil level must be checked regularly and corrected when necessary especially when the engine is new. Oil pressure signal drop outs in the MoTeC data logging are a clear indication for low oil level. Therefore the oil pressure must be carefully and regularly monitored. (e.g. with MoTeC). NOTE: THE OIL PRESSURE IS MEASURED AS ABSOLUTE PRESSURE. That means at the engine speed 0 the oil pressure equals the ambient pressure.

3.4.4. Filling capacities

New engine:	11.0 l
With oil filter change:	8.3 l
Without oil-filter change	8.1 l

3.4.5. Digital oil level display

An optional oil level display is available (997.641.139.9A):

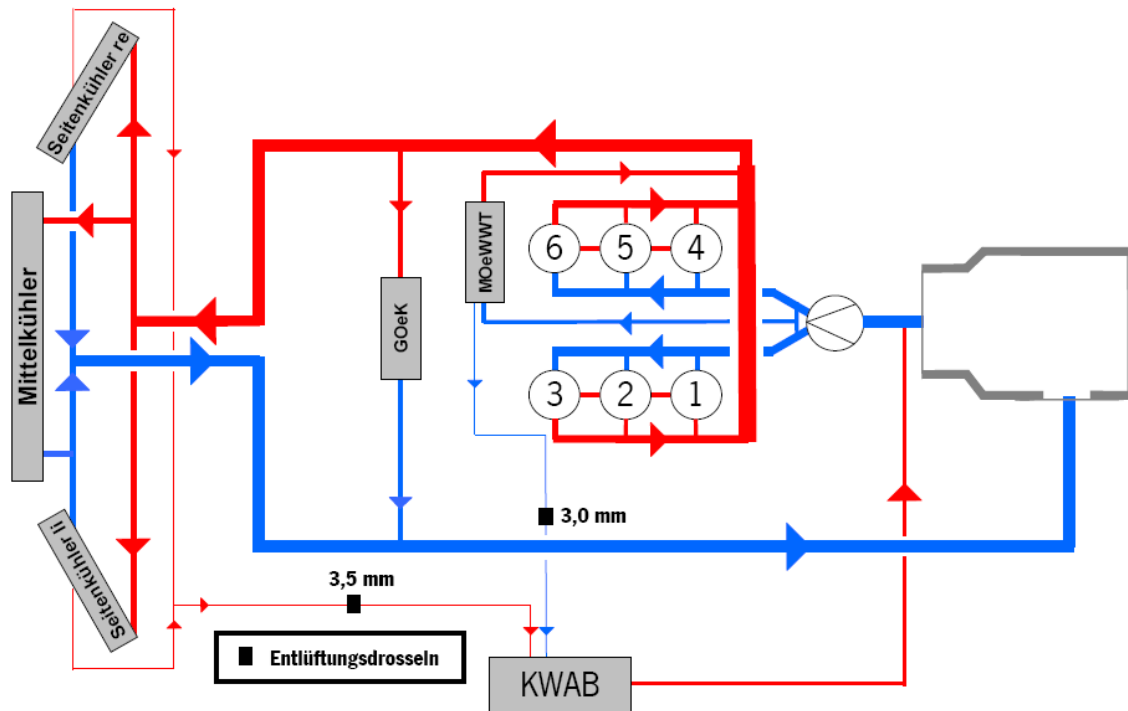


The car wiring loom is already prepared for use of this display. The connector for the display is located in the area of the rear side-window on right-hand side of the car.

3.5. Engine cooling system

The GT3 R cooling system is a standard cooling system optimised for use in a race car.

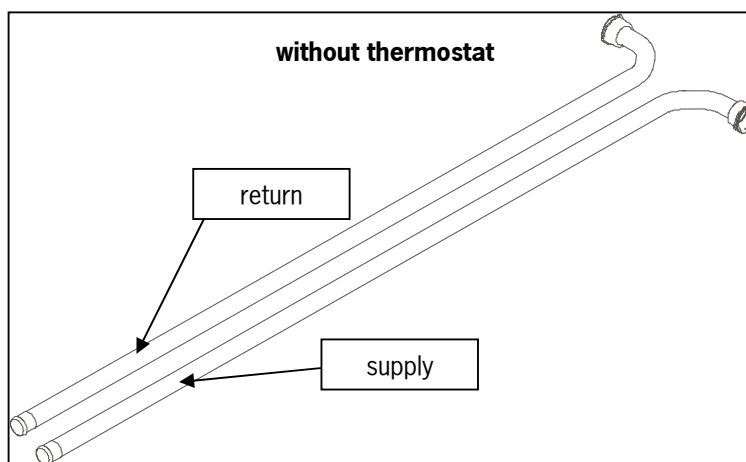
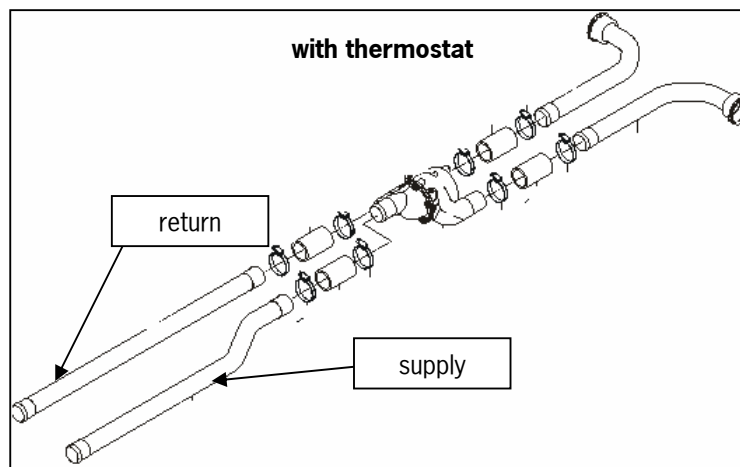
3.5.1. Scheme drawing



3.5.2. Thermostat

The stock GT3 R is not equipped with a thermostat. As an option a thermostat is available for cooler driving conditions (see parts catalog).

When competing under warmer conditions the car should be driven without the thermostat in order to reduce the temperature level of the cooling system.



The thermostat starts to open at 71 degrees celcius. It is fully opened at 85 degrees celcius.

3.5.3. Cooling fluid

The coolant remains fluid to temperatures of -15°C in delivery specification.

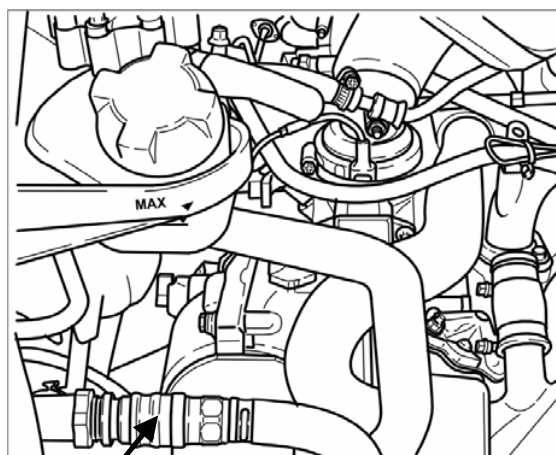
For all race events Porsche Motorsport recommends that the factory filled engine coolant is replaced by 24.3 litres of water and 2 litres of anti-corrosion additive (part number. 997.106.907.90), which protects the water galleries and other cooling system parts from corrosion, reduces cavitation, lubricates the water pump and increases the boiling point of the cooling water. This mixture offers **no** anti freeze protection.

3.5.3.1. Capacity

Approx 26.3 litres

3.5.4. Filling the cooling system

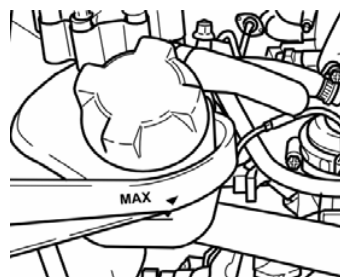
A quick-release coupling is integrated in the area of the expansion tank. The water system can be filled and bled quickly and safely via this coupling – after an engine change for example.



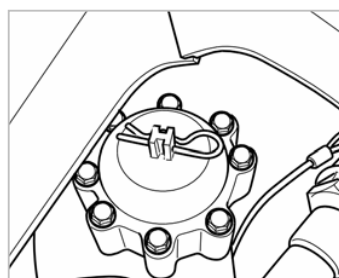
Quick-release coupling

Attention: When the water system has reached its operating temperature, the expansion tank cap should under no circumstances be opened and the pressure released. Since the operating temperature has already been achieved the water pressure cannot be built up again. This system pressure is necessary to increase the coolant boiling point.

A valve in the expansion tank allows the exhaust of steam at a pressure of 1.4 bars, and the release of water at a pressure of 1.8 – 2.0 bars. Air is drawn through the valve as the cooling system cools down.



The bleed valve in the standard production car improves the initial reaction from the heating car system; the valve remains open in the race car system allowing the system to be bled continuously.



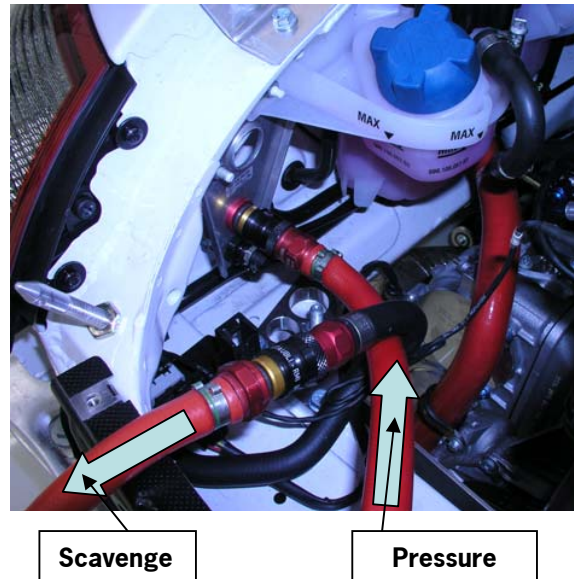
A special filling system available from Sobek should be used to fill the water system. The filling system consists of an electric pump that pumps water from a tank into the system.

Bernd Sobek – Mattern
Fliederstr. 10
D – 69517 Gornheimertal
Tel +49 (0) 6201 2051
Fax +49 (0) 6201 21834
www.sobek-motorsporttechnik.eu



Filling the system should be carried out as follows:

- Disconnect the quick release fittings in the engine bay and connect the corresponding fittings with those of the filling system.



- Switch on the pump. The system will be filled.
- The device must run for ten minutes to guarantee that the system is correctly filled and bled
- Warm-up the engine (80°C) and, if required, fill the reservoir to the maximum level with the filling device attached
- **The expansion tank cap must be closed throughout the entire procedure**

3.5.4.1. Filling the cooling system with engine at normal operating temperature:

A special filling system to fill the engine water system when the engine is at normal operating temperature is also available from Sobek. This appliance consists of a fluid reservoir with a coupling. The reservoir is charged with a pressure of 2.5 – 3.0 bars.

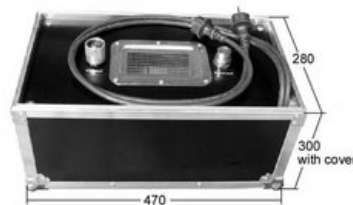


The system filling procedure should be carried out as follows:

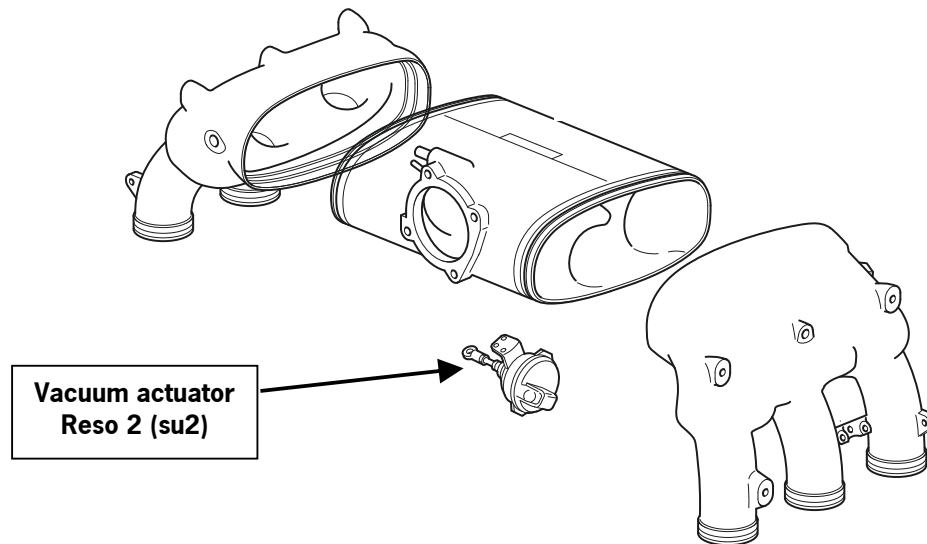
- Disconnect the quick release fitting in the engine bay and connect the filling system coupling to the corresponding end of the quick-release fitting.
- The system is filled via the expansion tank.

3.5.4.2. Heating of the filled cooling system

For the heating of an already filled system Sobek offer an extern heating unit.

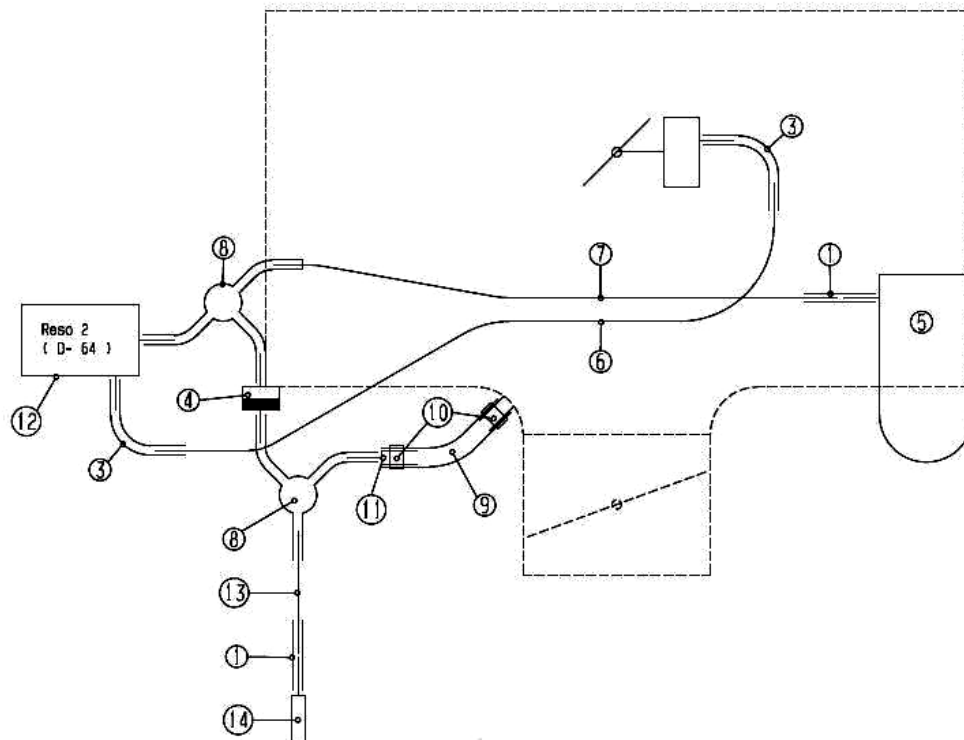


3.6. Induction system

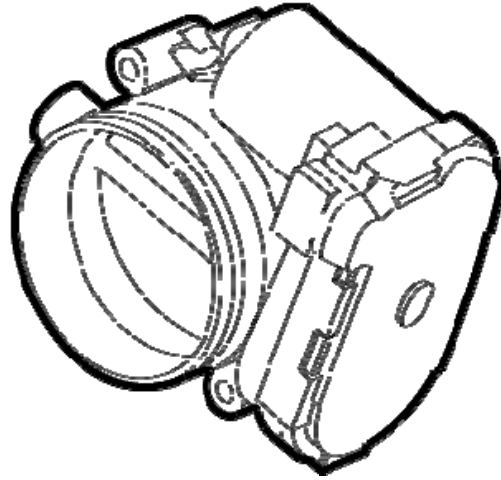


- 2 stage resonance induction system
- Activated by vacuum actuator resonance valve

3.6.1. Under pressure routing



3.7. Throttle butterfly



- Electronically actuated single throttle butterfly
- Redundant system (two pots)
- For information on the EGAS system refer to 10.9

3.7.1. Throttle butterfly setting

There is no mechanical connection between the throttle butterfly and the throttle pedal. The signal of the pedal is transferred to the throttle butterfly via an electro motor.

An adjustment of the throttle butterfly is not necessary. After turning on ignition the throttle butterfly opens and closes automatically in order to determine its setting.

3.8. Working on the engine

3.8.1. Connecting-rod bolt mounting instructions

- Thoroughly clean the mating faces, bolt threads and the tapped bores with cleaning grade petrol and nylon brush
- Smear PLB 05 grease on the bolt threads and mating faces

Tightening procedure:

- Tighten both bolts to 25 Nm
- Loosen one bolt and fit the bolt strain gauge
- Tighten to the required elongation: + 0.160 – 0.005 mm
- With a torque wrench check to see if a minimum torque of 55 – 90 Nm was achieved
- Loosen the second bolt and follow the above mentioned sequence



The bolts can be used three times if the above mentioned tightening procedure is adhered to.

The connecting rods have a coated surface. Care must be taken that no visible damage occurs to the connecting rod surface when dismantling and assembling the engine.

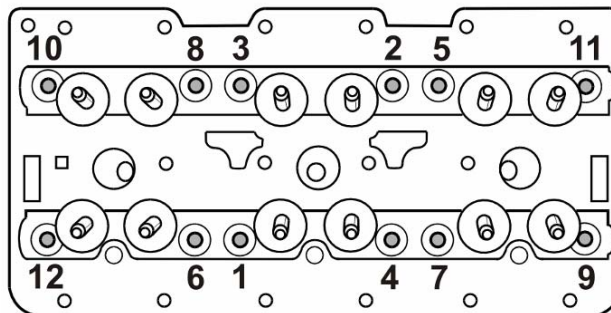


DO NOT polish the connecting rods.

3.8.2. Mounting the cylinder head

The following procedure should be adhered to when mounting the cylinder head:

1. Lightly oil the threads and mating faces
2. Tighten the bolts initially to 30 Nm in the following sequence, and then wait 15 minutes



3. Completely loosen the bolts in the reverse sequence
4. Initially tighten the bolts to 20 Nm, before finally tightening to 120° torque angle

3.8.3. Set valve timing

3.8.3.1. Special tools

Porsche Motorsport recommends use of the following special tools to adjust and set the valve timing of the 911 GT3 Cup



Base plate cylinder 1:	996.721.549.90
Base plate cylinder 2:	996.721.550.90
Guide element intake:	996.721.551.9A
Guide element exhaust:	996.721.551.93
Degree wheel crankshaft:	996.450.131.00
Chain tensioner:	000.721.940.10
Setting jig TDC:	996.721.511.91
Retaining key timing chain sprocket:	996.721.513.90

3.8.4. Valve clearance

The valve clearance is measured between the cam follower and the cam lobe heel when the engine is cold.

Inlet valve clearance [mm] 0.22 – 0.25

Exhaust valve clearance [mm] 0.22 – 0.25

3.8.5. Valve spring adjustment

The valve springs are set based on spring travel. The setting is the same for inlet and exhaust valves.

The following procedure must be adhered to:

1. Compress the complete spring assembly (outer and inner spring and upper and lower valve spring seats) till coil-bound with a spring balance, before reducing the stack height slightly (0.7 – 1.0 mm)
2. Record the spring stack height (seat to upper edge of spring seat)
3. Add the valve-lift to the measurement resulting from the procedure described above. The resulting value is the fitted spring stack height
4. Fit the valve and upper spring seat to the cylinder head, close the valve by pulling the spring platform
5. Measure the distance between the upper edge of the spring seat and the valve spring seat
6. Compensate for the difference between the calculated measurement and fitted-spring-length with shims during assembly

3.8.6. Removing and fitting the crankshaft seal – pulley-side

3.8.6.1. Special tools

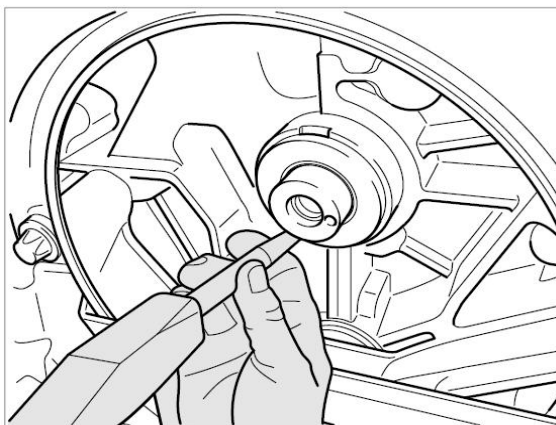
Porsche Motorsport recommends use of the following special tools to remove and fit the pulley-side crankshaft seal:



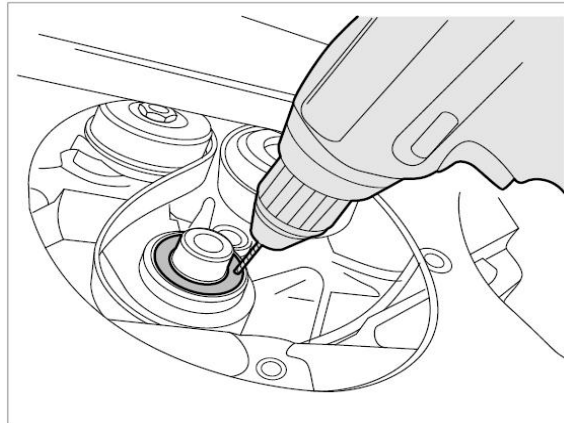
Retaining key pulley:	000.721.973.20
Adapter retaining key pulley:	000.721.973.21
Press tool crankshaft seal:	000.721.216.40
Spacer for press tool:	000.721.979.71
Protective cap crankshaft:	000.721.979.70

3.8.6.2. Removal

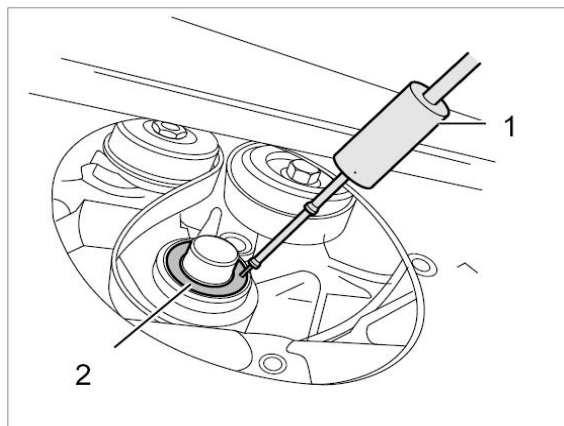
1. Remove the pulley from the crankshaft using the special tool 000.721.973.20 with the retaining key extension 000.721.873.20
2. Check the locating dowel on the pulley for damage and replace if necessary
3. Centre-punch the steel ring in two points offset from one another by 180°



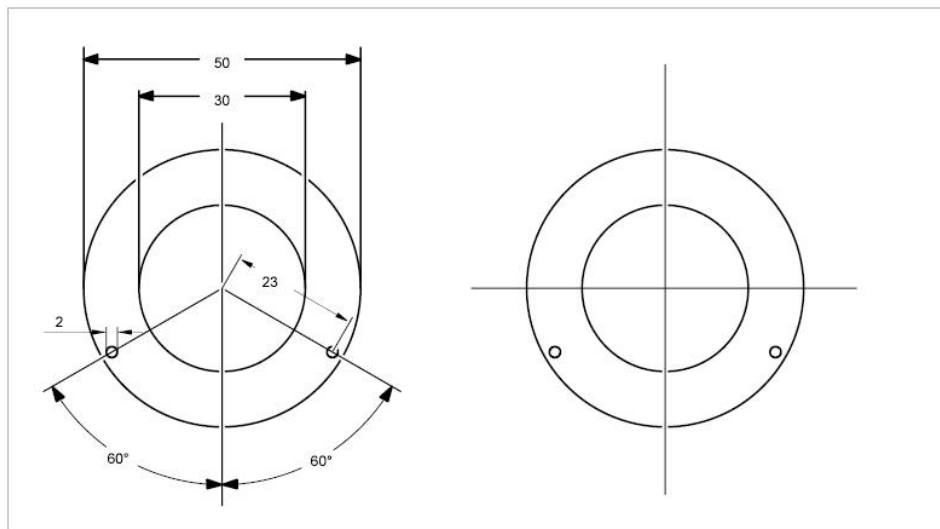
4. Drill two holes ($\varnothing$ 2 mm) at the centre punched points



5. Screw the threaded-end of a commercially available slide hammer -1- into the drilled holes. Carefully remove the seal -2- by swapping the slide hammer alternatively between the drilled holes



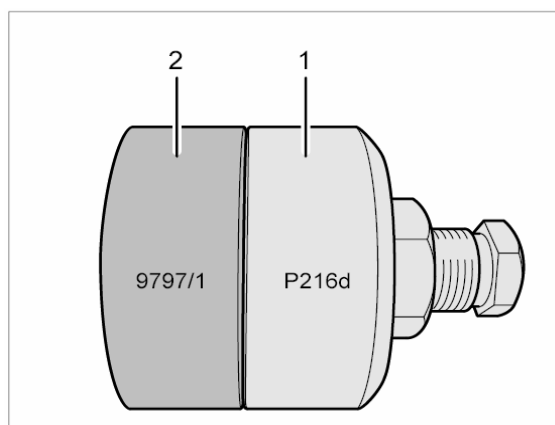
6. Make a drill jig according to the following sketch (paper our thick card). All dimensions in millimetre



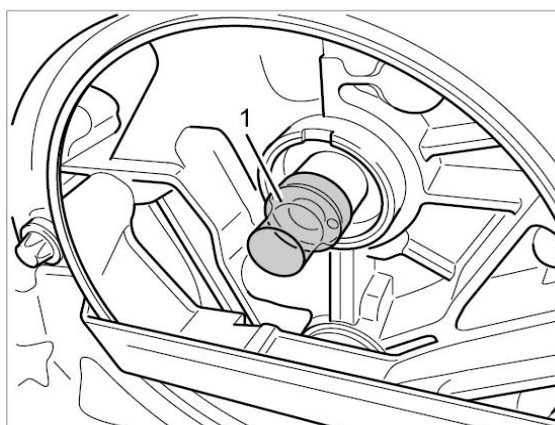
7. Slide the drill jig up to the seal on the crankshaft flange and position correctly
8. Coat the drill bit (Ø 2 mm) with extremely viscous grease
9. Drill at the specified points
10. Screw the pointed end of a commercially available slide hammer alternatively into the two holes and pull-out the seal.
11. Remove swarf
12. Thoroughly clean the flange with a cleaning solvent or acetone

3.8.6.3. Installation

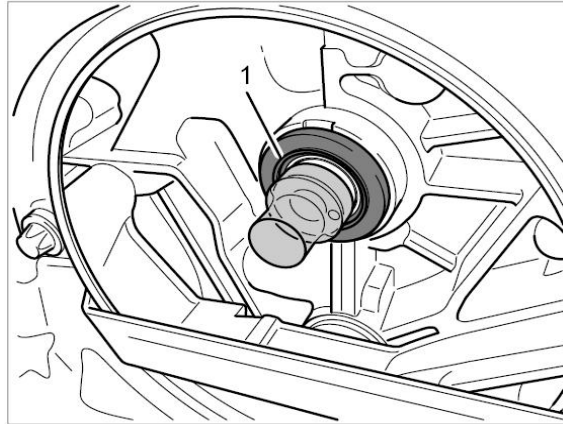
1. Fit the press tool 000.721.216.40 with spacer 000.721.979.71



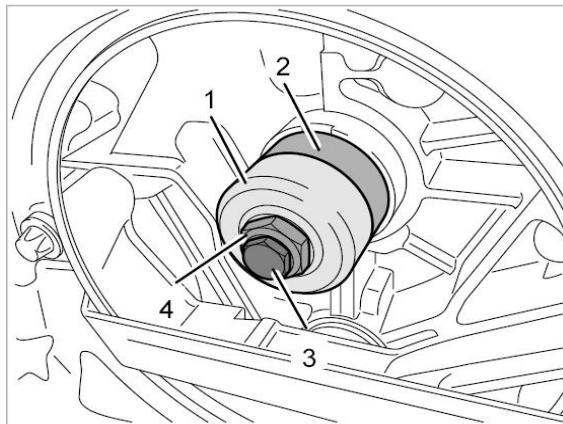
2. Always fit the crankshaft seal dry, DO NOT use grease
3. Push the protective cap 000.721.979.70 onto the crankshaft



4. Push the new crankshaft seal -1- onto the crankshaft flange (mounting position: steel disc to pulley)



5. Push the press tool (see 1) onto the crankshaft flange and fit the hexagon-head bolt -3- (17 mm AF)



6. Tighten the hexagon-head nut -4- till the spacer -2- touches the crankshaft flange
7. Leave the tool fitted for approximately two minutes so that the seal seats correctly
8. Loosen the hexagon-head bolt -4-, remove the hexagon-head bolt and tool
9. Remove the protective cap

3.8.7. Removing and fitting the crankshaft seal – crankshaft side

3.8.7.1. Special tools

Porsche Motorsport recommends use of the following special tools to remove and fit the flywheel side crankshaft seal:

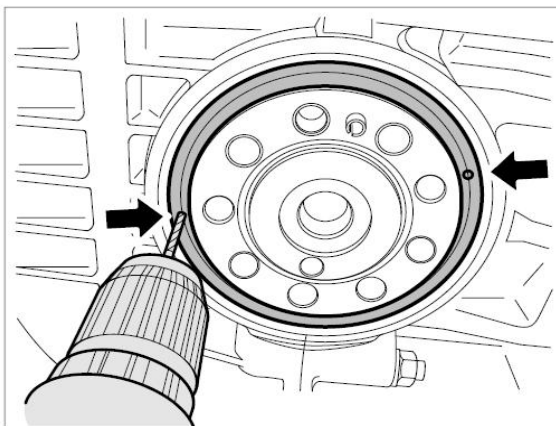


Pressure pad: 000.721.912.60

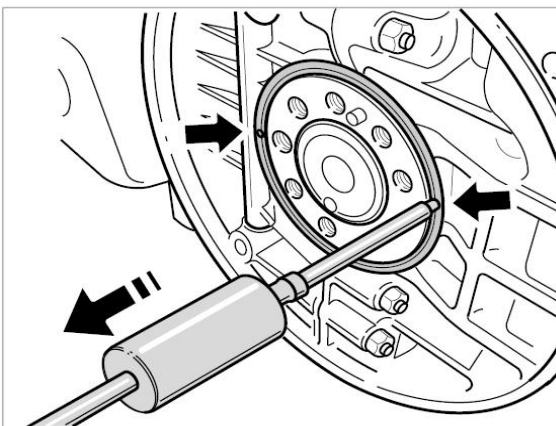
Seal extractor jig: 000.721.971.90

3.8.7.2. Removal

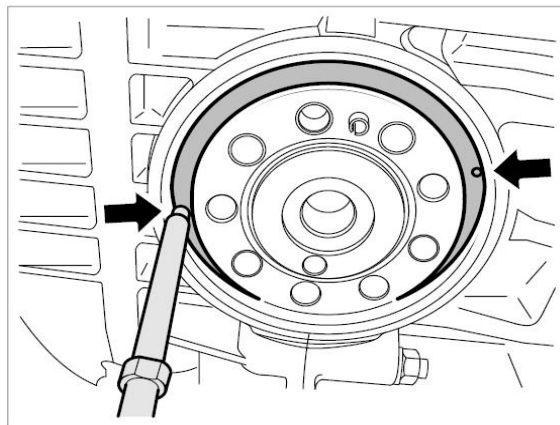
1. Drill two holes (Ø 2,5 mm), 180° opposed from one another, into the metal ring of the crankshaft seal. Never lever out the seal!



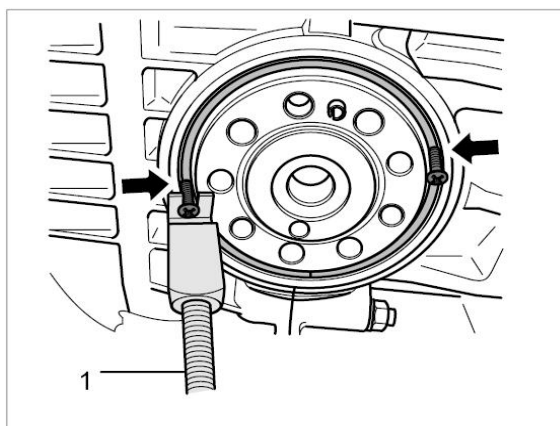
2. Screw the threaded end of a commercially available slide-hammer alternatively into the holes and extract the metal ring evenly.



3. After extracting the metal ring the actual seal remains in the crankcase. Under no circumstances whatsoever must this be levered out.
4. Carefully remove the drill swarf
5. Carefully drill two further 2.0 mm holes (arrows) as close as possible to the corners (metal body) of the seal.
6. A thrust ring is fitted behind the crankshaft seal which should prevent the possibility of the seal being fitted inclined. Aluminium swarf which may appear during drilling should be carefully removed.
7. Remove the seal, there are two procedures for this
 - a.) Screw the threaded end of the slide hammer alternatively into the bores and extract the seal evenly.



- b.) Screw in two self-tapping screws and extract evenly with the claw fitting of a slide hammer



8. Carefully remove the swarf and oil residue from the crankshaft bore

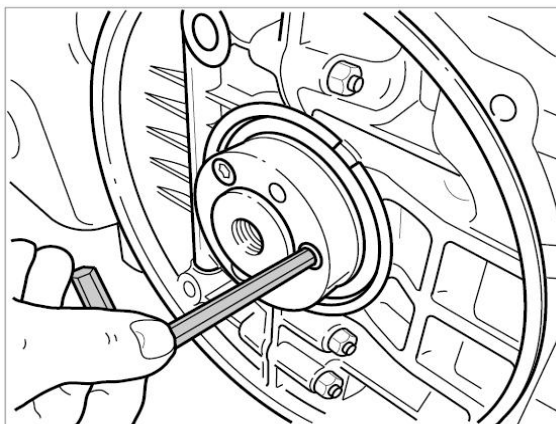
3.8.7.3. Fitting



If visible carefully remove small edges or burrs from the crankshaft flange chamfer with an oil stone, afterwards carefully clean the crankshaft journal and the crankcase bore (use cleaning solvent or acetone with a clean, lint-free cloth).

The crankshaft flange sealing face must not, under any circumstances, be treated with emery cloth, polish compounds or wire brushes. Remove corrosion on the crankshaft flange with a special metal polish wad. Afterwards carefully clean the crankshaft flange with acetone or cleaning solvent.

1. Fasten the insertion-jig base plate 000.721.971.90 hand tight and evenly to the crankshaft flange using the hexagon-head bolt

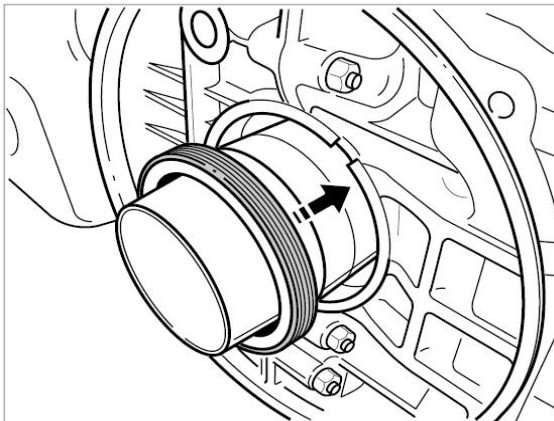


The crankshaft seal should always be fitted dry

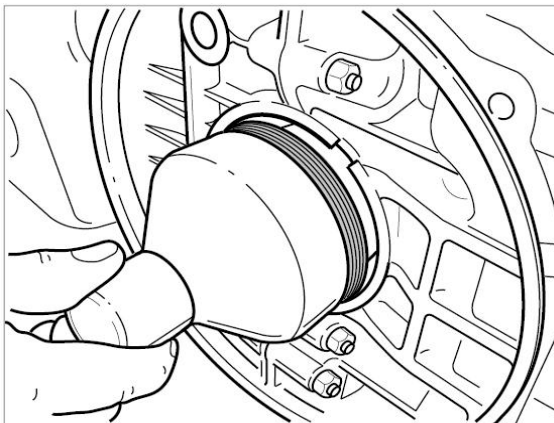
Do not touch the micro sealing lip

The steel ring must face towards the technician during assembly

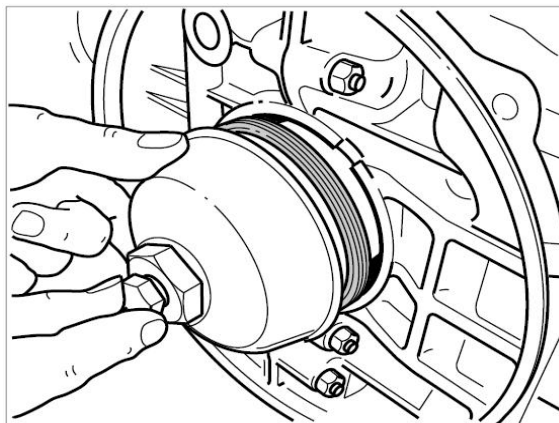
2. Fit the insertion-jig magnetic cone to the base plate, fit the crankshaft seal to the cone and carefully push it onto the base plate
3. Fit the seal dry



4. Remove the magnetic cone and using the pressure piece 000.721.912.60 push the crankshaft seal in a coplanar position.

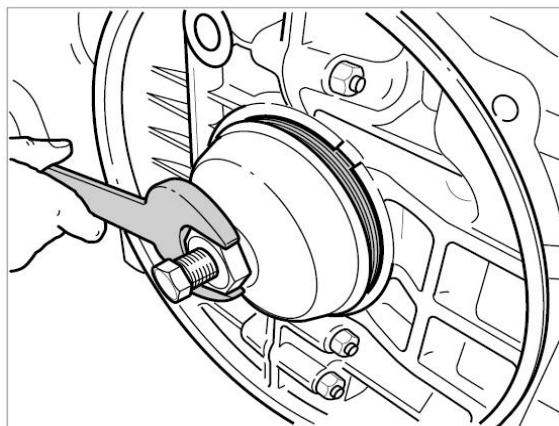


5. Fasten the insertion jig mounting dome 000.721.971.90 to the base plate, for this purpose tighten the mounting dome hexagon-head bolt by hand



6. Push the crankshaft seal onto the crankshaft flange by rotating the insertion nut clockwise till the mounting dome butts completely on the crankshaft flange mounting surface.

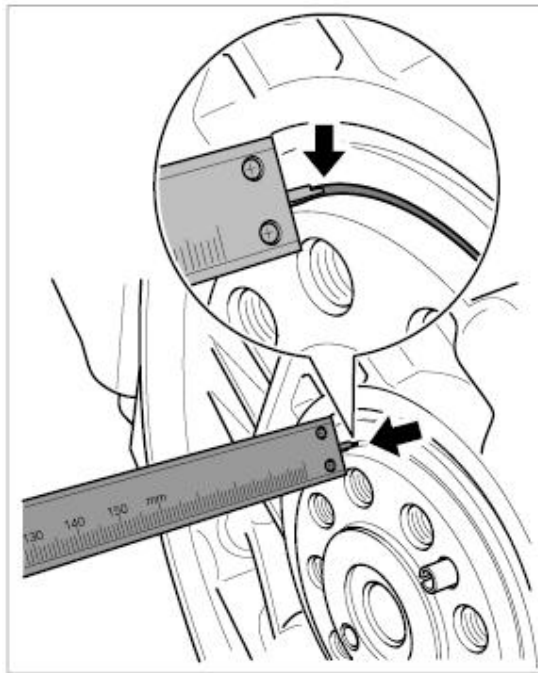
7.



8. Leave the assembly tools for one or two minutes in the final position, the seal and sealing lip position themselves as a result.

9. Loosen the inserting nut and remove the hexagon-head bolt of the inserting jig, remove the jig and unscrew the base plate

10. Check the fitted position of the seal, for this purpose measure the distance at four points from the crankshaft flange to the level surface of the steel ring (arrow).



Measurement depth is approximately 5 mm
Maximum permissible misalignment is 0.5 mm

11. If the comparable values exceed the maximum difference use the insertion jig again to press home

3.9. Engine component tightening torques

Component	Bolt dimensions	Tightening torque [Nm]
Crankshaft and crankcase		
Connecting rod	M10 x 1.25	see 3.8.1
V-belt pulley to crankshaft	M14 x 1.5	170
Plug screw for pressure release valve	M18 x 1.5	50
Oil drain bolt, crankcase	M20 x 1.5	70
Water drain bolt, cylinders	M10 x 1	10
Flywheel	M10	90
Cylinder head		
Cylinder head bolt	M10	see 3.8.2
Camshaft housing		
Anti-knock sensor	M8	23
Spark plugs	M12 x 1.25	20
Spark plugs should only be tightened a maximum of five times		
Camshaft wheel on camshaft	M12 x 1.5	30 + 90°
Timing chain case to crankcase	M8	23
Valve cover to camshaft housing	M6	9.7
Timing chain-case cover	M6	13
Ancillary components		
Drain bolt oil tank	M20 x 1,5	60

3.10. Engine mileage

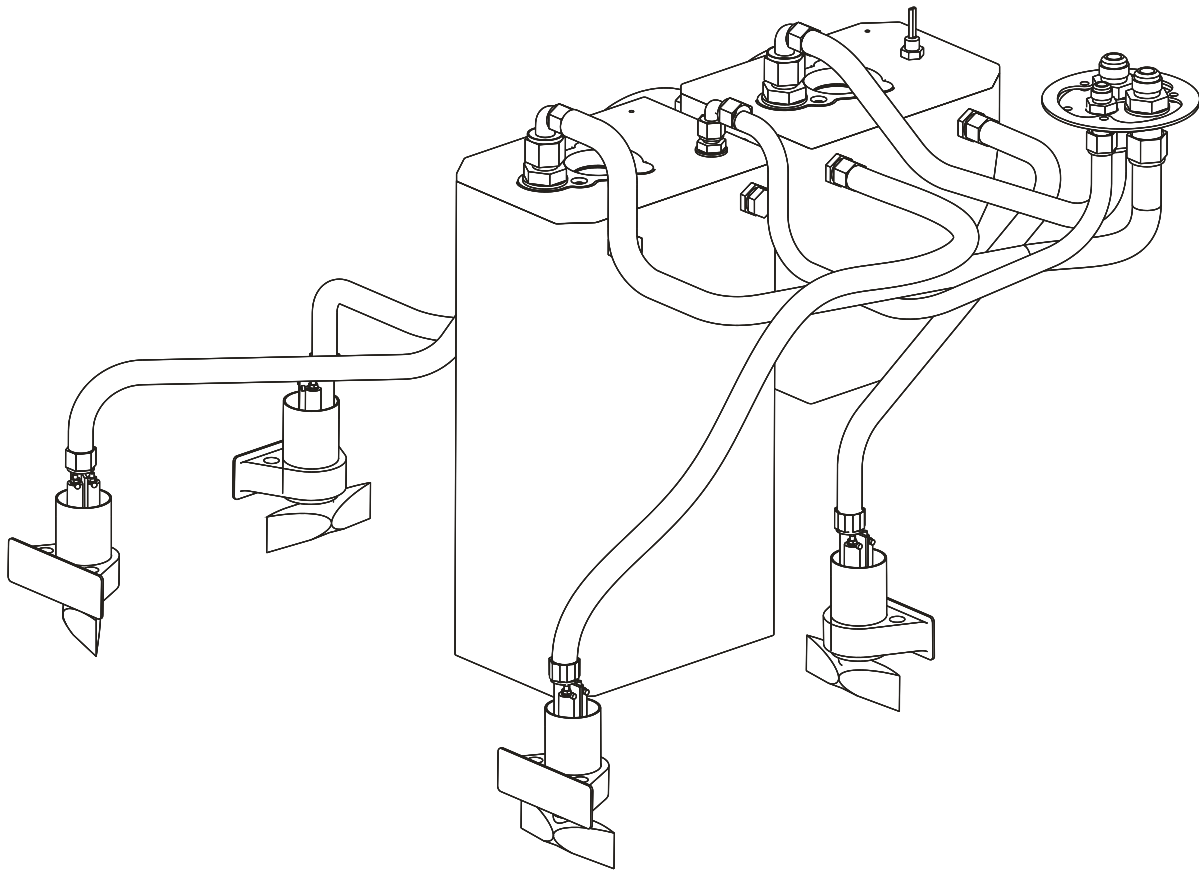
The engine in the 2010 911 GT3 R is designed to rev to a maximum of 9,400 rpm, in this case the rebuild interval is



30 hours

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4.2. Fuel cell



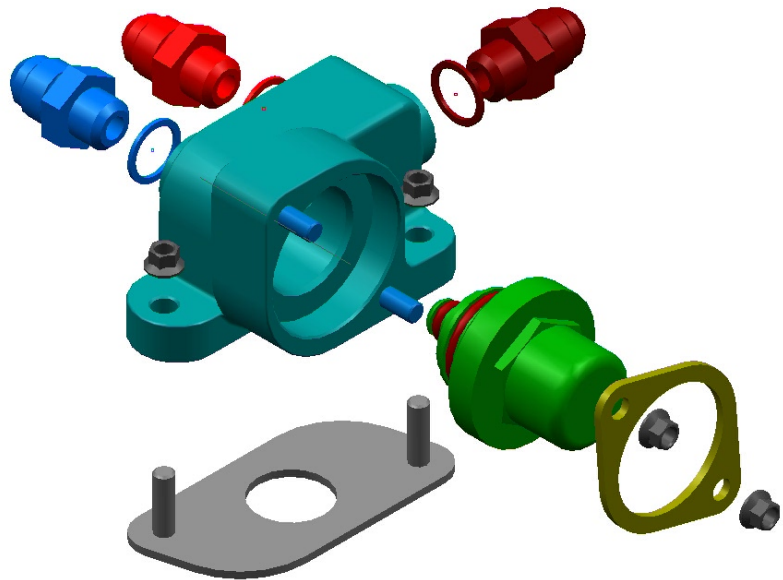
Attention: The fuel tank volume must be measured and adjusted before the first competition to ensure that the capacity does not exceed that stated by the relevant regulations.

Both the main and reserve fuel pumps are of the electrical vane type.

The fuel filter is located in the front luggage compartment and should be replaced after approximately every 24 hours of use. A scavenge filter element is mounted before the pump which should be cleaned after every race. The fuel system can be drained from the quick release coupling mounted on the left hand side of the engine bay.

Attention: The fuel pumps should not be activated under any circumstances if tank-engine quick release couplings are disconnected. Fuel pressure peaks in the system can cause leakage, and in the worst case the system pressure can exceed the burst pressure of the fuel filter.

4.2.1. Pressure regulator



The 911 GT3 R is equipped with a returnless fuel system. Due to this design fluctuation in fuel pressure is possible. The average fuel pressure over one complete lap should not be lower than



4.8 bar

4.2.2. Fuel

98 R0Z

DO NOT drill holes in the area of the fuel cell.

DO NOT use sharp objects when removing the fuel cell from the car.

4.2.3. Reserve pumps

A reserve fuel pump is fitted as standard and is activated from a switch mounted on the dashboard. A warning lamp in the push button is illuminated when the reserve pump is running.

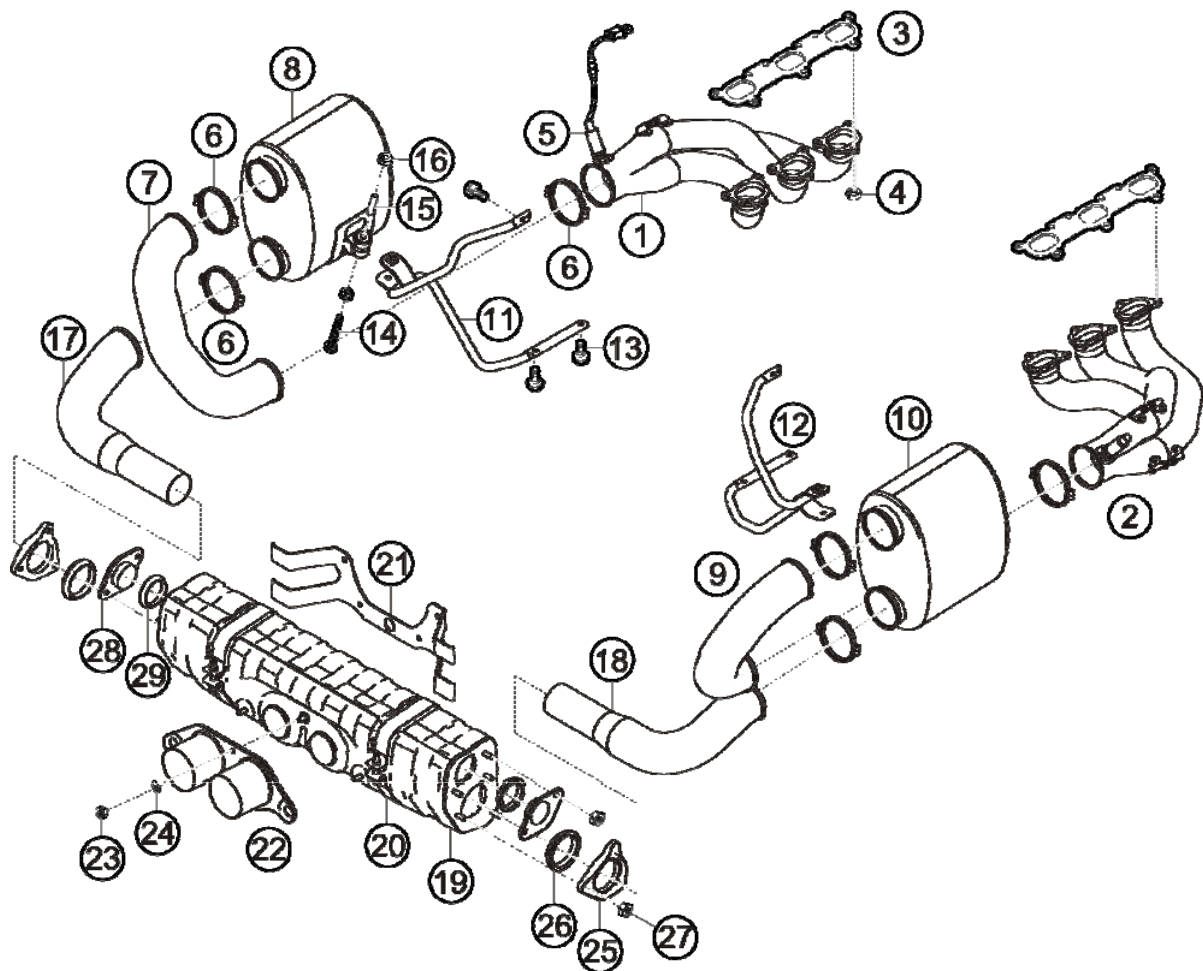
4.2.4. Main and in-tank pumps

A switch mounted on the dashboard can be used to switch between the various main and in-tank pump modes:

- Service: Normal operation
- Middle position: Fuel pumps off
- In-tank service: Only the in-tank pumps are in operation

4.3. Exhaust system

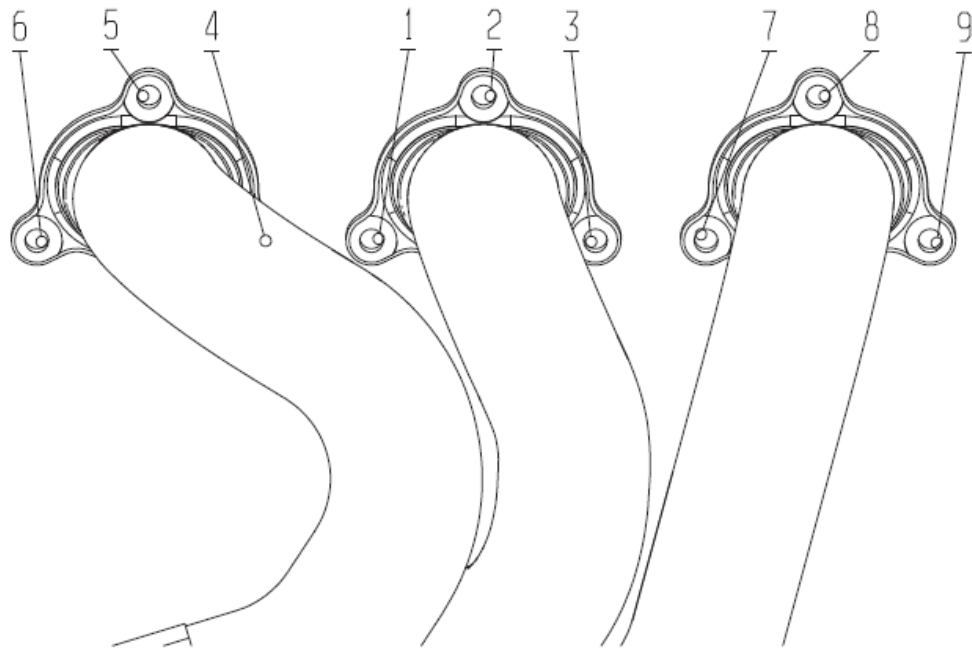
4.3.1. Standard system



4.3.2. Catalytic converter

100 cells

Endanzug : 23 Nm (nach Anziehreihenfolge,gesamter Schraubverband)



Anziehreihenfolge: 1-2-3-4-5-6-7-8-9

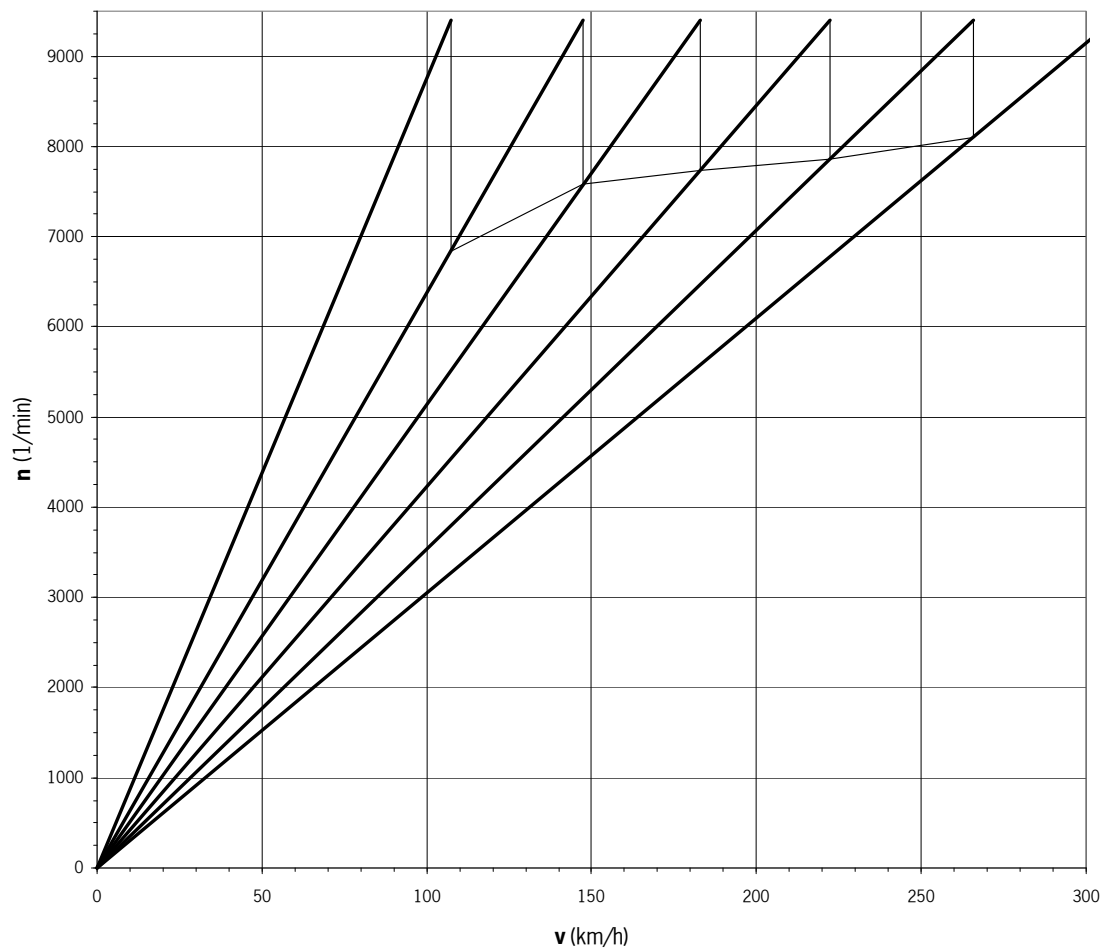
5. Gearbox

The six-speed sequential gearbox fitted to the GT3 R is fitted with a limited slip differential, an oil filter and a water / oil heat-exchanger for cooling purposes. The gear pairs are uniquely matched and should never be mixed. If one gear is damaged the gear pair should be replaced.

5.1. Gearbox technical data

Gearbox type		G 97/71
Design		Sequential
Number of gears		6
Standard gear ratios		
Drop Gear	25/32	1.280
Crown wheel & pinion	9/26	2.889
1 st gear	13/41	3.154
2 nd gear	17/39	2.294
3 rd gear	19/36	1.850
4 th gear	22/35	1.522
5 th gear	23/31	1.273
6 th gear	25/29	1.097
Lubrication		Gearbox mounted oil pump Oil – water heat-exchanger
Lubricant		Mobil 'Mobilube' SHC
Oil capacity after newly build		4.0 litre
Limited slip differential		
Locking value, drive		45 % (dynamic)
Locking value, overrun		65 % (dynamic)

5.2. Gear ratio diagram



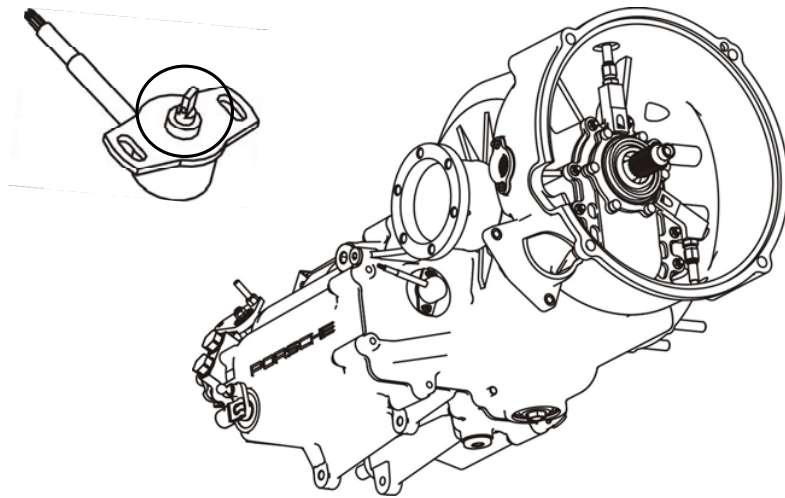
5.3. Gear position recognition

To determine the gear selected electronically a potentiometer, in which a defined current drops subject to the gear selected, is mounted to the gearbox. The gear recognition is required for the power interruption when shifting gear.

5.3.1. Gearbox potentiometer calibration

The gear position sensor must be recalibrated after repairs are carried out on the gearbox or if the gear ratios are changed.

- Turn on the ignition and switch to the “Warm up Modus” in the MoTeC display
- Select **3rd** gear. Turn the wheels to ensure that 3rd gear is correctly engaged
- The value in the display must be 2.71 V (refer to Modas handbook)
- 3rd gear must shown in the display

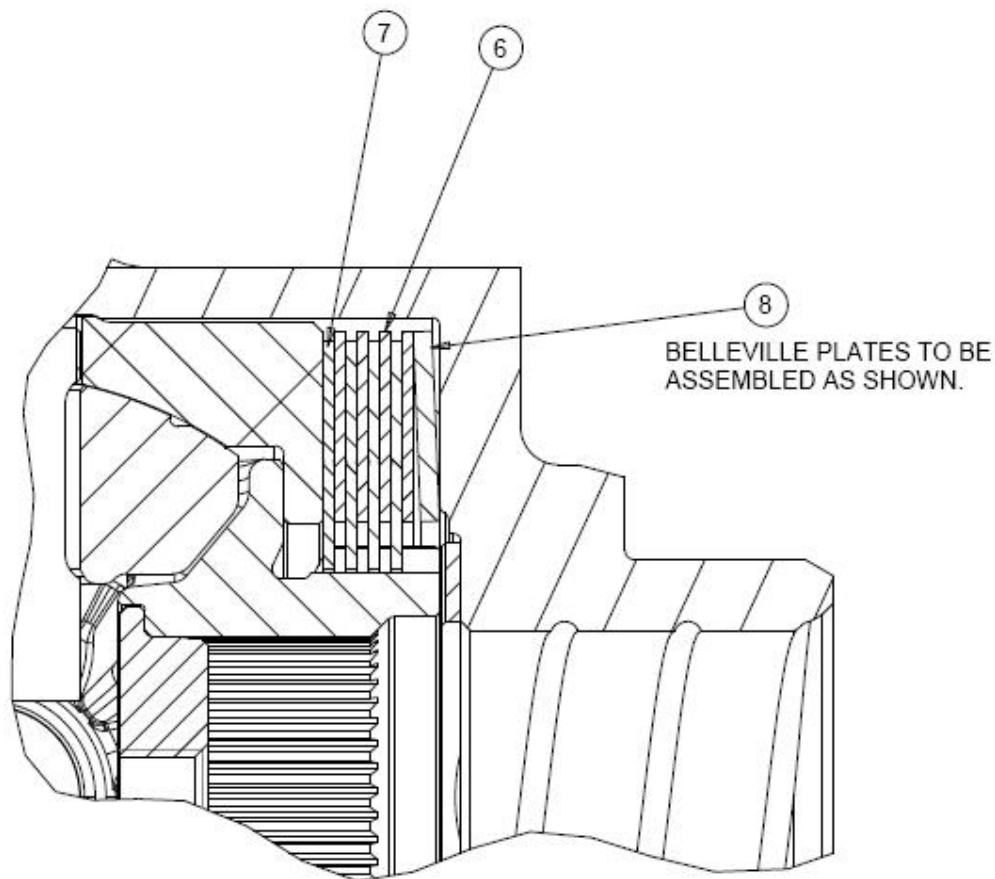


5.4. Differential

The limited-slip differential has a locking torque of 45 % / 65 % (power / overrun) (dynamic locking value).

The differential is checked by means of a friction test in which the preload and wear of the clutch disc plates are determined.

5.4.1. Differential assembly



6	Clutch disc	4 per side
7	Friction disc	4 per side
8	Belleville spring	1 per side

5.5. Clutch

3 disc Tilton carbon clutch

5.6. Working on the gearbox

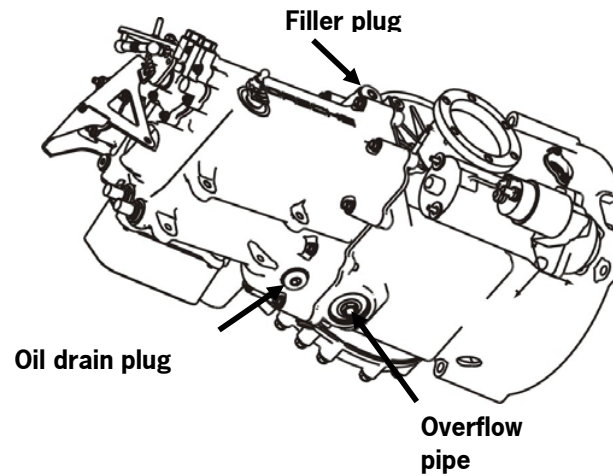
The dismantling, assembly and maintenance of the gearbox is described in this section. This gives you the possibility to replace damaged or worn parts. In the event of more comprehensive damage, which necessitates the replacement of gearbox housings, we strongly recommend that this is undertaken by Porsche Motorsport. Complex measurement and adjustment, which could not be included in these instructions, are necessary to guarantee that the gearbox works perfectly.

5.6.1. Special tools

997.450.116.9A	Assembling tool clutch	Wire bow for preload while assembling, deliverable
997.450.372.9A	Assembling tool	Tool fitting release spearing, deliverable
997.450.379.9A	Assembling tool	Central driver four part bearing, deliverable
997.450.380.9A	Assembling tool	Driver, deliverable
997.450.381.9A	Assembling tool	Special tool adjustment, deliverable
9R6.450.304.00	Special key	Assembling shaft nut pinion shaft, deliverable
000.721.925.30	Assembling tool	Locking tool input shaft, deliverable
997.450.375.9A	Assembling tool	Locking tool pinion shaft, deliverable
997.300.196.9A	Transportation Box	Analog RSR, deliverable

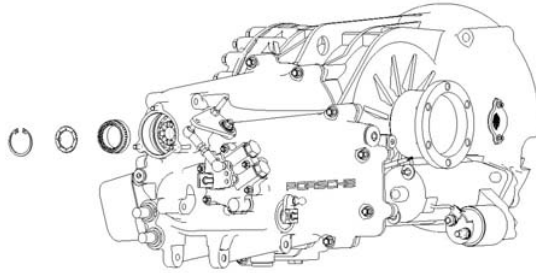
5.6.2. Oil filling

- Open the overflow pipe on the lower side of the gearbox (M6 socket cap screw)
- Add Mobilube SHC through the oil fill opening till the oil overflows from the above mentioned tube (approx. 3 litres for a newly build gearbox)
- Close the oil overflow pipe and add 1.0 litre of oil

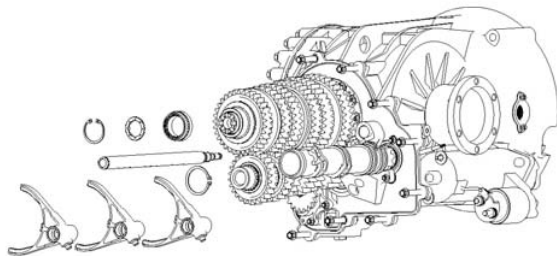


Porsche Motorsport recommends the use of Mobil Mobilube SHC.

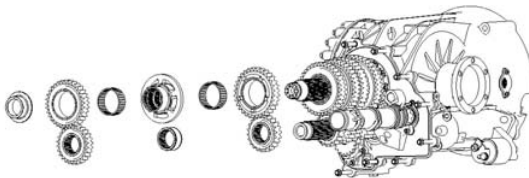
5.6.3. Changing gear ratios



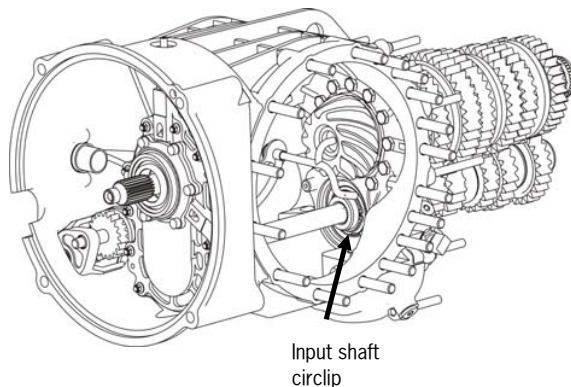
- Lock the gearbox
- Open closure plate on gear ratio housing
- Remove circlip from the M32 x 1.25 nut
- Remove anti-rotational safety
- Loosen M32 x 1.25 nut
- Completely remove gear ratio housing



- Extract shift rod
- Remove shift forks
- Remove circlip from input shaft
- Remove M 32x1.25 nut from pinion shaft



- Remove gear ratios, bushes, needle-roller bearings, hubs, dog-rings and spacer bushes.



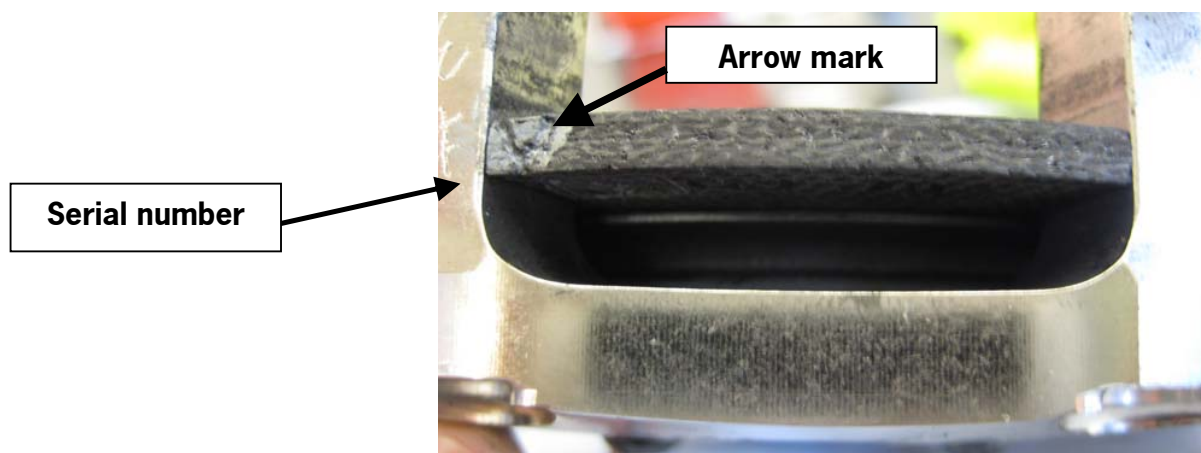
- To change the 1st and 2nd gear shaft remove the differential
- Remove reverse-gear shaft support
- Remove oil pump drive gear
- Remove 35x1.5 circlip from input shaft (differential side)

Ensure that the washer under the circlip (part of bearing inner race) is seated correctly when fitting the input shaft. Ensure that the marking on the gears on the input shaft (fixed gears) face to the outside.

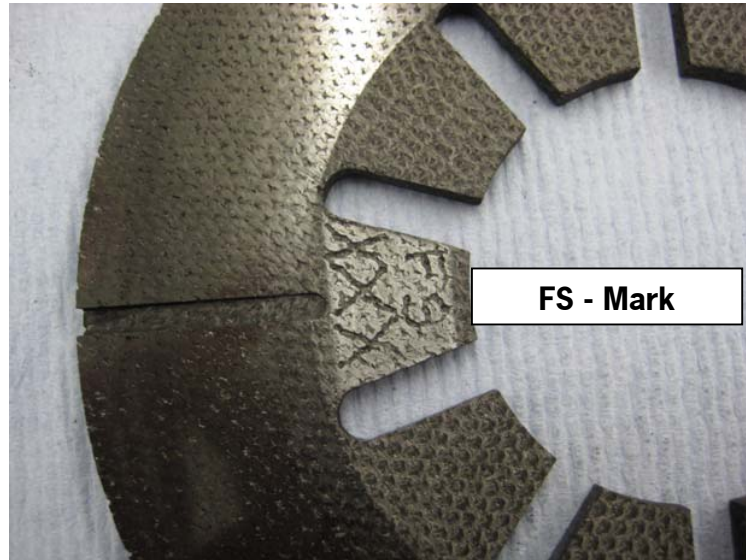
5.6.4. Mounting the clutch

The following points should be observed when mounting the clutch:

- Place pressure plate on first intermediate plate
- Place pressure plate and first carbon disc in the cage. The mark on the intermediate plate (arrow) must lie on the left-hand side of the cage foot with the serial number

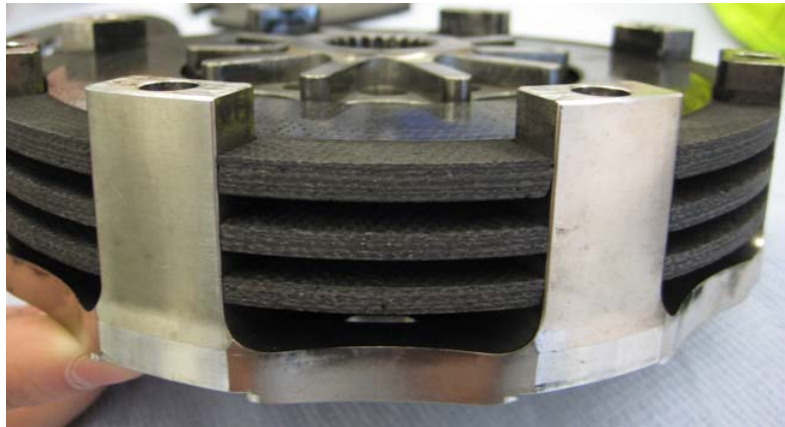


- Place intermediate and drive plates alternately in the cage
- The "FS" (Flywheel Side) mark on the drive plates must point towards the engine. Furthermore the "FS" mark of each drive plate should lie on top of each other "FS" mark



- After the third intermediate plate the hub is inserted. The "Engine Side" mark must point towards the engine





- Then insert drive plate 3 and intermediate plate 4



Attention: The clutch plates should be refitted in the original sequence and orientation. Please observe the markings on the edges.

The clutch hub must have at least 0.25 mm axial float. This dimension is of particular importance before the clutch reaches its maximum wear.

No greasy or oily substances should contaminate the clutch plates.

The splined section of the gearbox input shaft must mesh over the entire length of the drive hub. The gearbox input shaft bearing-journal must be smeared lightly with copper grease (Porsche part number 000.043.004.00) before assembly.

5.6.5. Release bearing

Under no circumstances whatsoever must gearbox come into contact with the clutch release bearing seal otherwise the seal can swell which, in the worst case, can result in the seal not functioning correctly.

Also, when handling the seal both hands and the working environment must be clean and free of residual oil (this also applies to engine oil and other oils).

According to the manufacturer the seal is only compatible with hydraulic fluids of specification DOT4 and DOT5.

5.6.6. Gearbox maintenance

The following work should be carried out regularly:

- Check gear ratio teeth, dogs and dog-rings
- Check the shift collars
- Check the gear hub and gear roller bearings for signs of wear and pitting
- Check the oil for signs of metallic debris

The following work should be carried out after a total running time of approximately 30 hours:

- Check the crown wheel and pinion for pitting
- Replace the pinion bearing (4-point bearing)
- Replace the oil filter
- Replace the shift cable
- Replace differential housing

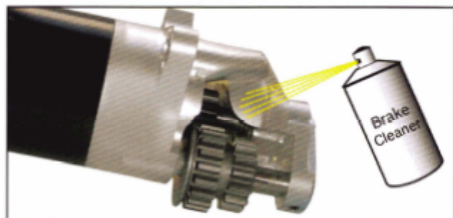
5.6.7. Starter motor maintenance

The starter motor maintenance includes the following work:

After each race:

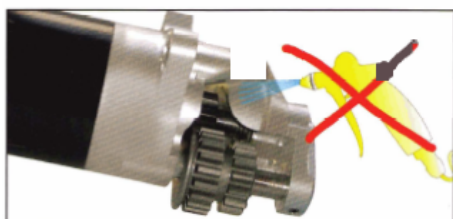
1. Reinigen

1. Cleaning



Reinigen Sie Wellen und Zahnräder mit Bremsenreiniger. Halten Sie den Starter beim Reinigen schräg, so dass Schmutz und Reiniger abfließen können.

Clean shafts and gears with brake cleaner. Keep the starter at an angle so that dirt and cleaner can drain.

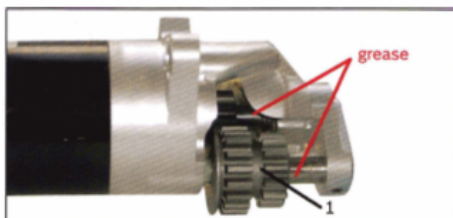


ACHTUNG!
Reinigen Sie nicht mit Druckluft!

WARNING!
Do not clean with compressed air!

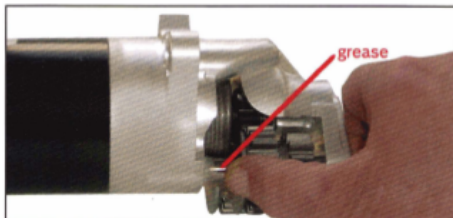
2. Fetten

2. Greasing



Fetten Sie Wellen und Vorgelegewelle nach dem Reinigen. Fetten Sie nicht das Starterritzel (1)! Wir empfehlen Shell Stamina Grease HDS.

Grease the shaft and the countershaft after cleaning. Do not grease the starter pinion (1)! We recommend Shell Stamina Grease HDS.



Schieben Sie das Zahnrad in Richtung der Außenseite des Antriebslagers und fetten Sie den Rest der Vorgelegewelle.

Move the pinion gear towards the outside of the drive end shield and grease the remaining area of the countershaft.

Shell Stamina Grease HDS

ET.Nr.: **997.605.920.9A** (400 g)

Every 6,000 km it is recommended to send the starter for an complete overhaul to Bosch Motorsport:

Bosch Engineering GmbH Motorsport
An der Bracke 9
D - 71706 Markgröningen
Tel.: 0711 811 3981
www.bosch-motorsport.com

5.7. Gearbox component tightening torques

Component	Bolt dimensions	Tightening torque [Nm]
Clutch on Flywheel	M8	33
Gearbox closure plate	M6	9.7
Gear ratio housing	M8	25
Pinion shaft nut	M32 x 1.25	180
Differential closure plate	M10	55
Reverse-gear shaft support	M6	9.7
	M8	25
	M8 x 35 plus Loctite 243	25
Joint flange	M10	45
Retaining clamp 4-point bearing	M8 plus Loctite 270	40
	<i>Always use new Simmonds nuts when reassembling</i>	
Oil pump housing	M6	9.7
	<i>Always use new Simmonds nuts when reassembling</i>	
Gearbox mount on gearbox	M8	30

6. Suspension

Both the front and rear suspension have been modified to suit the demands of competition and to enable the accurate and easy adjustment of camber, wheel alignment and ride height.

The front suspension is of the independent McPherson strut type with aluminium wishbones and the rear suspension is multi-link with 'LSA – System' (light, stable, agile).

6.1. Front suspension

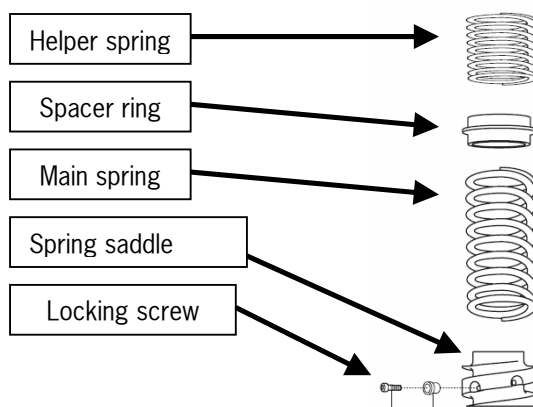
- McPherson strut suspension
- Adjustable main spring
- Adjustable anti-roll bar
- Two way adjustable dampers

6.1.1. Front springs

The front coil spring has a three-step adjustment range, the corresponding spring rates are listed in the table below:

Colour	Part number	Stiffness Range [N/mm]
wine red	997.343.531.9C	160 - 200
blue lilac	997.343.531.9B	190 - 230
golden yellow	997.343.531.9D	220 - 260

The spring is twisted into or out of the spring saddle in the individual positions to achieve each spring rate. The maximum spring stiffness is achieved by screwing the spring completely into the spring saddle.



Changing the spring rate (spring stiffness) directly affects the vehicle ride height as well as the toe. The ride height must be adjusted by four revolutions to compensate for one step in spring rate change. For example, when the spring rate is softened by one step the ride height must be lowered four turns to compensate. If the spring rate is stiffened the ride height must be raised by four turns. Changing the ride height about 10 mm changes the toe about 2.4'. The ratio of the front spring is 0.7. The thread pitch of the spring saddle is 1.5.

6.1.2. Front dampers

A 2-way damper adjustable in bump and rebound (compression / droop) is fitted to the front axle. The bump and rebound damping forces are adjustable in the high-speed piston range. Both softer and harder are adjusted on the valve block.

6.1.2.1. Rebound

The rebound is adjustable in the high speed range. The high-speed adjustment range has 16 positions (1 = less damping forces, 16 = higher damping forces).

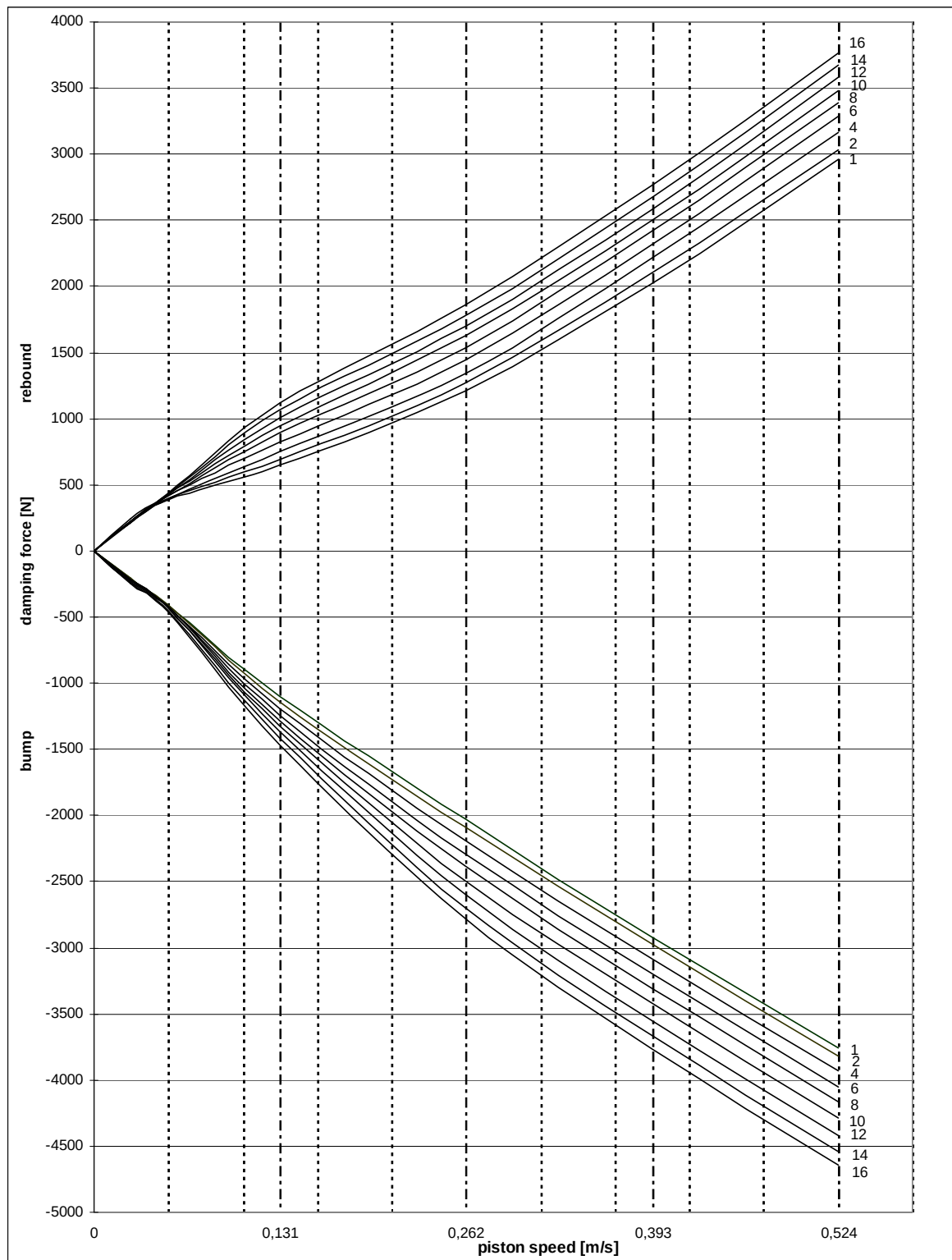
6.1.2.2. Bump

The bump is adjustable in the high speed range. The high-speed adjustment range has 16 positions (1 = less damping forces, 16 = higher damping forces).

Attention:

When changing the existing dampers for those of another manufacturer, it is necessary to ensure that the recommended ride height and spring travel values are retained. Porsche AG does not accept any liability for any subsequent damage to the suspension or related components.

6.1.2.3. Damper curves (F2T1)

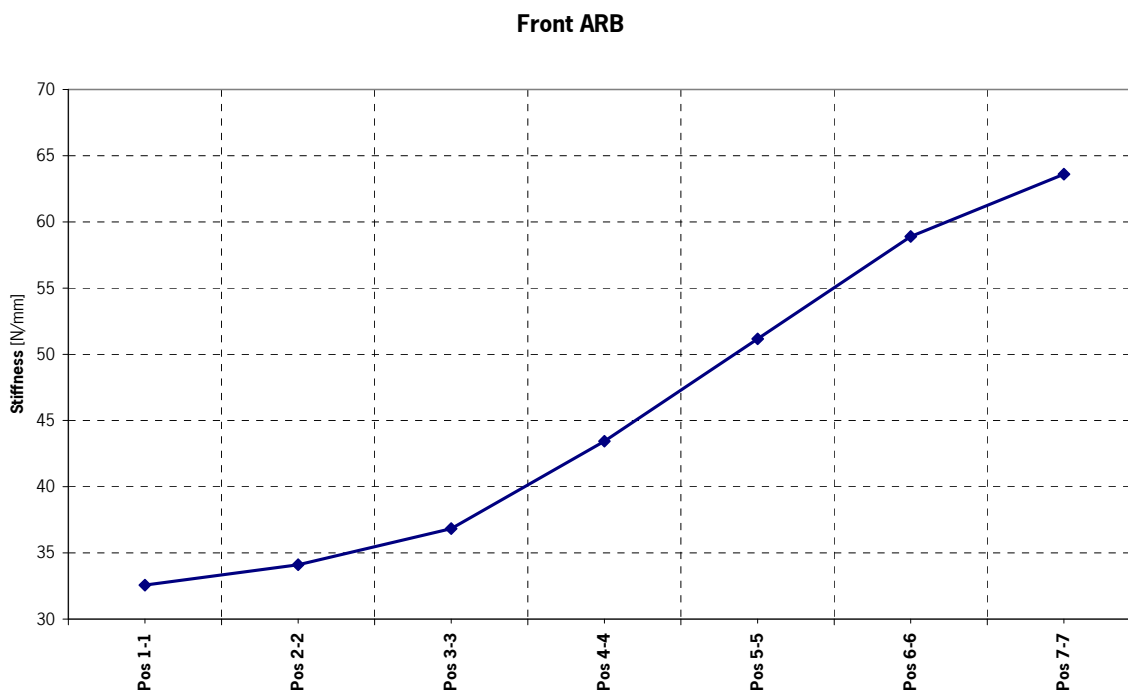


6.1.3. Front anti-roll bar

The front anti-roll bar has a 7 position adjustment range on both sides, each position results in the blade being adjusted by an angle of 15°. The maximum stiffness of the anti-roll bar is achieved when the blade is aligned parallel to the anti-roll bar link. The minimum stiffness is achieved when the blade is aligned at 90° (Pos1-1) to the anti-roll bar link.

Always use suitable tools to rotate the blade as incorrect tools can cause damage. Notches or other damage can cause the blade to break.

In the following diagram the component stiffness of the front ARB dependent on blade position is represented:



6.1.4. Steering system

The 911 GT3 R is fitted with an electrical servo assisted rack and pinion steering system.

6.1.4.1. Servo pump control

Control of the electrical servo pump is made via terminal 61. This means that the servo pump only operates when the engine is running and the alternator is charging..

6.1.4.2. Steering system maintenance

System leak check:

With the engine idling, carefully rotate and hold the steering wheel in the full lock position to ensure the greatest possible system pressure is achieved. Check all the lines, pipes and fittings for leakage. When implementing the test this level of system pressure should be held for an absolute maximum of ten seconds. If it is necessary to repeat this procedure, a pause of at least 10 seconds should be made between tests.

The electric servo pump is located in the luggage compartment. The fluid reservoir is mounted directly on the pump.

The fluid level is checked with the steering in the straight-ahead position and with the engine running at idle speed.



The rack and pinion steering and servo pump should, under no circumstances be repaired or dismantled. Damage to the power steering system can occur through a lack of oil circulating in the hydraulic system. Due to the high system pressure even a small loss of fluid through leakage can damage the servo pump.

Bleeding the steering system:

This procedure is best carried out by two people.

To fill the complete steering system after fitting a new steering rack, oil lines or because of excessive hydraulic fluid loss, start and then immediately stop the engine several times. This procedure causes the fluid level in the reservoir to sink rapidly, therefore ensure that the reservoir is refilled constantly with 'Pentosin' (000.043.206.56) as the engine runs. The reservoir must never be allowed to run dry during this procedure.

The electric hydraulic pump only operates when the engine is running. Fill the reservoir before starting the engine to bleed the system. Recheck the reservoir level immediately after the engine has started.

Rotate the steering wheel quickly and repeatedly from one lock to the other to allow air in the cylinders to escape. To prevent unnecessary system pressure spikes do not rotate the steering wheel against the stops with any more force than required.

Check the fluid level constantly during this procedure. If the oil level continues to sink, add "Pentosin" oil till the reservoir fluid level remains constant and no air bubbles surface in the reservoir when the steering wheel is turned back and forth.

Check the fluid level with the dipstick integrated into the reservoir top when the hydraulic pump is running.

6.2. Rear suspension

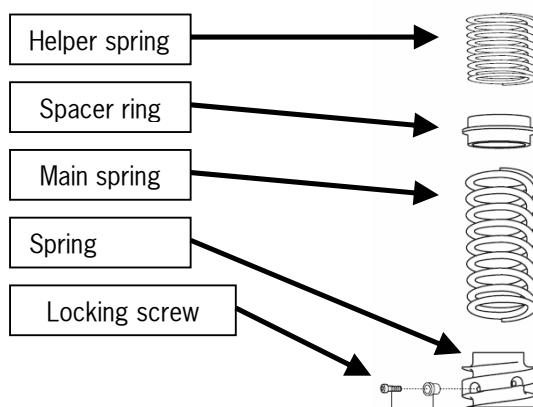
- Multi-link suspension
- Adjustable main spring
- Adjustable anti-roll bar
- Two way adjustable dampers

6.2.1. Rear springs

The rear coil spring has a four-step adjustment range, the corresponding spring rates are listed in the table below:

Colour	Part number	Stiffness Range [N/mm]
light green	997.333.531.9B	170 - 230
green	997.333.531.9A	220 - 280
braun	997.333.531.9C	250 - 320

The spring is twisted into or out of the spring saddle in the individual positions to achieve each spring rate. The maximum spring stiffness is achieved by screwing the spring completely into the spring saddle.



Changing the spring rate (spring stiffness) directly affects the vehicle ride height as well as the toe. The ride height must be adjusted by four revolutions to compensate for one step in spring rate change. For example, when the spring rate is softened by one step the ride height must be lowered four turns to compensate. If the spring rate is stiffened the ride height must be raised by four turns. Changing the ride height about 10 mm changes the toe about 5.7°. The ratio of the front spring is 0.73. The thread pitch of the spring saddle is 1.5.

6.2.2. Rear dampers

A 2-way damper adjustable in bump and rebound (compression / droop) is fitted to the rear axle. The bump and rebound damping forces are adjustable in the high-speed piston range. Both softer and harder are adjusted on the valve block.

6.2.2.1. Rebound

The rebound is adjustable in the high speed range. The high-speed adjustment range has 16 positions (1 = less damping forces, 16 = higher damping forces).

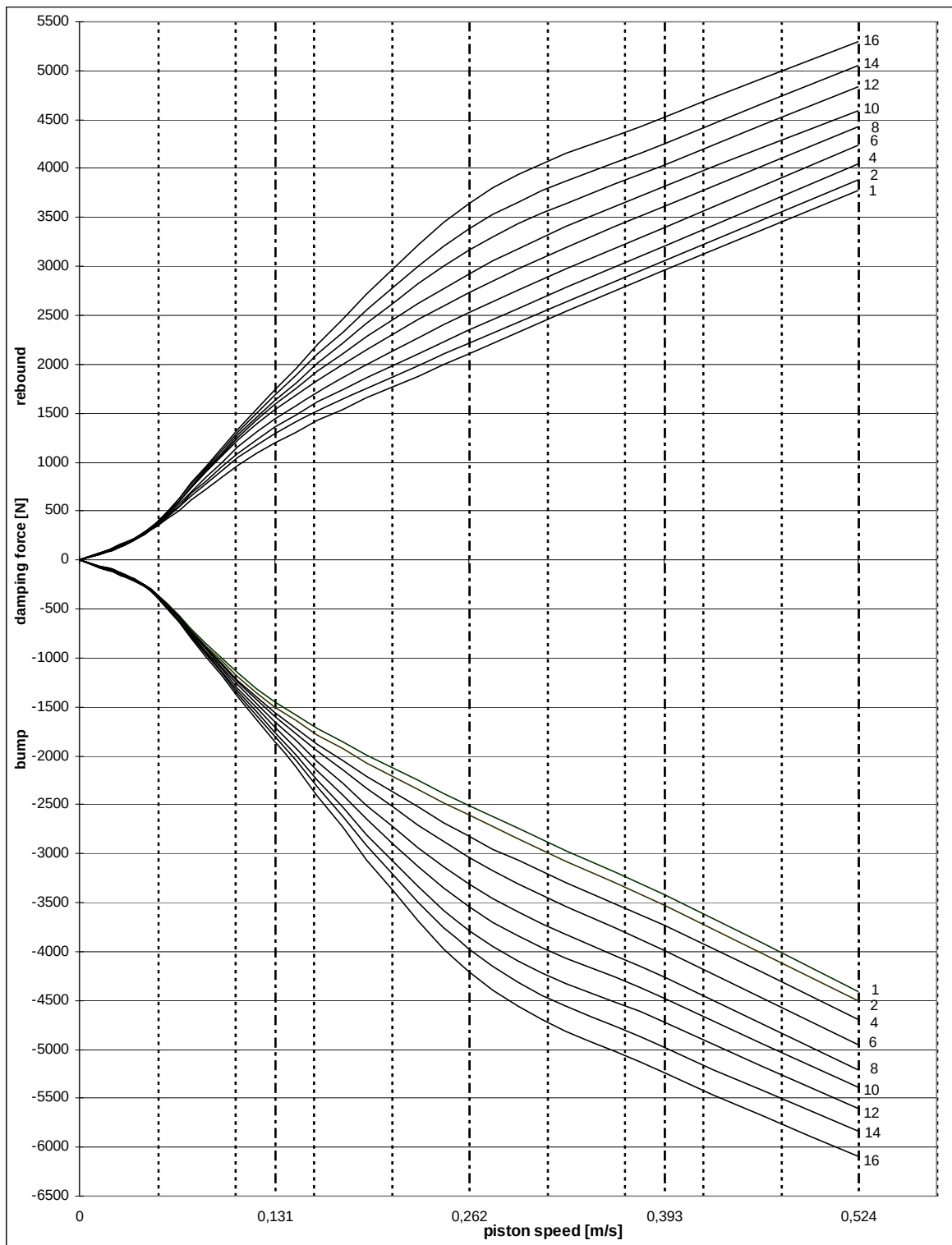
6.2.2.2. Bump

The bump is adjustable in the high speed range. The high-speed adjustment range has 16 positions (1 = less damping forces, 16 = higher damping forces).

Attention:

When changing the existing dampers for those of another manufacturer, it is necessary to ensure that the recommended ride height and spring travel values are retained. Porsche AG does not accept any liability for any subsequent damage to the suspension or related components.

6.2.2.3. Damper curves (NFB2T1)

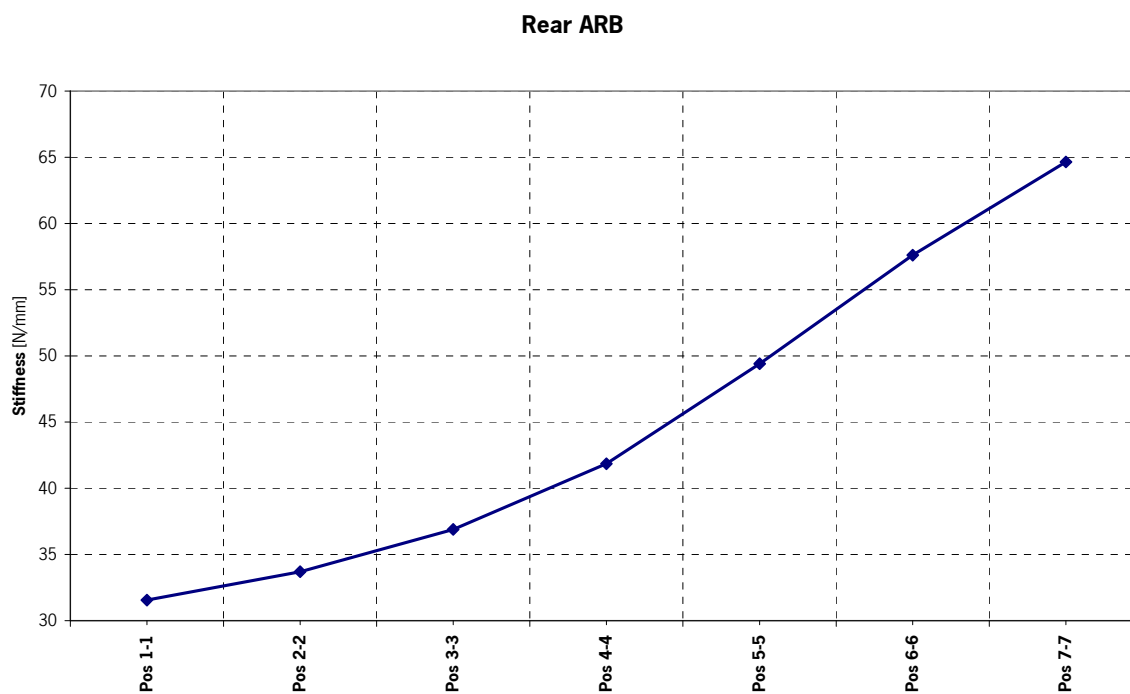


6.2.3. Rear anti-roll bar

The rear anti-roll bar has a 7 position adjustment range on both sides, each position results in the blade being adjusted by an angle of 15°. The maximum stiffness of the anti-roll bar is achieved when the blade is aligned parallel to the anti-roll bar link. The minimum stiffness is achieved when the blade is aligned at 90° (Pos 1-1) to the anti-roll bar link.

Always use suitable tools to rotate the blade as incorrect tools can cause damage. Notches or other damage can cause the blade to break.

In the following diagram the component stiffness of the rear ARB dependent on blade position is represented:



6.2.4. Driveshafts

It is recommended that new cars and/or newly fitted driveshafts should be run-in for approximately 100 km at a maximum speed of 200km/h at low torque.



- **Only use HT1LF grease to repack the joints when servicing the driveshafts**
- **Used driveshafts must not be exchanged fromt the left to the right and vice versa**
- **Tightening torque: 92 Nm (gearbox flange)**
- **Maximum running time: 30 hrs**

Grease quantity outer joint: 90 g

Grease quantity inner joint: 100 g

Porsche part number: 000.043.110.01

6.3. Basic wheel alignment



In the event of an accident or any other damage occurring to the suspension every component, including those not directly affected, should be measured, checked for cracks and, where necessary, replaced (e.g. steering, wishbones, uprights, ball-joints, centre lock wheel nuts and all fasteners).

The wheel alignment should be carried out using an optical and/or electronic or mechanical suspension alignment device. The measurement procedure described in the device operating instructions should be followed.

Electronic suspension alignment devices can be purchased from the following company:

Beissbarth GmbH
Hanauer Straße 101
D-80993 München
Telephone: +49-(0)89-14901-0
Telefax: +49-(0)89-14901-285
www.beissbarth.com



Porsche Motorsport parts sales offers a cord alignment tool:
997.450.351.90

Bracket front left: 997.450.561.90

Bracket front right: 997.450.562.90

The following points must be followed before alignment can begin:

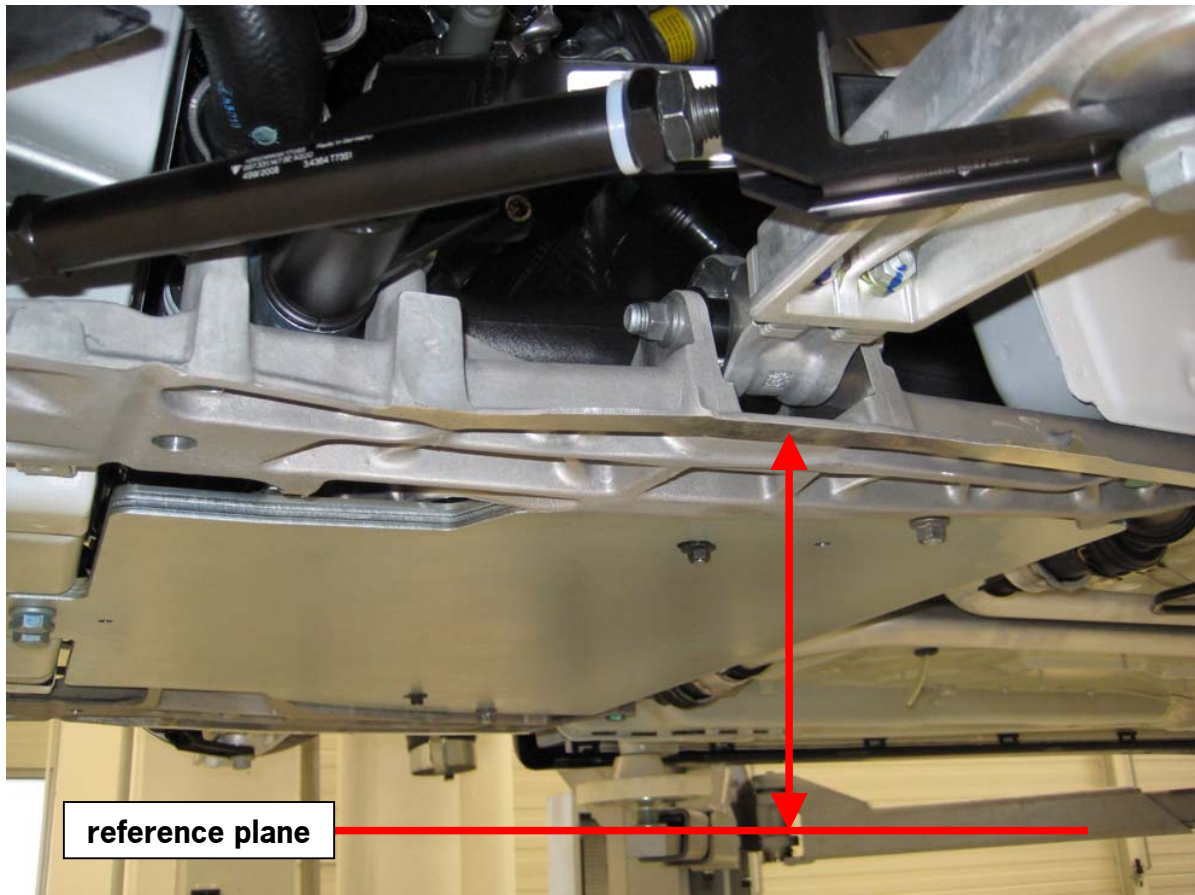
- Set the front and rear tyre pressures to hot running pressure, if set-up wheels are used their dimensions must correspond with the tyre dimensions at the relevant tyre pressure
- Measure the wheel alignment, including camber, toe-in, ride height and corner weights with the fuel cell half full and the appropriate driver ballast placed in the driver's seat.
- Put the car on the corner-weight scales.
- The suspension spherical bearings and wheel bearing play must be checked (wheel bearing play cannot be adjusted) and replaced where necessary.
- Place all four wheels on the swivel plates.
- Lock the steering in the straight ahead position. Check that the steering wheel lock from left to right is equal when the steering wheel is in the straight ahead position.
- Measuring wheels: See parts catalogue



6.3.1. Front axle

6.3.1.1. Ride height

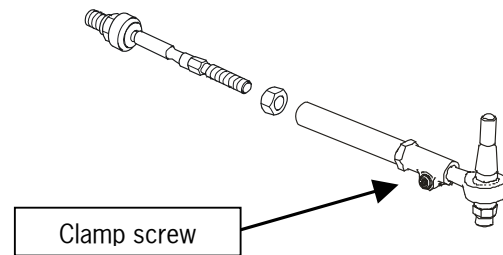
The car must be placed on a level surface (set-up platform) to check the ride height. The front and rear suspension should be loaded and unloaded (compressed) several times to allow the suspension to settle.



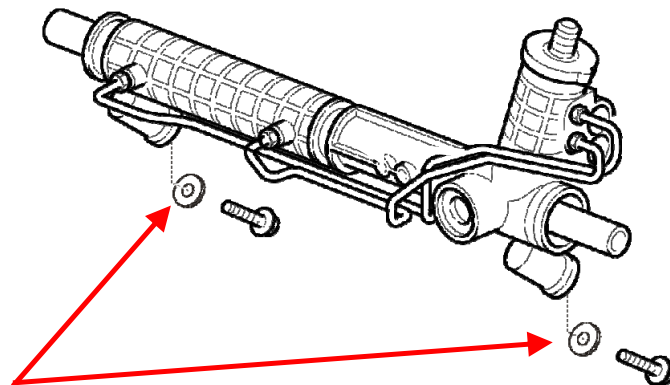
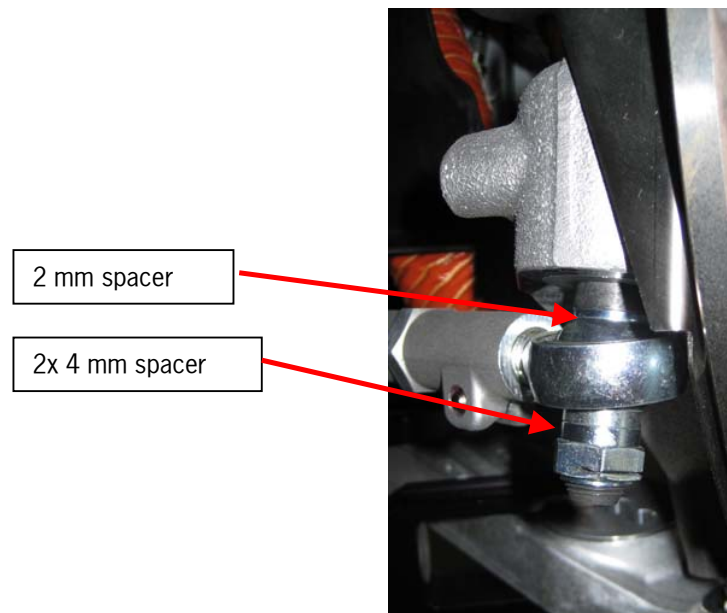
The ride height is adjusted by rotating the lower spring platform.

6.3.1.2. Toe

The toe-rod length can be set using the clamping screw.



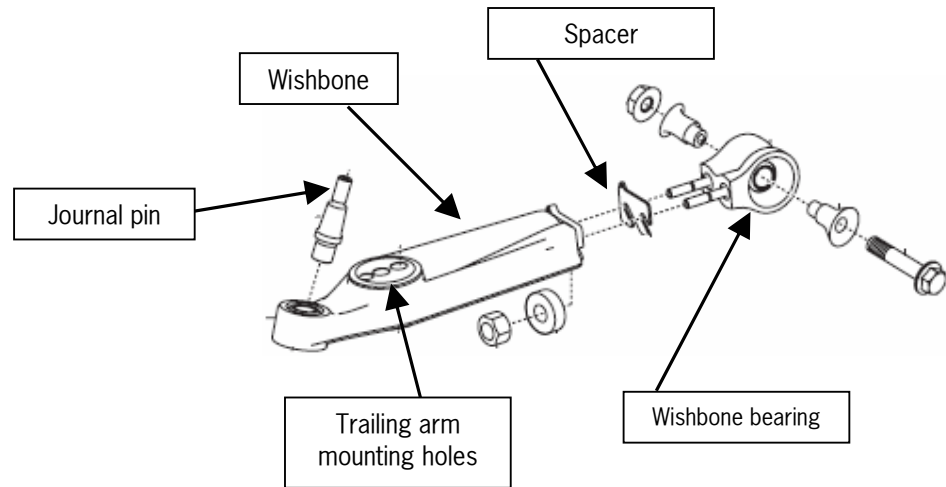
Porsche Motorsport provides a special tool to remove the trunnion pin:
997.450.349.9B



The steering gear is shimmed on the two mounting points by a 3 mm shim. It is not allowed to remove the shim.

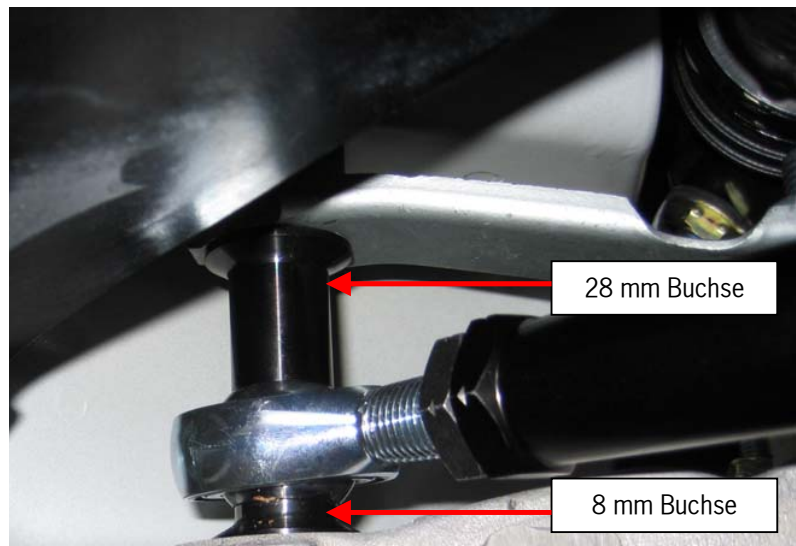
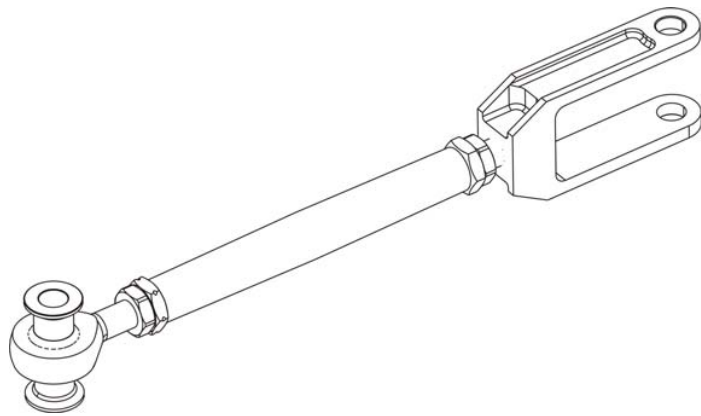
6.3.1.3. Camber

The front wishbone can be adjusted as follows:



- Spacers: The wishbone length can be adjusted using different spacers, a 1 mm adjustment in length equates to a camber change of approximately 13'.
- Trailing arm mounting hole: The mounting position of the trailing arm should not be changed (wheel clearance)
- Porsche Motorsport provides a special tool to remove the trunnion pin: 997.450.345.9B)

6.3.1.4. Trailing arm



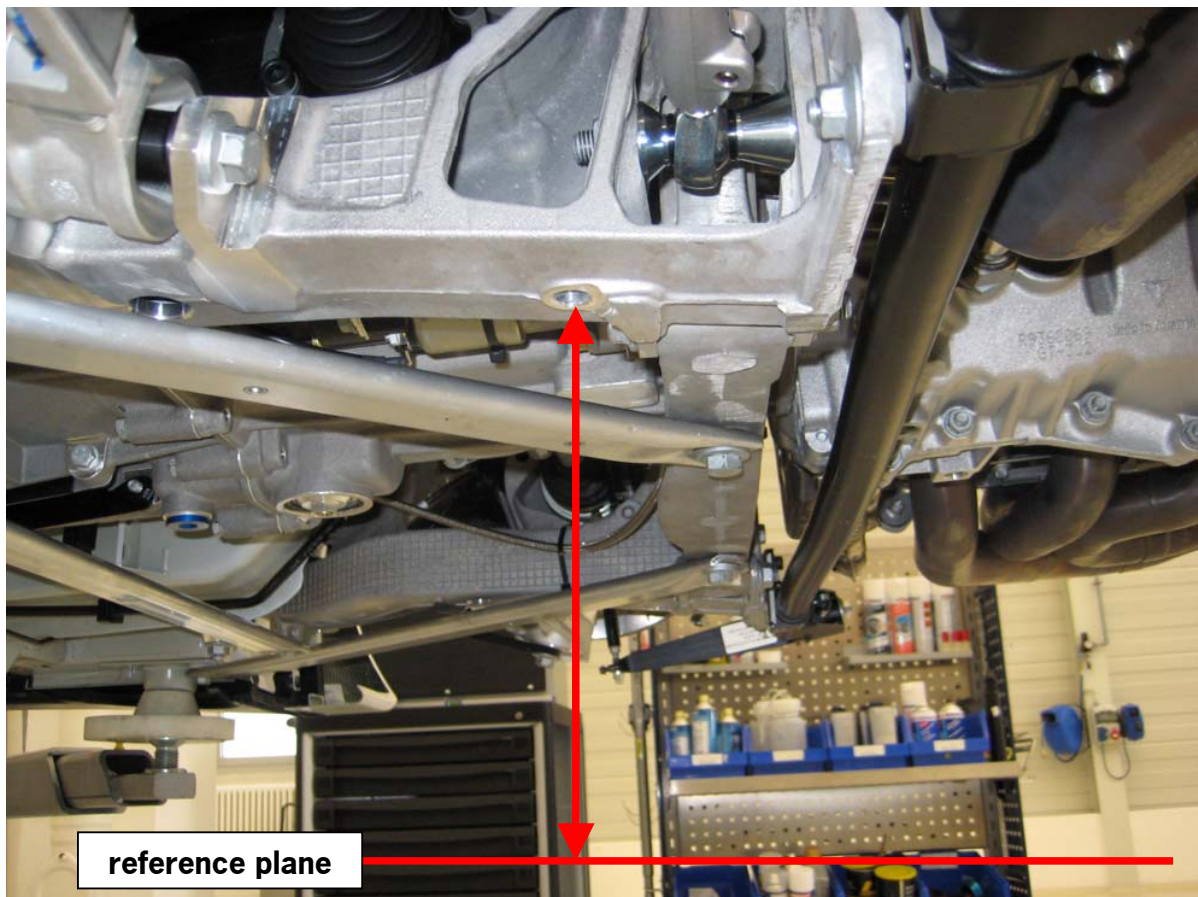
6.3.1.5. Upper mount

The upper-mount position can be adjusted by using the slots in the car body.

6.3.2. Rear axle

6.3.2.1. Ride height

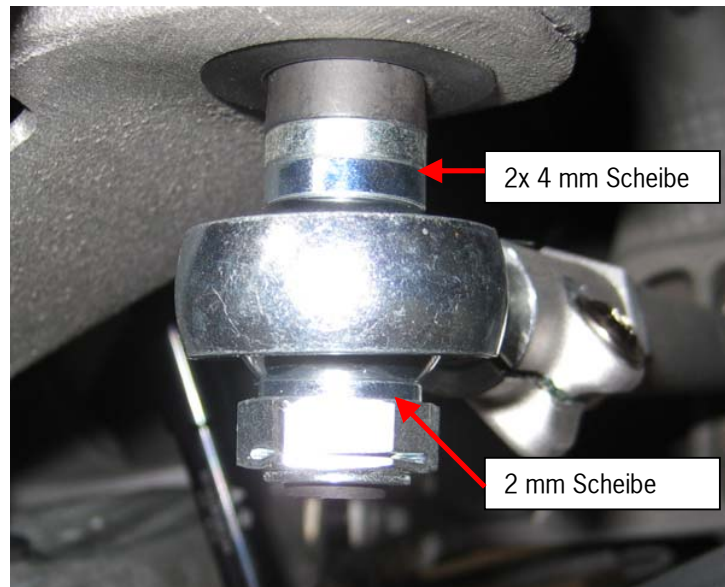
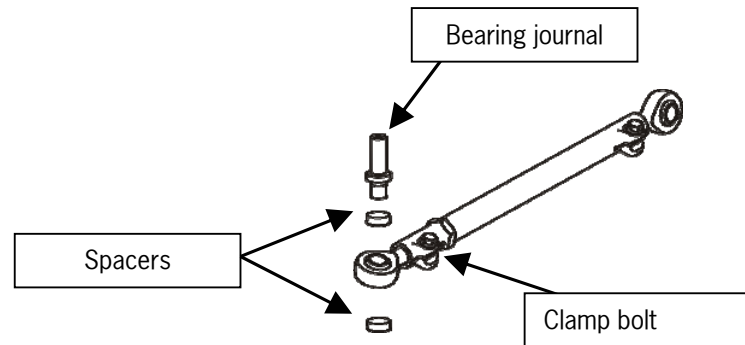
The car must be placed on a level surface (set-up platform) to check the ride height. The front and rear suspension should be loaded and unloaded (compressed) several times to allow the suspension to settle.



Ride height adjustment is made by rotating the spring perch.

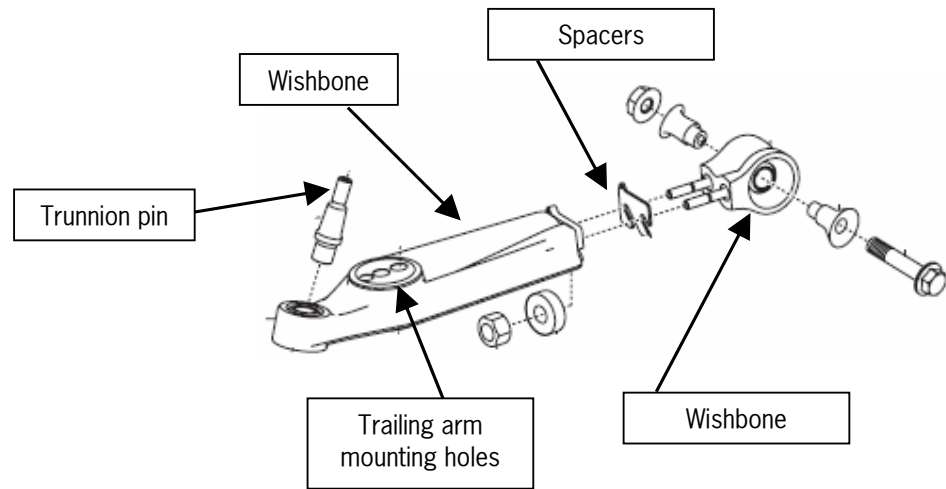
6.3.2.2. Toe

The length of the toe-rod can be adjusted using the clamp bolt.



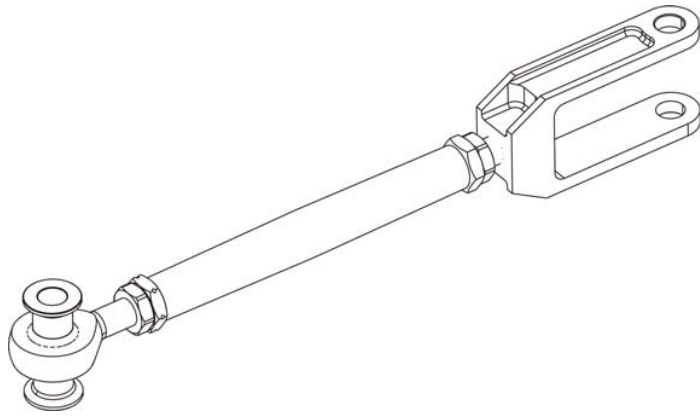
6.3.2.3. Camber

The rear lower-wishbone can be adjusted as follows:

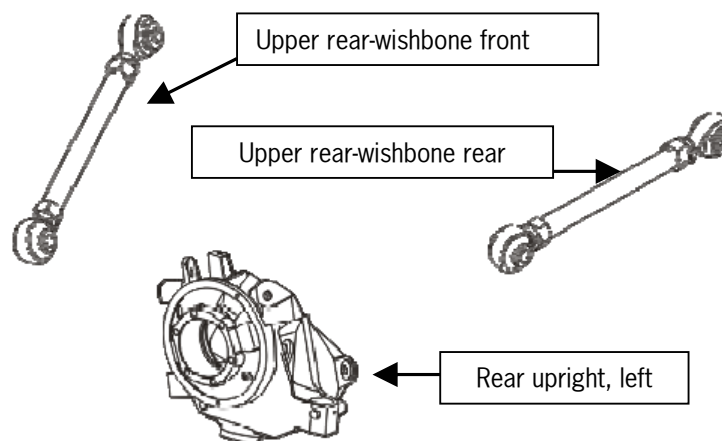


- Spacers: The wishbone length can be adjusted using different spacers, a 1 mm adjustment in length equates to a camber change of approximately 10'.
- Trailing arm mounting hole: The mounting position of the trailing arm should not be changed (wheel clearance)
- Porsche Motorsport provides a special tool to remove the trunnion pin: 997.450.345.9B

6.3.2.4. Trailing arm



6.3.2.5. Upper wishbone



6.3.3. Summary of suspension geometry adjustment components

	Front	Part number	Rear	Part number
Lower wishbone				
+ spacer shims [mm]	10	996.341.543.95	10	996.341.543.95
	7	996.341.543.93	7	996.341.543.93
	3	996.341.543.92	3	996.341.543.92
	2	996.341.543.91	2	996.341.543.91
	1	996.341.543.90	1	996.341.543.90
	0,8	996.341.543.98	0,8	996.341.543.98
	0,6	996.341.543.97	0,6	996.341.543.97
	0,3	996.341.543.96	0,3	996.341.543.96
+ trunnion pin [mm]	76	997.341.413.9H	80	997.341.413.9J
Trailing arm				
+ Bushings [mm]	28	997.331.567.9A	28	997.331.567.9A
Shifting: 10 mm	8	997.331.567.9E	8	997.331.567.9E
Toe rod				
+ spacer shims [mm]	4	997.347.235.9B (2x)	4	997.347.235.9B (2x)
	2	997.347.235.9A	2	997.347.235.9A

6.3.4. Suspension set-up

The basic settings for the suspension are listed in the following table. These settings can be used as the basic set-up for the majority of race tracks.

Performance Setup				
		Front left / right	Rear left / right	Remark
Ride Height		67 mm	87 mm	
Camber		-4° 20'	-3° 30'	
Toe		0' / 0'	+14' / +14'	single toe
Main spring	Type	lilac	green	
	Position	1	3	1= soft 4=stiff
Helper spring		40-60-30	60-60-50	
Bumpstop		35 mm	16 mm	
Damper setting	Bump	6	9	
	Rebound	6	10	
Anti roll bar		2/2	4/4	1= soft 7=stiff
Length trailing arm		362 mm	372 mm	
Length upper wishbone			front 261 mm rear 255 mm	

Due to transportation purposes the delivery setup of the car does not match with the recommended performance setup.

Delivery Setup				
		Front left / right	Rear left / right	Remark
Ride Height		85 mm	110 mm	
Camber		-3° 50'	-3° 00'	
Toe		0' / 0'	+14' / +14'	single toe
Main spring	Type	lilac	green	
	Position	2	3	1= soft 4=stiff
Helper spring		40-60-30	60-60-50	
Bumpstop		35 mm	16 mm	
Damper setting	Bump	6	9	
	Rebound	6	10	
Anti roll bar		4/4	6/6	1= soft 7=stiff
Length trailing arm		362 mm	372 mm	
Length upper wishbone			front 261 mm rear 255 mm	

6.4. Working on the suspension

6.4.1. Changing wheel bearings

Follow the following points when changing defect wheel bearings:

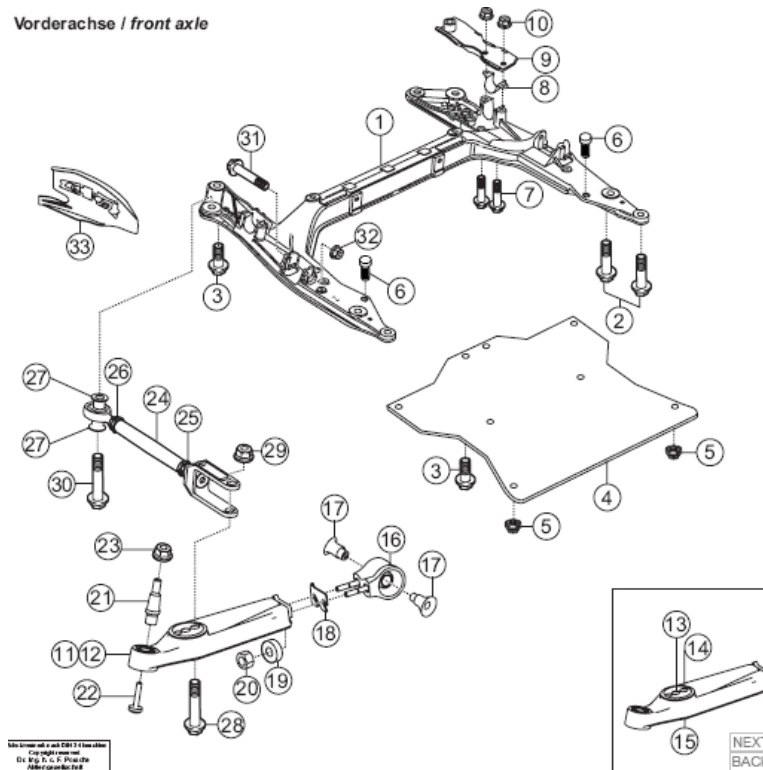
- Heat the upright to 110°C to remove or fit the wheel bearing
- Press the wheel bearing out of the upright
- Put the wheel bearing in by hand
- It should be noted that the wheel bearing sits correctly on the wheel bearing seat in the upright after being pushed in
- Tighten the wheel bearing cover to the stipulated torque
- A maximum of one wheel bearing change per upright (bearing seat) recommended by Porsche Motorsport



Re-tighten the wheel bearing cover to the stipulated torque after approximately 200 km.

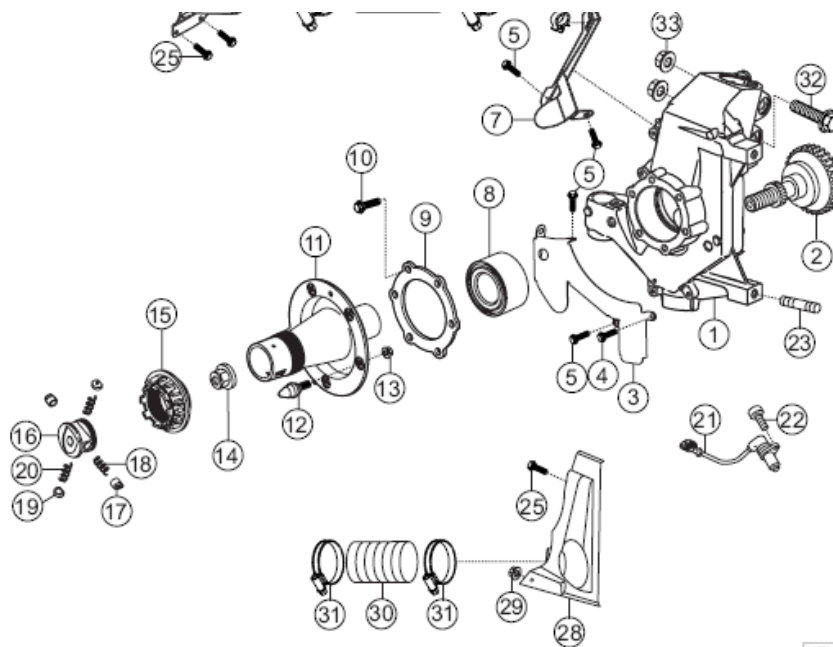
6.5. Tightening torques suspension

6.5.1. Front axle



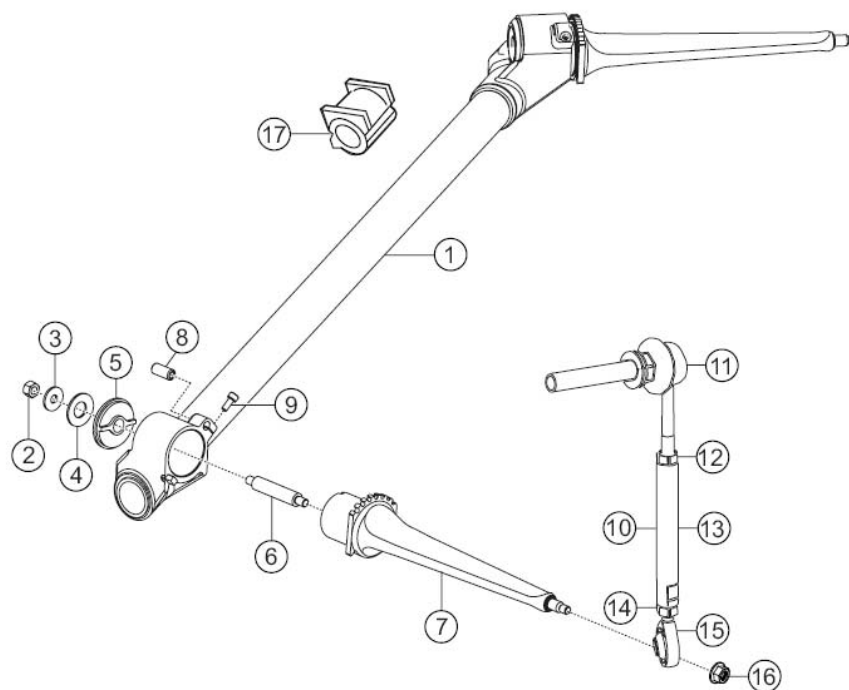
Position	Dimension	Tightening Torque [Nm]
2	M14 x 1.5 x50	160
3	M12 x 1.5 x30	100
5	M12 x 1.5	100
10	M10 x 1.5	65
20	M8	25
22	M8	45 with Loctite 243
23	M12 x 1.5	75 (replace after dismounting)
29	M14 x 1.5	160
30	M14 x1.5x120	160
31	M12 x 95 10.9	110
32	M12	110

6.5.2. Front upright



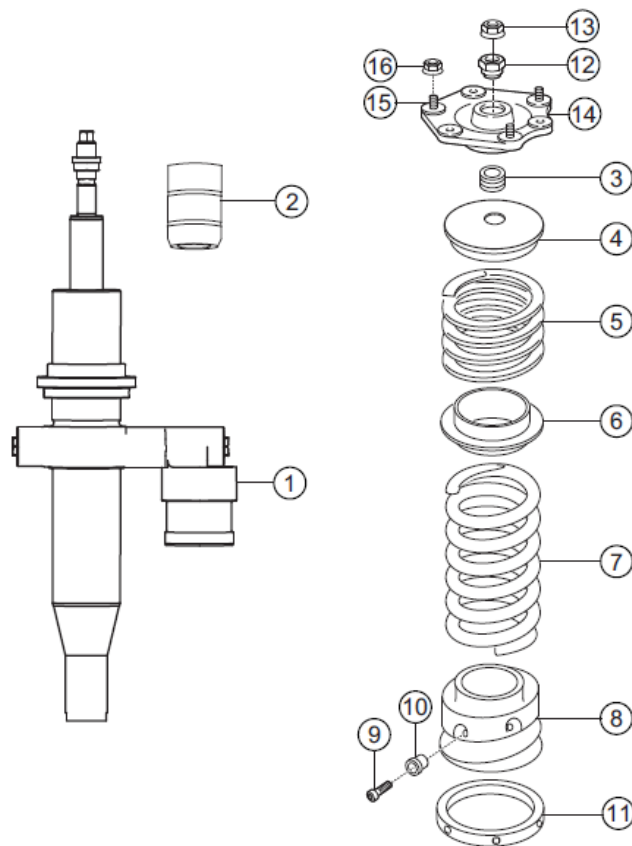
Position	Dimension	Tightening Torque [Nm]
2	Copper paste thin on: thread, gearing, front side	
4+5	M6 x 16 8.8	10
10	M8 x 35 10.9	37
11	Grease hub with longtime grease	
13	M8	31 with Loctite 270
14	470 (retighten after 100 km when reassembled), Copper paste on contact surface	
15		500 + 25
22	M6 x 16	10
23	Exchange after disassembling	
25	M6 x 12	10
29	M6	10
33	M12	75, must not be exceeded

6.5.3. Anti roll bar front



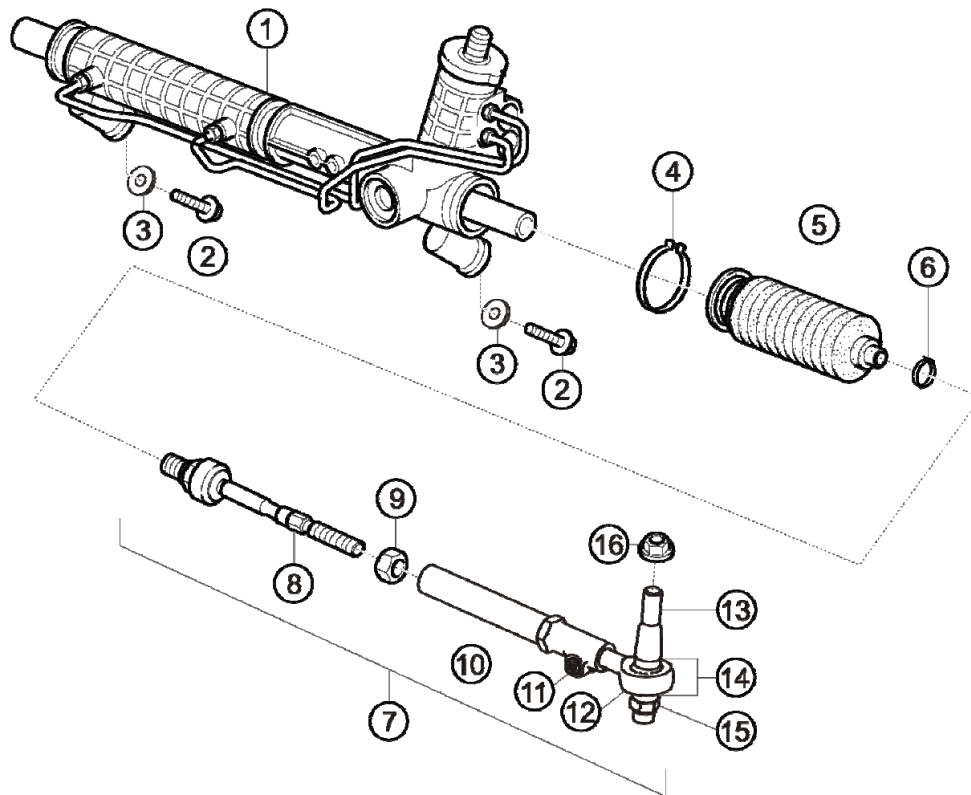
Position	Dimension	Tightening Torque [Nm]
2	M6	10
11	M10	50
12	M8 LH	23
14	M8	23
16	M6	10

6.5.4. Suspension strut front



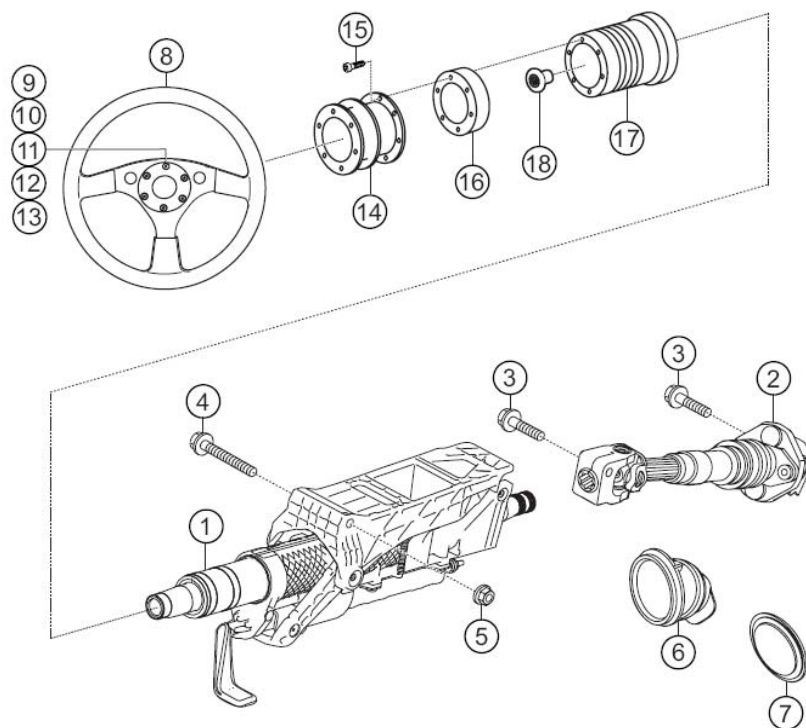
Position	Dimension	Tightening Torque [Nm]
9	M6 x 12	10
12	M8	75
13	M14	40
16	M8	35

6.5.5. Steering gear



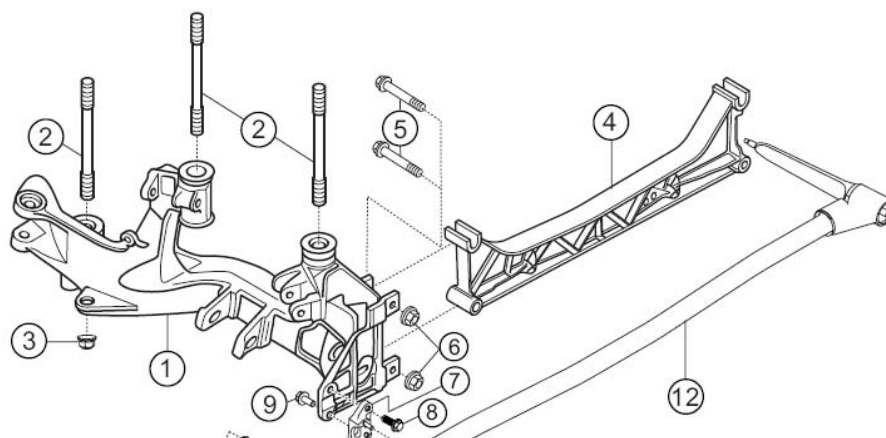
Position	Dimension	Tightening Torque [Nm]
2	M10 x 45 10.9	70
8	M18 x15	90 (track rod on steering gear)
9	M14 x 1,5	50
11	M6 x 20	10
15	M14 x 1,5	75
16	M12 x 1.5 10.9	75 (replace after dismounting)

6.5.6. Steering column



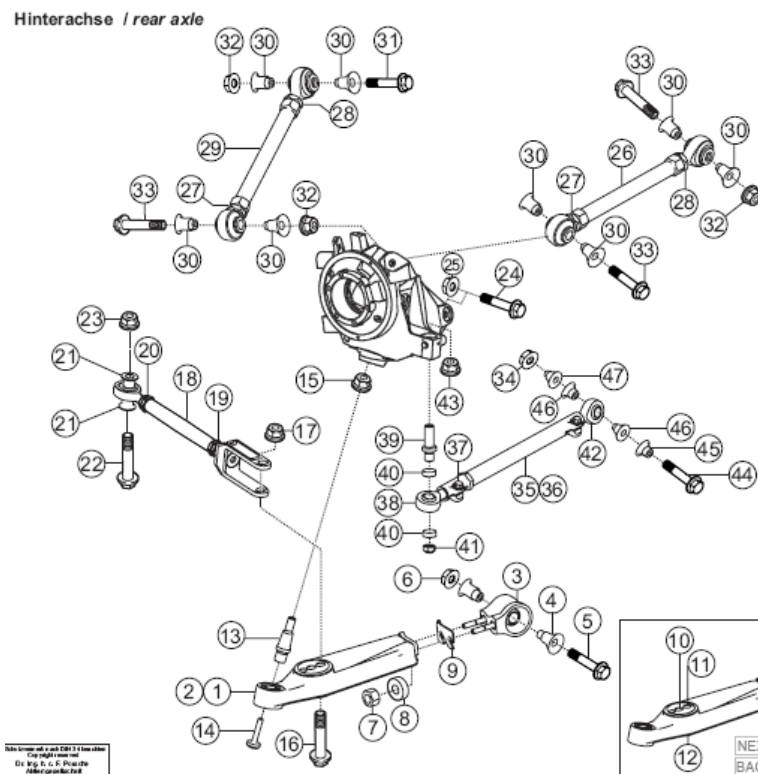
Position	Dimension	Tightening Torque [Nm]
3	M8 x 35 10.9	37
5	M10	46
11	M5	8
15	M5 x 35	5
18	M16 x 1.5	50 +5

6.5.7. Side part rear



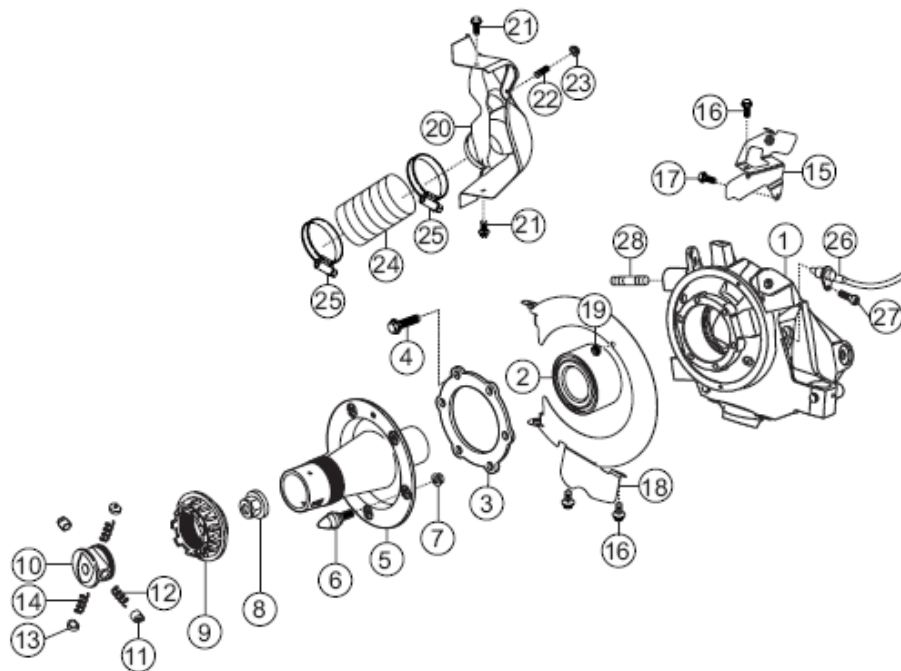
Position	Dimension	Tightening Torque [Nm]
2	M12 x 97	75 with Loctite 270
3	M12 x 1.5 10.9	110
5	M12 x 80	110
6	M12 x 1.5	110

6.5.8. Rear axle



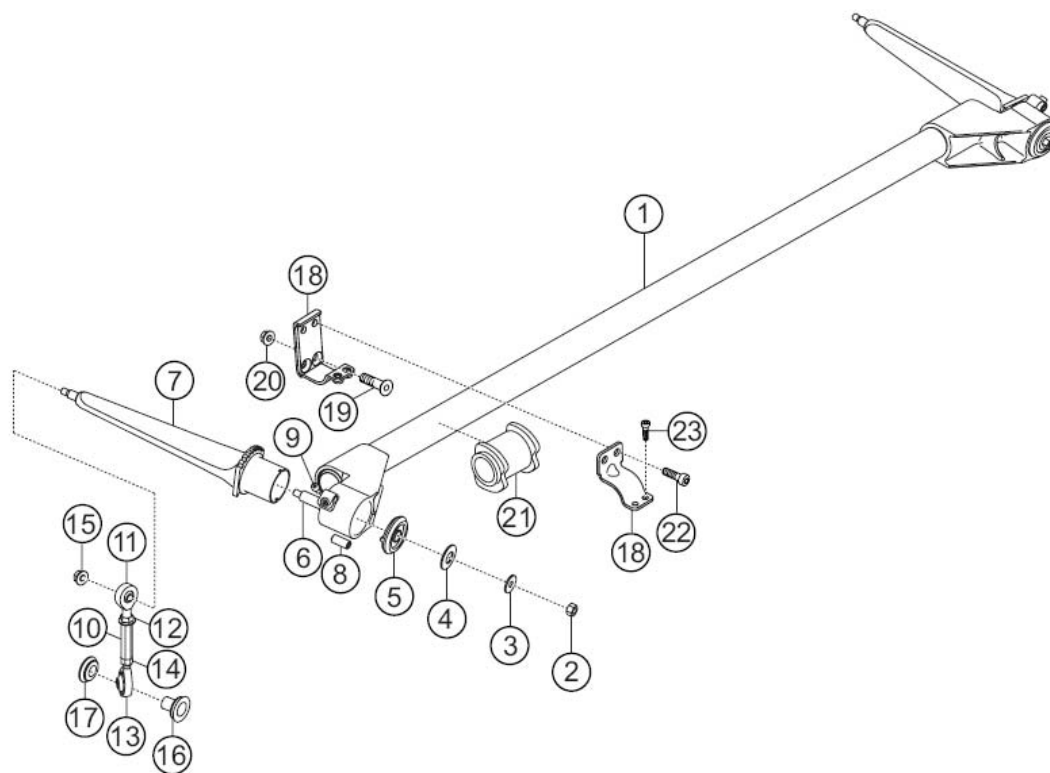
Position	Dimension	Tightening Torque [Nm]
6	M12	100
7	M8	25
12	M5	8
14	M8	45 with Loctite 243
15	M12 x 1.5	75 (replace after dismounting)
17	M14 x 1.5	160
23	M14 x 1.5	160
25	M12	75
32	M12x1.5	110
33	M12 x 70	110
34	M12 x 1.5	110
37	M6 x 20	10
41	M14 x 1.5	75
43	M12	75 (replace after dismounting)

6.5.9. Upright rear



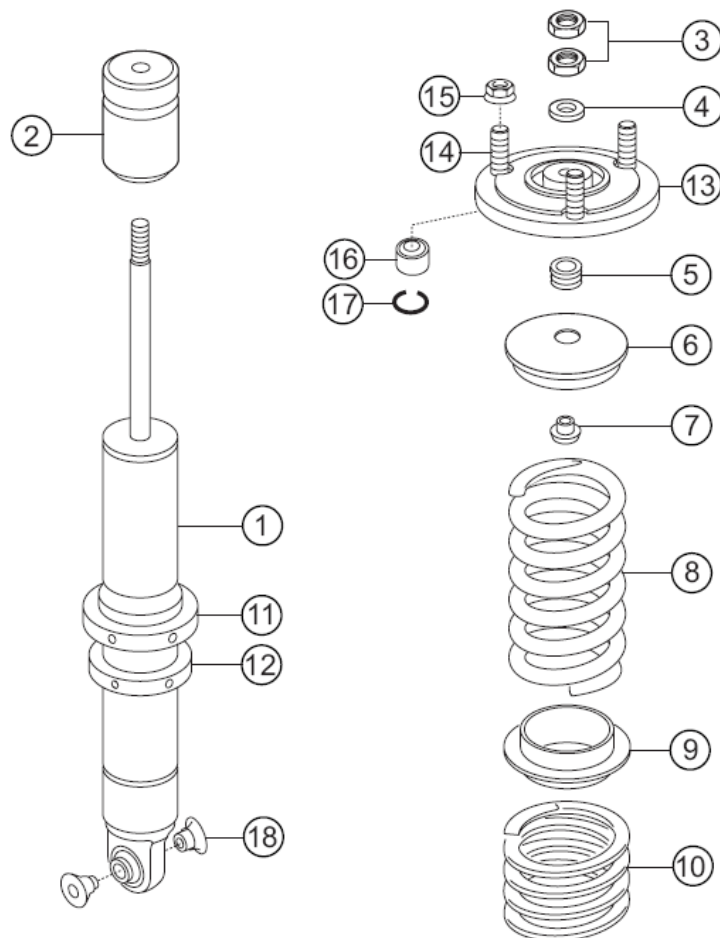
Position	Dimension	Tightening Torque [Nm]
4	M8 x 35	37
7	M8	31 with Loctite 270
5	Grease hub with longtime grease	
8	470 (retighten after 100 km when reassembled), Copper paste on contact surface	
9		500 + 25
16	M6 x 16	10
17	M6 x 12	10
27	M6 x 16	10
28	Replace after disassembling → microcapsulated	

6.5.10. Anti roll bar rear



Position	Dimension	Tightening Torque [Nm]
2	M6	10
9	M4 x 10	2
12	M8 LH	25
14	M12	46
15	M6	10
20	M8	25
22	M8 x 25	25
23	M6 x 12	10

6.5.11. Suspension strut rear



Position	Dimension	Tightening Torque [Nm]
3 upper	M12 x 1	35
3 lower	M12 x 1	40
15	M10	46

6.6. Sachs damper service information

Service partners for Germany:

ZF Sachs Race Engineering GmbH

Ernst-Sachs-Straße 62

97424 Schweinfurt

Phone +49 9721 983258

Fax: +49 9721 984299

Gallade Technologiezentrum am Nürburgring

Rudolf-Diesel-Straße 11 – 13

53520 Meuspath

Phone +49 2691 9338-54

Fax +49 2691 9338-50

Service partner for the UK:

BG Motorsports Ltd

47 – 48 Silverstone Circuit

Silverstone, Northants NN12 8TN

Phone +44 1327 855200

Fax +44 1327 855201

Service partners for the USA:

ZF Sachs Race Engineering NA

15811 Centennial Drive

Northville, MI. 48168

Phone +1 734 416 6200

Fax +1 734 416 1948



Oceanshore Motorsports

David Glenn

5892 John Anderson Highway

32136 Flagler Beach, FL

Phone +1 386 6731936

Fax +1 386 6731184

Service partner for Asia:

Enable Inc. Technical center

1 – 36 Ootsuzaki Ogakie-cho

Kariya-shi, Aichi-ken, 448-0813

Japan

Phone +81 566 62 86 05

Fax +81 566 62 86 07

After 2,500 km the dampers should be overhauled.

7. Wheels

The following three-piece wheels are supplied with the car:

Front axle:	BBS 10.9 x 18" offset 35 mm Tyre dimensions: 27/65-18 (rain tire)
Rear axle:	BBS 13 x 18" offset 12.5 mm Tyre dimensions: 31/71-18 (rain tire)

Porsche AG strongly recommends that the wheels are cleaned and a comprehensive visual inspection is carried out after every practice session or race.

Check for cracks on both the inner and outer faces of the spokes, damage to the centre lock mating face and deformation to the wheel well and the fasteners. Careful attention should be paid to the mileage of the wheels. Use the collected data to ensure that wheels are used in rotation, therefore ensuring a balanced and even usage and helping to identify early the need for spares.

7.1. Wheel nuts

The aluminium wheel nuts are marked as follows:

Right-hand side of car =	left-hand thread, colour blue
Left-hand side of car =	right-hand thread, colour red

Porsche recommends that the wheel nuts are also changed during a long distance race (after approximately 6 hours running) and to inspect and service them, which means cleaning the thread, visual inspection and re-grease with Klüber Nontrop RB3 999.917.507.00. Furthermore, the contact surface nut - rim should be greased.

Wheel nut tightening torque **500+25 Nm**



Please check the setting (tightening torque) of the wheel gun. Tests have shown that the centre-lock threads can be damaged if the wheel gun is incorrectly set. The above mentioned procedure must be strictly adhered to. A control test must also be carried out to ensure that the required tightening torque is also achieved (also different wheel guns supplied by a different manufacturer and specification).

Two different wheel guns are necessary for both vehicle sides. Source of supply:

Paoli
Dino Paoli S.r.l.
Via Guido Dorso 5
42100 Reggio Emilia
Italy

Tel: +39 0522 300 828
Fax: +39 0522 304 864
www.dinopaoli.com
E-Mail: info@dinopaoli.com

The smooth operation of the wheel safety-mechanism integrated in the centre lock must be checked.

8. Brake system

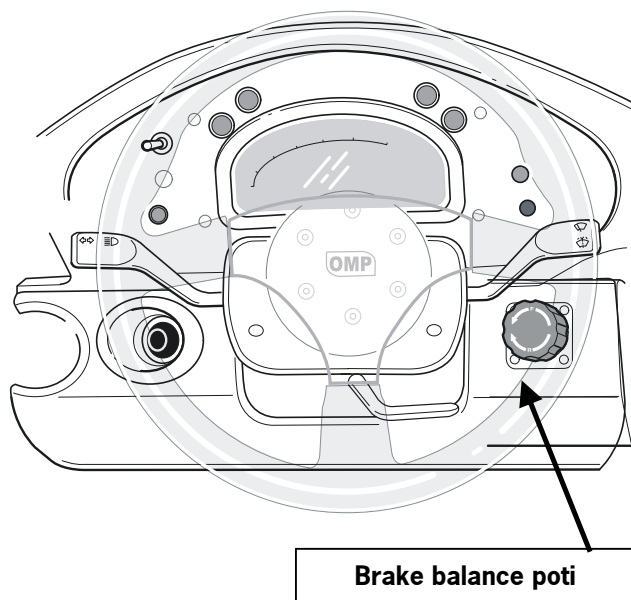
The GT3 Cup is fitted with a dual circuit brake system incorporating two separate brake master cylinders. The front to rear brake balance ratio is set by rotating the brake balance knob.

8.1. Technical data brake system

	Front axle	Rear axle
Master cylinder	AP CP2623	AP CP2623
Master cylinder diameter [mm]	19.1	17.8
Brake disk diameter [mm]	380	355
Brake disk thickness [mm]	32	32
Brake pad	Pagid RS 19 (gelb)	Pagid RS 19 (gelb)
Pad thickness [mm]	22	22
Brake caliper	6 piston	4 piston
Brake caliper piston diameter [mm]	38 / 30 / 28	35, 28
Brake fluid	Endless RF - 650 Racing Super Fluid	

8.2. Brake force distribution (brake balance)

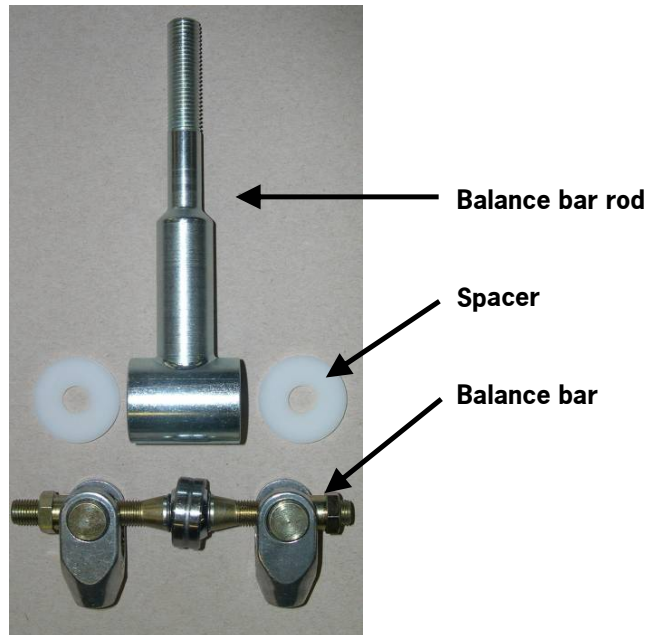
The brake balance adjustment is made via a balance-bar system. The brake balance is adjusted by a potentiometer on the instrument panel.

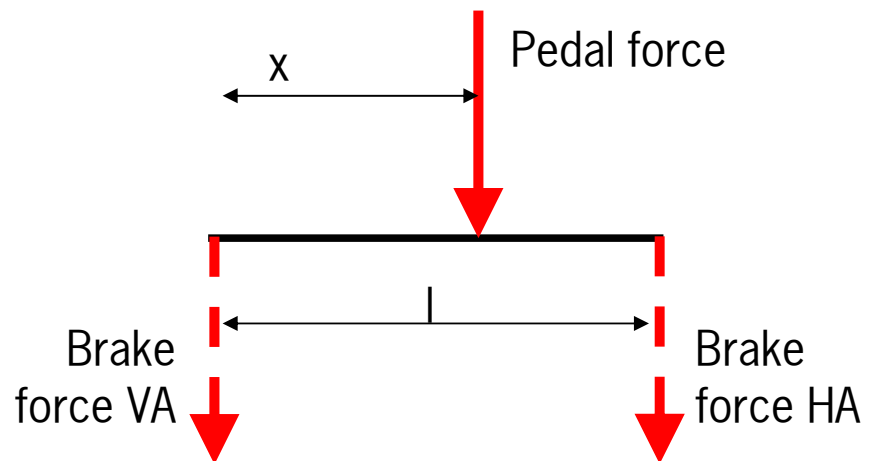


Rotating the brake balance adjuster knob in the “-” direction increases the brake pressure on the rear axle in comparison to the front. In the “+” direction vice versa.

8.2.1. Brake balance system

If the brake balance potentiometer is rotated the lever ratio (dimension x) on the balance bar is adjusted directly by a adjuster cable



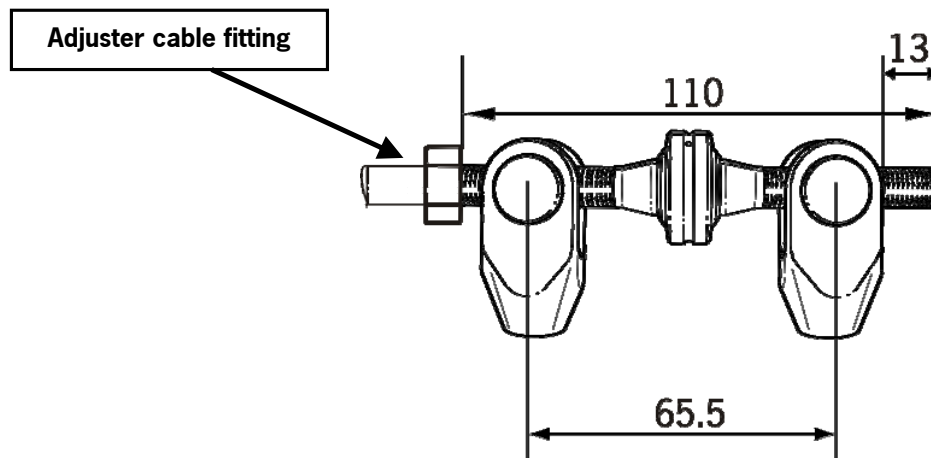


$$brakeforce_rear = \frac{pedalforce \cdot x}{l}$$

$$brakeforce_front = pedalforce - brakeforce_rear$$

8.2.1.1. Basic setting balance bar

The following dimensions must be set in the basic setting (0).

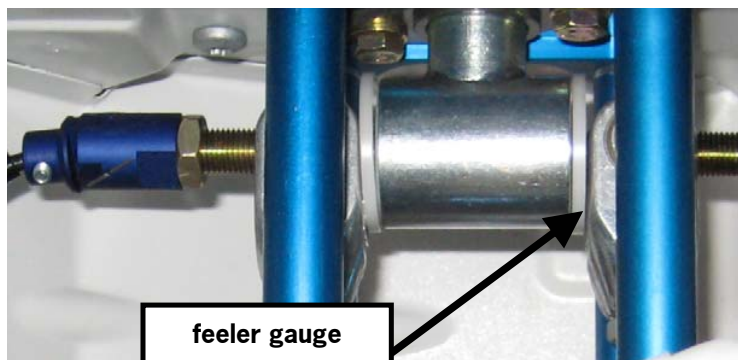




In addition one has to take care for sufficient axial play of the balance bar. Therefore a play of

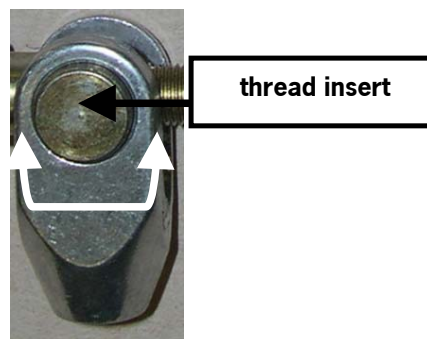
0.9 ... 1.5 mm

between the plastic spacer and the fork end has to be set. The adjustment of the play is performed by altering the difference between the two fork ends. **This play is absolutely necessary to prevent a twisted system. The lever ratios are not affected by this play.**

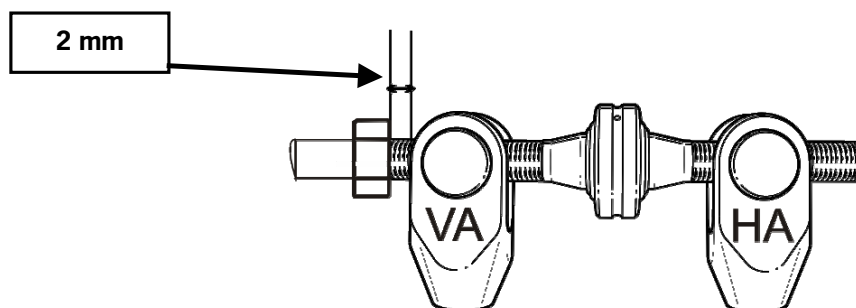


Furthermore, it is possible that the play changes when the balance bar system is mounted on the car. Therefore, the play has to be re-checked when the balance bar system is mounted on the car.

The pitch of the threaded balance bar rod is 1.2 i.e. when the fork end is turned a full revolution the fork end moves 1.2 mm. In case the play can not be set to the defined value the fork end should be removed from the balance bar and the thread insert should be turned 180 deg.



In addition, it should also be noted that with the maximum positive rotation in the anti-clockwise direction (+7) there must be a 2 mm gap between the adjuster cable lock-nut and the front brake master cylinder pushrod clevis to prevent the clevis colliding with the lock-nut.



Under all circumstances avoid the system being fitted with preload. The pushrods of the two master cylinders must be aligned with the blue aluminium rod of the retaining frame.

The pushrod of the two master cylinders must be screwed into the clevis so that the thread is visible.



8.2.1.2. Brake balance potentiometer



- The brake force distribution is shown in the MoTeC-Display (BBIAS) in practice mode
- The adjustment range is from -7 to +7

Pay attention when changing potentiometer:

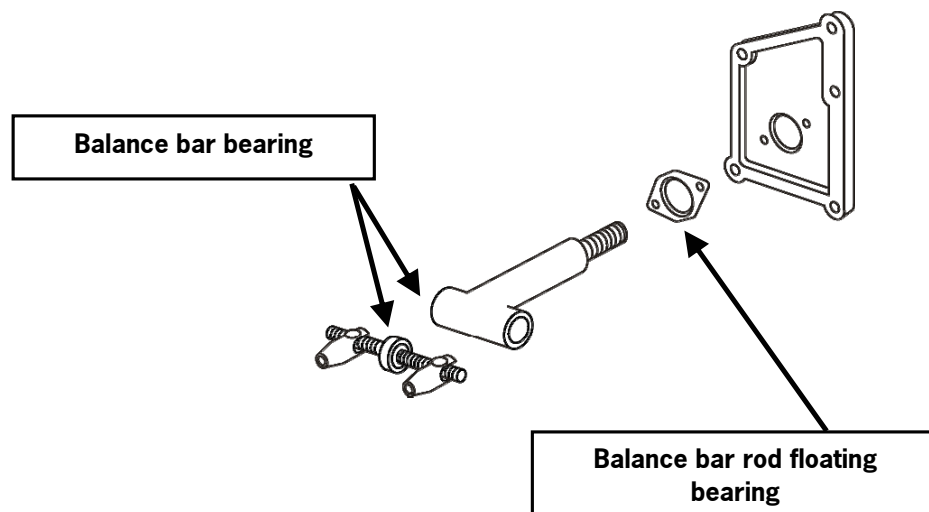
- The potentiometer is preset to "0"
- First remove the transport lock and only adjust the potentiometer when the complete set is fitted to the car and the shaft is mounted to the centralized balance bar
- When doing maintenance work on the balance bar it must be set in the centre position before mounting the adjustment shaft.
- Afterward set the potentiometer in the MoTeC display to "0"
- Do not rotate more than +7 and -7 on the display (the potentiometer does not have a rotation limit and would otherwise be damaged).
- Set unfitted potentiometers to "0" with the MoTeC system before fitting



8.2.1.3. Brake balance system maintenance

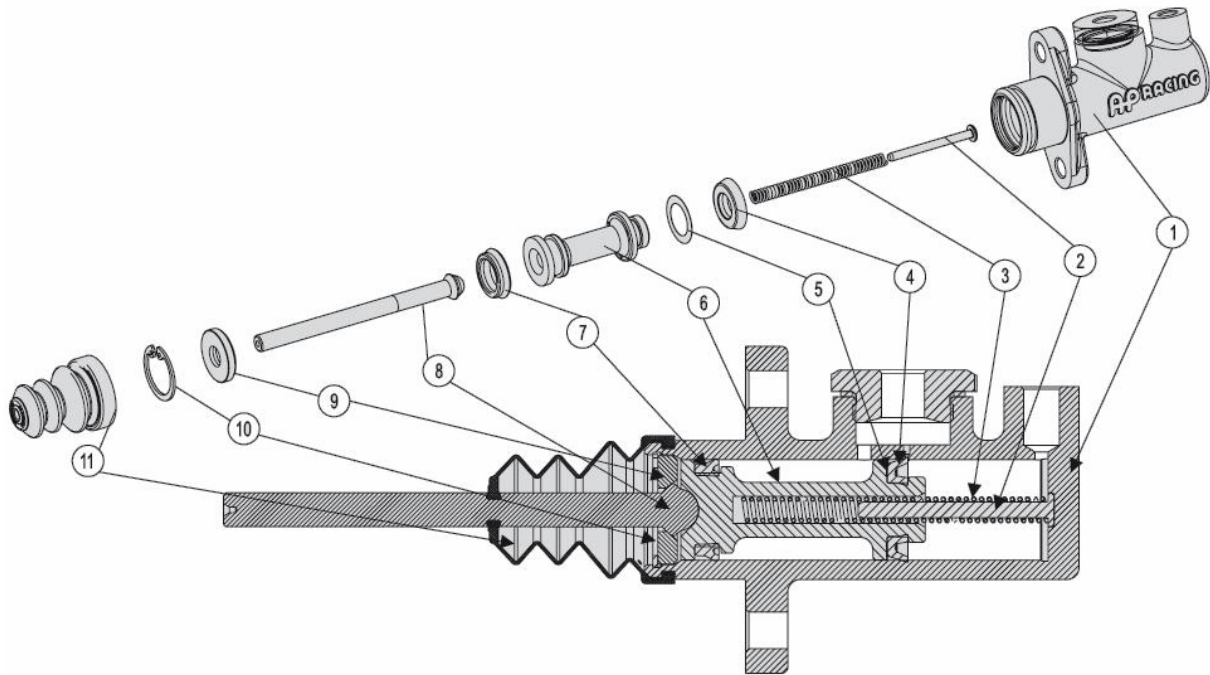
The brake balance system is comprised of many moving parts. In general all joints should be free of friction and no parts should be preloaded when fitted

The following parts in the system should be cleaned and re-greased regularly:



Porsche Motorsport recommends the used of Autol Top 2000 grease.

AP Racing provides a repair kit for the brake master cylinder



The repair kit includes the following parts:

- 4 - Main seal
- 5 - Piston shim
- 7 - Secondary seal
- 10 - Circlip
- 11 - Rubber boot

Repair kit installation:

1. Remove rubber boot -11- and circlip -1
2. Carefully remove the internal components
3. Remove dirt / deposit in the cylinder
4. Coat the cylinder with brake fluid
5. Replace the following parts when rebuilding the master cylinder:
Main seal, piston shim, secondary seal, circlip, rubber boot. While replacing parts make sure that all seals are coated with brake fluid.

8.3. Brake caliper

A 6-piston caliper is used on the rear axle and a 4-piston caliper on the rear.

The caliper pistons are fitted with dust boots. When working on the brake system, such as when changing brake pads, attention should be taken that there is no dirt on the pistons when they are pressed into the caliper body.



Porsche Motorsport provides a repair kit for brake calipers which includes new pistons and seals.

There are two bleed nipples on each brake caliper. If a pressure manometer is connected to the caliper it should be noted that the system including manometer is bled.

8.4. Tightening torques brake system

Component	Bolt dimension	Tightening torque [Nm]
Brake disc to hub	M6 x 12	12 plus Loctite 243
Brake disc to disc bell	M6	10
Brake pipe bracket on subframe	M6 x 16	10
Threaded rod nut Mounting frame Balance bar	M8	15 plus Loctite
Banjo bolt master cylinder		25
Caliper on upright	M10	73
Lock nut clevis brake balance bar	M10	10

9. Chassis



DO NOT under any circumstances modify the roll-cage as its structural integrity will be compromised. **DO NOT** weld additional brackets, or drill holes in the tubes. If in doubt please contact **Porsche Motorsport**.

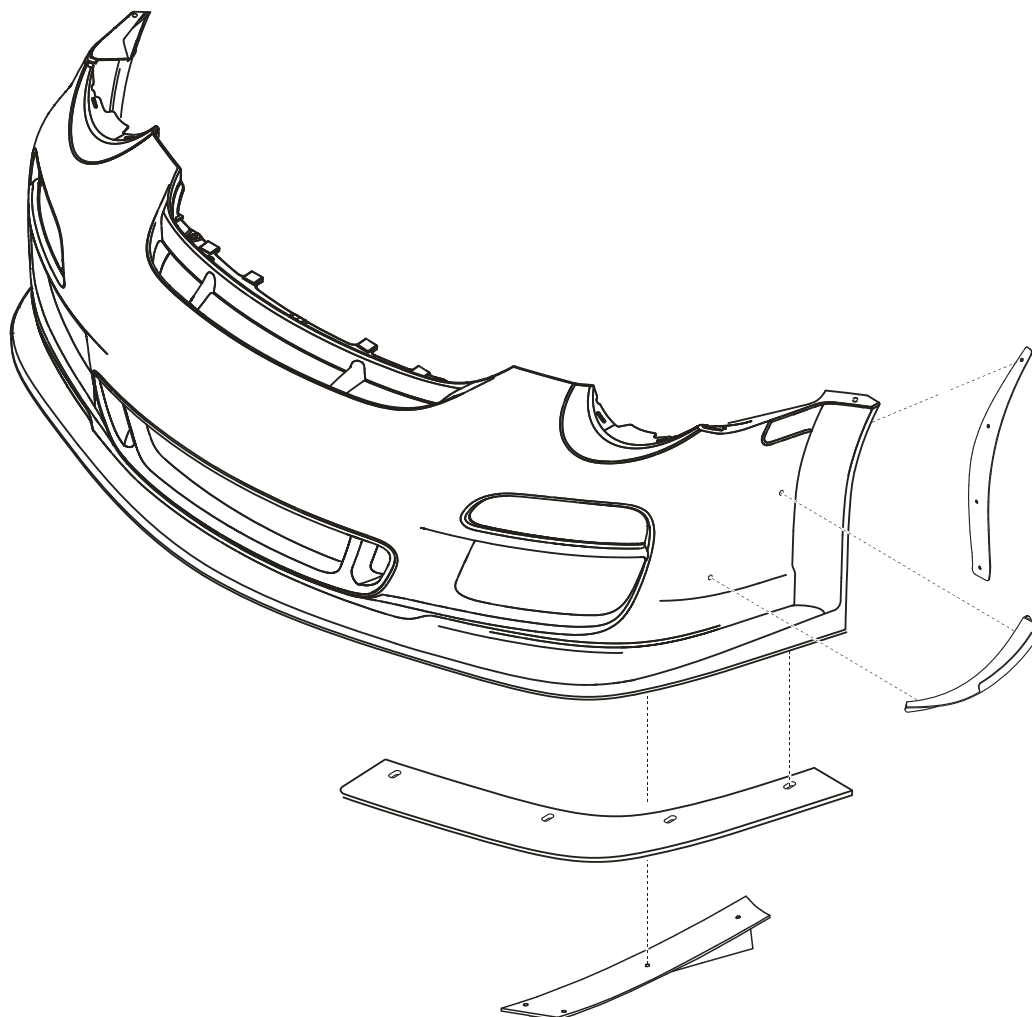
All unnecessary panels and sound proofing materials have been removed to reduce weight.

9.1. Interior

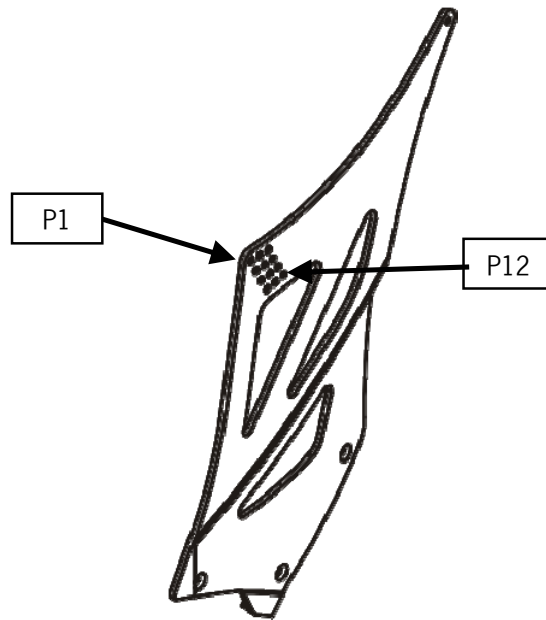
- Removable steering wheel
- Race bucket seat with fire resistant upholstery fabric (only driver side)
- 6-point safety harness

9.2. Exterior

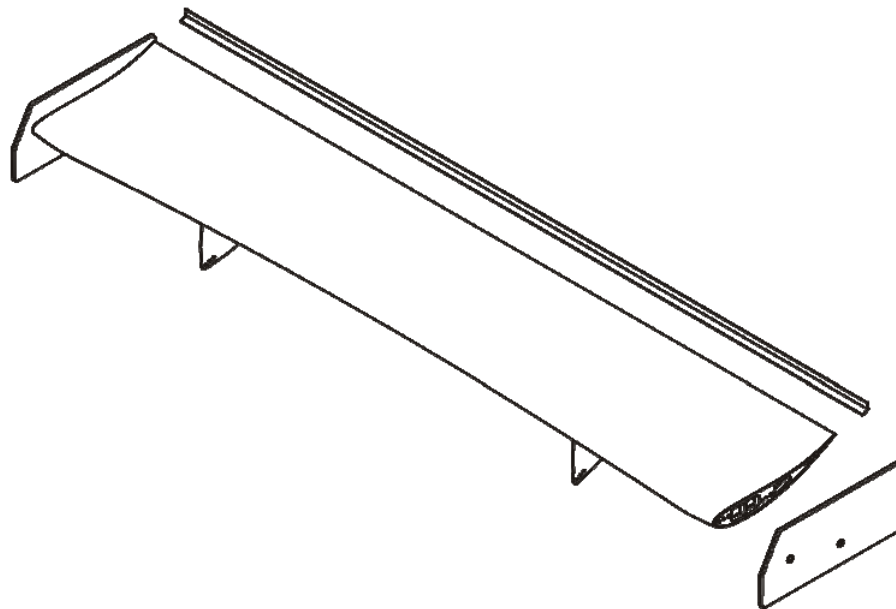
9.2.1. Front bumper



9.3. Rear wing



Left wing support



- Gurney 10mm

9.4. Fire extinguisher system

The car is equipped with an FIA homologated fire extinguishing system using AFFF as extinguishing agent. The extinguishant cylinder has two separate chambers each with a two kilogram capacity. The extinguishing agent is discharged through three nozzles located in the engine bay and a further three located within the cockpit.

The system operates between -15° C and +60°C. The extinguisher cylinder must be protected from frost (remove from vehicle).

The operating pressure of system is 14 bars, and should be checked regularly using the manometer mounted to the extinguisher bottle.



The extinguishing agent, extinguisher cylinder and flexible pipes should be replaced after a maximum of 2 years from the date of manufacture by original spare parts.

9.4.1. Fire extinguisher activation

The extinguisher system is live when the toggle switch on the trigger box is set in the “System Active” position. The extinguisher is discharged by pressing the dash mounted push button and/or the push button in the windshield apron.

9.4.2. Extinguisher system error analysis

Battery check:

- Hold the toggle switch on the trigger box in the "Battery Check" position
- If the battery charge state is good the trigger box warning lamp will blink

Warning lamp does not glow:

- Check battery charge state (refer to 'Battery Installation')
- Check the cable connection to the firing buttons (refer to 'Trigger box wiring harness')
- Check fire button function

Battery installation:

Attention: The toggle switch on the trigger box must be set in the 'System Inactive' position.

- Remove the trigger box cover and change the battery. Ensure that the battery poles are connected correctly. Only Alkaline batteries should be used.

Checking the firing button:

Attention: The toggle switch on the trigger box must be set in the 'System Inactive' position.

- Throw the toggle switch in the luggage compartment
- If the switch is functioning correctly the trigger box warning lamp will glow
- Return the switch to the original position
- Press the dashboard mounted push button
- If the switch is functioning correctly the trigger box warning lamp will glow

Trigger box connection:

The firing button '1' is connected to the terminals '3' and '4', firing button '2' with the terminals '5' and '6'.

Incorrectly connected cables accidentally can fire the extinguisher system.



9.5. Air-jack system

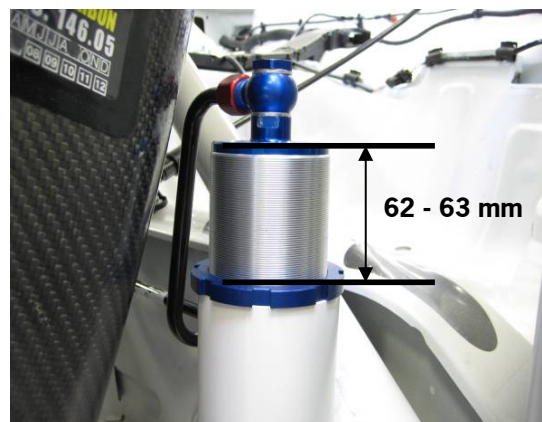


- The exhaust valve must always be open (pulled out) to ensure that the air-jack cylinders are completely retracted when the car is running
- Never work under the car when the car is raised on the air-jack system without the air-jacks being blocked with 'safeties'
- To prevent damage to the air-cylinder end stops never operate the system without the full weight of the car as resistance.
- To let down the car slowly a service valve is mounted to the rear right air-jack.
- **Max pressure. Operating pressure approximately 35-38 bar**
- The rear right airjack contains an over pressure valve
- Never use mineral oil based cleaning agents
- Never open the air jacks: There is residual pressure in the system even when jacks are retracted!
- Porsche Motorsport recommends that the system is overhauled after 2000 lifts or two years
- The torque setting for the grooved nut (air-jack fixed mount) must be checked during the standard maintenance procedure

Torque setting grooved nut rear $45 \pm 5 \text{ Nm}$

Torque setting grooved nut front $45 \pm 5 \text{ Nm}$

See picture below for position of rear air-jack in the mounting tube



- If a loose or incorrectly tightened air-jack is discovered this must be changed immediately
- Please refer to the manufacturer's product description (Krontec) for further safety measures

KRONTEC

Maschinenbau GmbH

Pommernstraße 33

D - 93073 Neutraubling

www.krontec.de

9.5.1. Car lift system



Never use a third party product as this can lead to damage to the air-jack cover or piston tube.

10. Electric

10.1. Alternator

- TAG 140 A

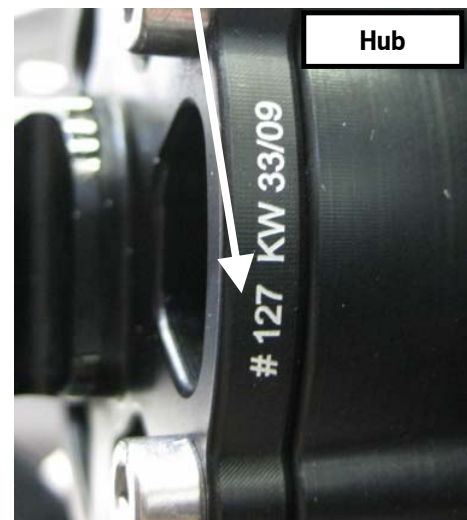
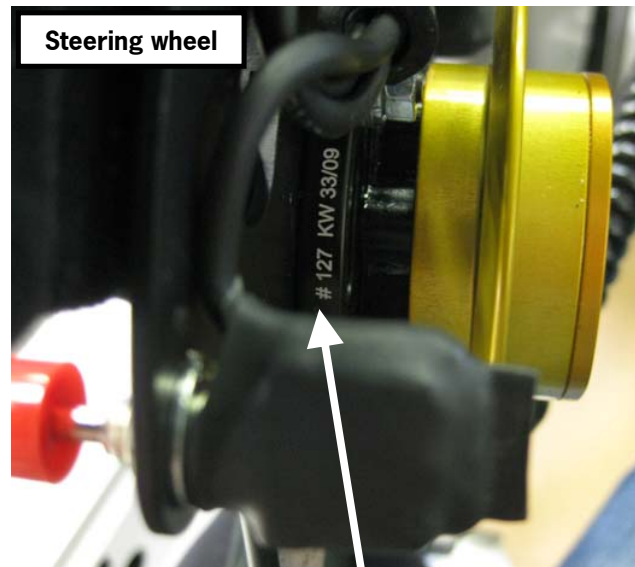
10.2. Battery

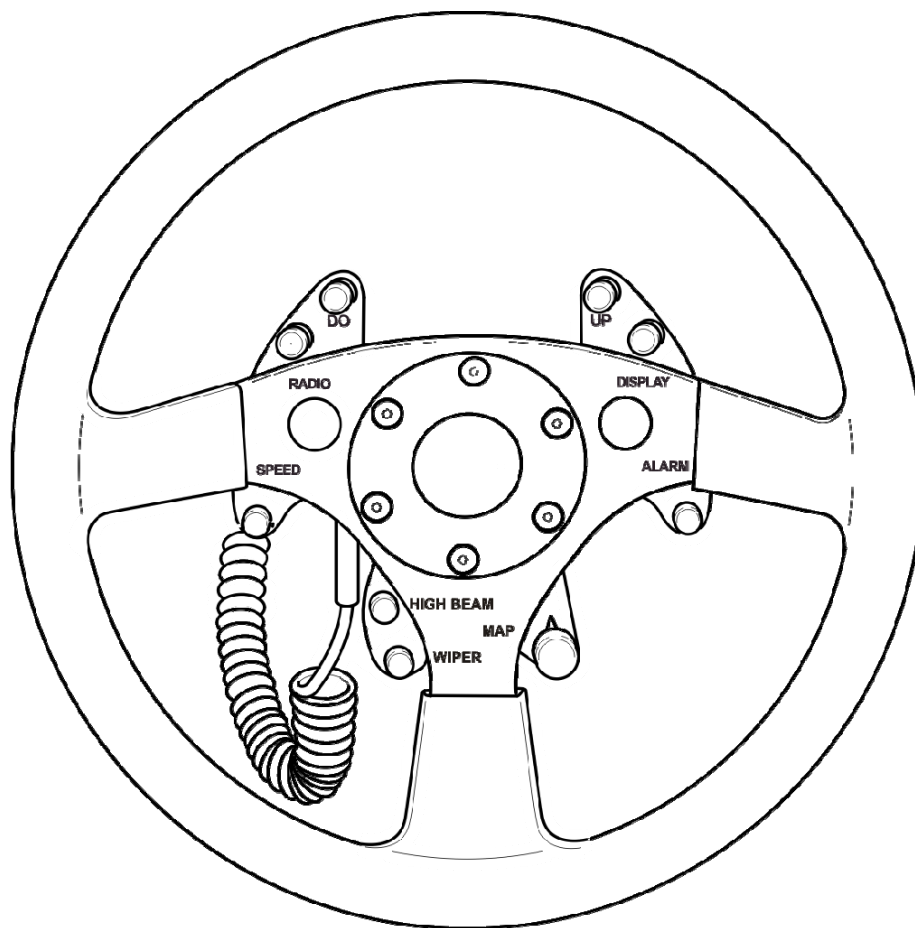
- 12 V, 80 Ah

10.3. Steering wheel



- Quick-release race steering wheel
- **The two parts of the release coupling are balanced together and therefore have to be used in only one combination (numbers on steering wheel and hub must match)**





DO, UP

Adjust traction control setting

RADIO

Radio

SPEED

Speed limit

HIGHBEAM

Headlight flash, if the button is pressed for about 1 second the headlights stay on till the next time the button is pressed

WIPER

Wiper

DISPLAY

Change MoTeC display pages

ALARM

Reset MoTeC Alarm

MAP

Change engine characteristics

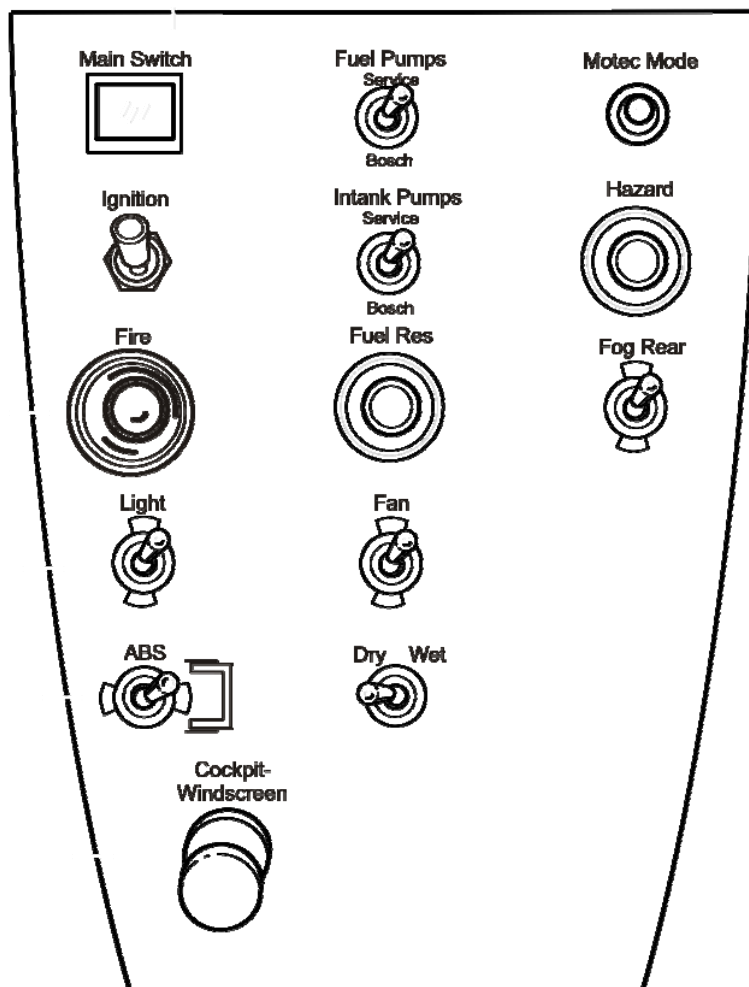
0 Pace Car

1 Race, Low Fuel, Low Power

2 Race

3 Qualifying

10.4. Centre console



MAIN SWITCH:	Main power supply
IGNITION:	Ignition
FIRE:	Fire extuingisher
LIGHT:	Head light
ABS:	ABS on / off
WINDSCREEN	Pulled: 100% windscreen Pushed: floor, air vents, driver ventilation
FUEL PUMPS:	Fuel pump Bosch: Pump runs when engine runs Middle position: Fuel pumps off Service: Pumps run with ignition (only to drain fuel cell)

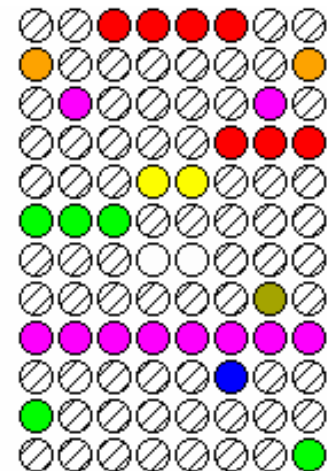
INTANK PUMPS:	same as FUEL PUMPS for the Intank pumps
FAN:	Driver cooling (on or off)
DRY/WET	Traction control mode
MOTEC MODE:	Switch through the different MoTeC display setups (practice, warmup, race)
HAZARD	Hazard lights
FOG REAR:	Fog lights

10.5. Shift Light Module



The Shift Light Module (SLM) is located above the MoTeC dash. It serves as an additional indicating instrument. The following configuration is preset

Con22_Thr_Error_light
Warning Light
Fuel RES light
Up Shift Light 3
Up Shift Light 2
Up Shift Light 1
Speed Limit Request
Con14_Ign on light
TC aktiv
Con11 High Beam Out
Flasher left
Flasher right



10.6. MoTeC Dash

The MoTeC Dash fitted has a 1 MB memory. This has a recording capacity of approximately 15 minutes.

The Cup MoTeC system is sold exclusively worldwide by Brücke-Motorsport. If information and/or a system is required please contact Brücke-Motorsport directly.

Brücke-Motorsport
Consulting GmbH
Werner Brücke
Zennerstr. 29
D 81379 München
Tel. +49 89 72308198
Fax +49 89 72308199
Email: werner.brueckle@t-online.de

10.6.1. Display modes

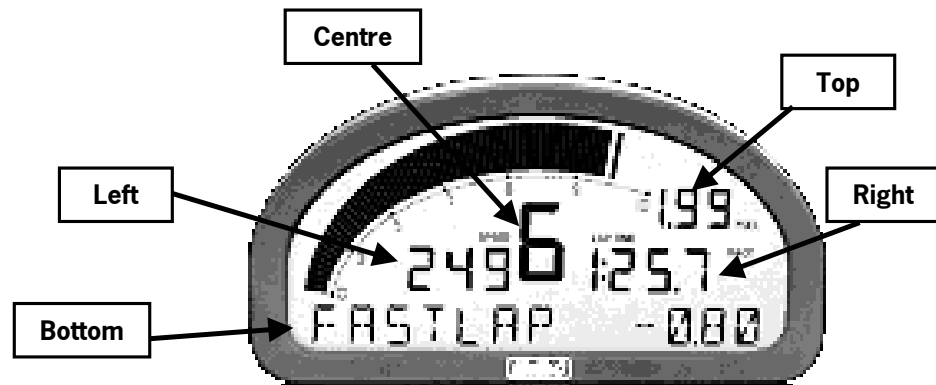
The MoTeC Dash has three different display modes



- **Race**
- **Warm up**
- **Practice**

The information displayed differs between each mode. The MoTeC Mode switch in the centre console is used to page through the individual modes.

10.6.1.1. Race mode



The lower (bottom) display line can be changed via the steering wheel mounted 'Display' switch.

Left:	Speed	
	Brake balance	
Centre:	Gear	
Top:	Traction control setting	
	Throttle valve angle	
Right:	Actual lap time	
	Previous lap-time	
Bottom:	Engine temperature	ET
	Oil temperature	OT
	Oil pressure	OP
	Fuel pressure	FP
	Total fuel consumption	FU
	Fuel consumption per lap	FL
	Battery voltage on dash	VOLTS

10.6.1.2. Practice mode

Left:	Speed / Wheel Speed	
	Brake bias	
Centre:	Gear	
Top:	Traction control setting	
	Throttle valve angle	
Right:	Engine speed	
	Previous lap time	
Bottom:	Engine temperature	ET
	Engine oil temperature	OT
	Engine oil pressure	OP
	Fuel pressure	FP
	Gearbox oil temp	GT
	Ambient temp	AT
	Battery voltage on dash	VOLTS
	Distance covered	TRIP_D
	Fuel consumption per lap	FU
	Total fuel consumption	FU
	Data logging	LOG_RUN

10.6.1.3. Warm up mode

Left:	Engine temperature	
Centre:	Gear	
Top:	Battery voltage on dash	
Right:	Engine oil temperature	
Bottom:	Fuel pressure	FP
	Oil pressure	OP
	Engine oil temperature	OT
	Gearbox oil temp	GT
	Data logging	LO
	Throttle valve angle	THR_POS
	Accelerator pedal angle	PEDAL
	Brake bias	BRBIAS
	Front brake pressure	BF
	Rear brake pressure	BR



Vertical acceleration	G-Vert
Lateral acceleration	G
Longitudinal acceleration	G
Odometer	ODO
Trip distance	TRIP_D
Steering angle	STANG_W
Steering wheel angle	SW_ANG
Gearbox potentiometer	GEARSEN

10.6.2. MoTeC Dash configuration

The existing configuration can be modified with the software 'ADL2 Dash Manager'. The following version is required:



DM2_450Y6_P

Communication PC - MoTeC Dash only function with this version. Delivered with the car is a CD with the programme and the configuration used.



Under NO circumstances should the USB connection cable PC - MoTeC Dash be removed or the power supply cut during the up or downloading of configurations and/or measurement data.

10.6.3. MoTeC Interpreter

To analyse measurement data the software **MoTeC I2 Standard** is required (is supplied with the car).

10.7. Car sensors

Sensor	MoTeC	Modas	Nominal value
Engine			
Oil temp	Oil Temp	toil	< 100°C
Water temp	Water Temp	tmot	< 90°C
Oil pressure	Oil Pressure	poil	> 3 bar
	ATTENTION: ABSOLUTE PRESSURE		
Water pressure	Eng Coolant Pres - System	pwat	> 0,3 @ 90°C
Fuel pressure	Fuel Pres	pfuel	4,8 - 5,2 bar
Throttle valve angle	Throttle Position Bosch	wdk_w	0-100 %
Acc. pedal angle	Thr Pedal	pdg	0-100 %
Ambient pressure	Manifold Pres	pu	
Ambient tem	Air Temp - Intake	tans	
Crankcase pressure	Crankcase Pres	pcrank_rel	< -300 mbar
Camshaft sensor	—	camshpos	20 - 30° KW
Speedsensor crankshaft	RPM	nmot_w	
Water level switch	Water Level	—	
Gearbox			
Gear lever sensor	Gear Lever Force Volt 2	ugs_w	2,5 V
Gearbox poti	Gear Pos Volts	ugang_w	2,71 V @ 3rd
Clutch pressure	P Clutch	pclutch_w	
Oil temp	Gearbox Oil Temp	tgearoil	< 120°C
Vehicle			
Wheel speed (4x)	Wheel Speed XX	vrad_xx	
Battery voltage	Battery_Voltage_at_Dash	ub	12 - 14 V
Acceleration sensor (x,y,z)	G-lat	accx	
	G-long	accy	
	G-vert	accz	
Brake bias poti	Brake BIAS Driver	—	
Yaw rate	Yaw_ABS	—	
Steering angle	Steering Angle	steer	-17 ...0... +17°
	Steering Wheel Angle		
ABS			
Brake pressure (for each wheel)	PBR_XX		
Brake pressure front brake circuit	Master brake pres		

10.8. Engine Control Unit (ECU)

The GT3 R is equipped with a Bosch MS 4.0 ECU specially developed for motorsport applications. The Bosch MS 4.0 can be programmed with special software. The ECU is programmed exclusively by Porsche Motorsport. If an engine is overhauled by Porsche Motorsport the ECU should be delivered with the engine to run them both together on the dynamometer.

As a safety precaution the ECU should always be disconnected from the wiring loom and removed from the car if welding work is carried out.

10.8.1. ECU DIAG

The message 'ECU DIAG' is displayed in the MoTeC dash when electric errors (sensors) occur at a specific frequency or are always active. The message also indicates MS 4.0 system errors.

A special software (Bosch Modas), which can be purchased from Porsche Motorsport, is required to delete the errors.

10.8.2. MODAS

With the MODAS software various parameters can be retrieved from the ECU and modified.

In addition, errors occurring are saved in an error log that can be retrieved for analysis.

The Laptop used must have the following minimum system requirements:

- WINDOWS 98, 2000, XP (NT is not supported)
- 64 MB RAM
- 233 MHz Processor
- 4 Gigabyte free hard disk space
- Parallel Port with vehicles older than 2008 otherwise USB
- CD-Rom drive

A copy of the MODAS user instructions is included with the car.

10.9. EGas

The following points have to be observed when dealing with the system Egas:

10.9.1. Hardware requirements

The EGas system can only function if the hardware requirements specified in points 10.9.2 to 10.9.6 are observed. If one of more of the constraining conditions are violated the system must not be operated further. This is also valid for structural modifications or other manipulations made to the components mentioned in 10.9.2 to 10.9.6 without the permission of Bosch Engineering GmbH.

10.9.2. Control unit and amplifier

A Bosch Motronic with a programme version supplied by Bosch Engineering GmbH must be used to control the EGas system.

10.9.3. Throttle butterfly actuator

The throttle butterfly actuator must be approved by Bosch for a production application, or must demonstrate the same quality and safety features. Structural modifications to the actuator must only be implemented after consultation with Bosch Engineering GmbH and must be approved by the same company.

10.9.4. Driver preference logging

The driver pedal module must be approved by Bosch for a production application or must demonstrate the same quality and safety features. Structural modifications to the module must only be implemented after consultation with Bosch Engineering GmbH and must be approved by the same company. The driver preference logging must be made via a redundant displacement or angle sensor. The sensor must have two entirely independent shunt circuits. To ensure that a defect does not influence the second shunt circuit, the sensor earth, sensor power supply and also the signal outputs must be doubled.

10.9.5. Emergency-stop switch

The system must have an emergency-stop switch which, when actuated, must at least isolate the throttle butterfly actuator from the power supply. Isolation of the control unit primary power supply is also permitted. The emergency-stop switch in the car must be clearly visible, and be easily activated by the driver. The emergency-stop switch must be labelled as such.

10.9.6. Wiring loom

The wiring loom between the primary power supply, emergency-stop switch, pedal value logging, control unit, optional ETC amplifier and throttle butterfly actuator must be manufactured or approved by Bosch Engineering GmbH.

10.9.7. Software requirements

Only original software from Bosch Engineering GmbH, which was developed to operate with an EGas system in a corresponding control unit, must be used. The use of an incompatible EGas software version, any changes to the software or use of a software version not developed explicitly by Bosch Engineering GmbH for the project is prohibited.

10.9.8. Programme section

Changes to the software must only be made by Bosch Engineering GmbH. The customer is obliged to use only the last software versions delivered.

10.9.9. Data section

Changes to the data section of the software can be made by the customer only with application tools provided by Bosch Engineering GmbH. Inappropriate calibration can lead to safety related situations. Changes to the data section must therefore only be implemented by persons familiar with the mode of operation of both engine control unit software and hardware, and especially the EGas function. The EGas mode of operation is documented in the relevant documents distributed to the customer with the system. The customer is responsible that all EGas related diagnostics are activated and correctly calibrated.

10.9.10. Conditions of use

The safety functions, error recognition and error responses of the EGas system can differ in various aspects of design and application from EGas systems known from high-volume production. Therefore, the system diagnostics should be run every time before the car is used. The EGas diagnosis mode of operation and the error responses are described in the documentation which is distributed to the customer with the system. The system description must be a component of the car documentation.

10.9.11. Driving the car

A car equipped with a Bosch Engineering GmbH EGas system must be driven exclusively by racing drivers (must have an international DMSB license or an international license of another FIA (ASN) member association) at motorsport events or by drivers, trained to use such a system, on circuits closed to the public.

10.9.12. Transfer to third parties

Cars equipped with a motorsport EGas system from Bosch Engineering GmbH must not be transferred to third parties by Porsche AG without reference to these operating regulations.

10.9.13. Damage to the system

If the hardware components described in 10.9.2 to 10.9.6 are damaged or malfunction the car must be stopped and/or suspended from operation.

10.9.14. Operating principle

There is no mechanical connection between the accelerator pedal the the throttle valve. The pedal as well as the throttle valve are equipped with two potentiometers (redundancy)

10.9.14.1. Pedal characteristics

The characteristics of the accelerator pedal (ratio pedal angle - throttle valve angle) can be adjusted by the Bosch Modas system. One can switch between three different characteristics (1 ... less aggressive, 3 ... aggressive). This is carried out via the parameter **CWDVEKF** (in Modas: Engine → Dashboard).

10.9.14.2. Engine start



No throttle application by the driver is necessary when starting the engine. The throttle valve opens automatically during the engine start.

10.9.14.3. Traction control

During a traction control intervention the EGas automatically reduces the throttle valve angle when necessary.

10.9.14.4. Throttle blip



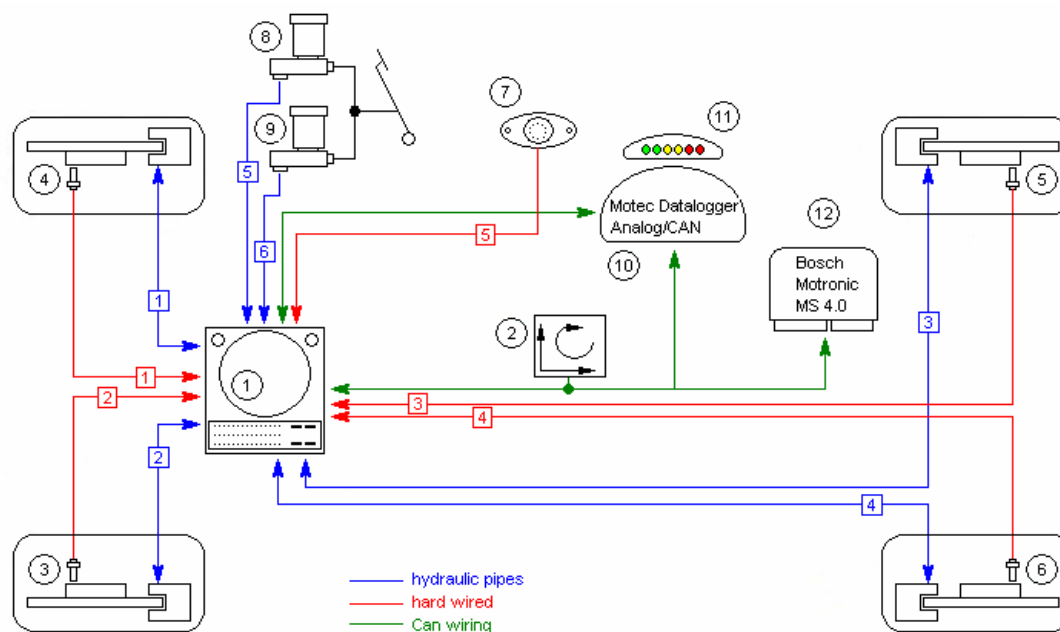
When downshifting the system automatically applies a throttle blip. Therefore, it is not necessary for the driver to apply the throttle blip when downshifting.

10.10. ABS

The ABS function is realised as a compromise between driveability and break performance. Driveability is of big importance on a street car. The ABS is supposed to allow the driver to control the car under each circumstances.

For motorsport purposes this compromise has been shifted towards the optimum brake performance.

10.10.1. System overview



10.10.2. Measuring vehicle dynamics

The ABS allows the driver to brake near the locking limit of the wheels. By preventing the locking of a wheel the system ensures braking in the optimum deceleration range.

To determine the vehicle's driving state the following data is permanently measured:

- Brake pressure at each wheel
- Brake pressure of the front brake circuit
- Lateral acceleration
- Longitudinal acceleration
- Yaw rate
- Each wheel speed

To prevent the locking of a wheel the wheel speeds and brake pressures of each wheel are measured. The system calculates the corresponding wheel accelerations. These values are compared with the expected optimum wheel accelerations.

In case the measured values differ from the calculated optimum values the ABS becomes active. The brake pressure at each wheel is corrected until the wheel slip is back in the optimum range to be able to brake at the highest deceleration rate. The comparison of the measured and the calculated values is being carried out through the whole brake phase and for each wheel individually.

To reduce the brake pressure at a wheel an electrical scavenge pump returns brake fluid via the pressure reservoir of the hydraulic control unit to the corresponding master brake cylinder. This return can be noted acoustically by a pulsating brake pedal.

10.10.3. Usage of different tires

The application of the ABS System of the 911 GT3 R has been carried out with Michelin tires. Therefore, the stored tire circumference is valid for the actual Michelin tires.

This circumference is



**2037 mm on the front and
2230 mm on the rear**

If different tires are used one has the possibility to adapt a different circumference for the ABS system with MoTeC. This could be necessary when tires from a different manufacturer are used. To change the tire circumference the following steps are necessary:

- Open the MoTeC dash manager and load the GT3 R configuration
- Go to Menu → Inputs → Constants / Remote Control
- A window with both circumferences appears
- By clicking on the shown circumference one can alter the value to the desired one
- After the changes have been made, do not forget to save the configuration and send the new configuration to the dash



A correction is necessary when the actual circumference value differ by more than 5% from the above listed values. A correction of the values when changing from slicks to wet tires is normally not necessary.

10.10.4. Hydraulic control unit



- | | |
|---|--|
| 1 | Hydraulic control unit with integrated ECU |
| 2 | Connecting cable |
| 3 | Rear brake circuit |
| 4 | Front brake circuit |
| 5 | Front left brake line |
| 6 | Rear right brake line |
| 7 | Front right brake line |
| 8 | Rear left brake line |

10.10.4.1. Characteristics

- Integrated analogical valves for an optimised controllability
- 5 integrated pressure sensores (front brake circuit, wheel specific brake pressures)
- Directly wired wheel speed sensors (transmitted to MoTeC via CAN)

10.10.5. Turn off ABS

Due to the optimum brake performance it is not recommended to turn the system off. Under certain conditions e.g. adjusting the balance bar brake system, braking in new brake pads or brake discs it could be necessary to switch off the system. Therefore, the switch in centre console must be flipped.

When ABS is turned off an alarm appears in the MoTeC display and the outer LEDs start to flash. By pushing the alarm button on the steering wheel the alarm disappears. The alarm gets active again 45 seconds after the alarm button has been pushed.

10.10.6. Diagnosis

In case of a system failure the outer LED's on the shift light module start to flash and the message „ABS Error“ is displayed in the MoTeC dash.

The alarm disappears after 5 seconds automatically if the alarm button on the steering wheel is not pushed to turn off the alarm. Nevertheless, the alarm message appears again on the display after 45 seconds.

System errors can be caused by either a malfunction of the acceleration / yaw sensor or a failure of one of the wheel speed sensors.



The breakdown of a wheel speed sensor leads to the deactivating of the ABS.



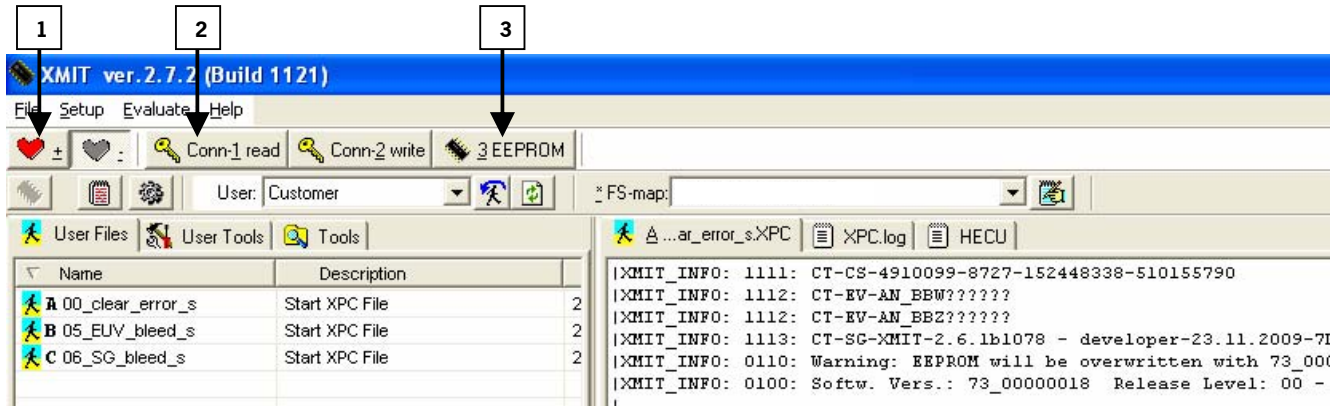
In case a wheel speed sensor is disconnect and the ABS is active. The ABS error gets active. When the sensor is connected and works properly the error message disappears when a ground speed of 20 kmph is achieved.

To communicate with the ABS' ECU a special cable is necessary (see parts catalog).

Zur Kommunikation mit dem ABS Steuergerät ist ein zusätzliches Kabel notwendig (siehe Teilekatalog).

10.10.6.1. Checking the error memory

- Connect ABS cable, turn on ignition, start XMIT
- When using XMIT for the first time one has to select the file Xmite_Motorsport.dat in the field FS-map
- Click on read heart
- Click on „Conn-1 read“
- Click on “EEPROM” → error memory is being read



- Possible errors are shown in the display on the right
- In case there are errors stored → fix them

10.10.6.2. Clearing the error memory

- Mark „00_clear_error_s“ (left display side)
- Click on „Conn-2 write“
- Rightclick on „00_clear_error_s“ → execute
- Check the error memory one more time to ensure that the previous detected errors are not present anymore

10.11. Traction control

The 911 GT3 R is equipped with a traction control. The application of the system is carried out by Bosch Modas.

A comparison of desired and actual slip is the basic principle of the traction control. A PID controller takes care of the necessary torque corrections.

The actual slip is calculated by using the signals from the wheel speed sensors. The target slip is derived from a vehicle model. In case the actual slip is greater than the actual slip the traction control comes into play as long as the actual slip is lower or equals the target slip.

Parameters of the following categories offer the possibility to adapt the traction control:

- slip dependant parameters
- parameters of the PID controller
- driver influence
- track influence

10.11.1. Adapt the traction control

The Bosch software Modas is necessary to customise the traction control functionality. A special connection cable is necessary (see parts catalog).

By switches on the steering wheel the setting of the traction control can be changed. 12 different settings are available (1... less traction control intervention 12 ... more traction control intervention, 0 ... traction control off). In addition there is a dry / wet switch on the centre console. Under wet the conditions the switch should be flipped to wet in order to achieve optimised traction control interventions for wet conditions.

10.11.1.1. Target slip

FSLSV is the base factor for the calculation of the target slip. It reflects the tyre/racetrack characteristics. FSLSV affects a 3D map which is addressed by TC switch position and ground speed. This parameter works like a multiplier on the complete TC calculation.

If problems with the TC occur, first try to work on this map in order to tune traction control to your (and the drivers) liking!

FSLSV = 1.0 is the basic calibration

10.11.1.2. Permitted slip

The target slip is limited by the minimum and maximum permitted slip. **FTCSLSMIN** affects the minimum permitted target slip, especially during cornering

FTCSLSMIN = 1.0 is the basic calibration

decrease this value if the support from the TC during cornering is insufficient

increase this value if the support from the TC during cornering is more than desired.

FTCSLSMAX affects the maximum permitted target slip.

FTCSLSMAX = 1.0 is the basic calibration

Under normal conditions, this factor does not need to be recalibrated.

10.11.1.3. Lateral acceleration

FSLSGG is a correction of the target slip due to the handling state of the car. This factor is efficient on the y-acceleration correction. This factor works like an amplification factor.

FSLSGG = 1.0 is the basic calibration

Increasing this parameter will lead to less target slip during cornering and more intensive torque reductions. Use FSLSGG to make a general setup of the handling correction.

10.11.1.4. PID controler

FPASR is the amplification factor of the P-component of the TC controller. The P-component (proportional component) of the controller can be adjusted via this value. This controller component works proportionally on the deviation. This controller determines the effectiveness of the control at the start of regulation. An excessive large P-component can cause the controller to pulsate and therefore lead to oscillation in the drivetrain.

FPASR = 1.0 is the basic calibration

The P-component is a fast controller!

FIASR is the amplification factor of the I-component of the TC controller. The I-component (integral component) of the PID-controller determines the control action during the entire duration of the regulation. If the vehicle decelerates excessively during cornering a lower I-value can reduce this.

FIASR = 1.0 is the basic calibration

The I-component is a slow controller.

FDASR is the amplification factor of the D- component of the TC controller. The D-component (differential component) of the controller reacts exclusively to changes in the deviation. It determines the initial regulation of the traction control. A larger D-component reacts rapidly to a change in slip, but can also lead to instability and system oscillations.

FDASR = 0.0 is the basic calibration (D- component is not active!)

The D-component is a faster controller.

10.11.1.5. Driver influence

KLMIFAASR (dry condition) and **KLMIFAASR_WET** (wet condition) are factors to calibrate the driver influence to the TC controller. Both are 2D maps with breakpoints addressed by the TC switch position. This factor is included to give the driver the opportunity to influence the TC intervention with „his right foot“.

Decrease of KLMIFAASR causes a longer TC intervention (less driver influence)

Increase of KLMIFAASR causes a shorter TC intervention (more driver influence)

Typical values are 50 up to 90 %

10.11.1.6. Track

KLTCDSWASR is a track dependent correction for the TC. The parameter is a 2D map with breakpoints addressed by the travelled lap distance. KLTCDSWASR allows to modify the TC position depending on the track position. KLTCDSWASR is an offset (positive or negative) for the original TC position (Driver demand)

KLTCDSWASR = 0 is the neutral calibration

-2 up to 2 are typical values for KLTCDSWASR

10.11.2. Traction control hints

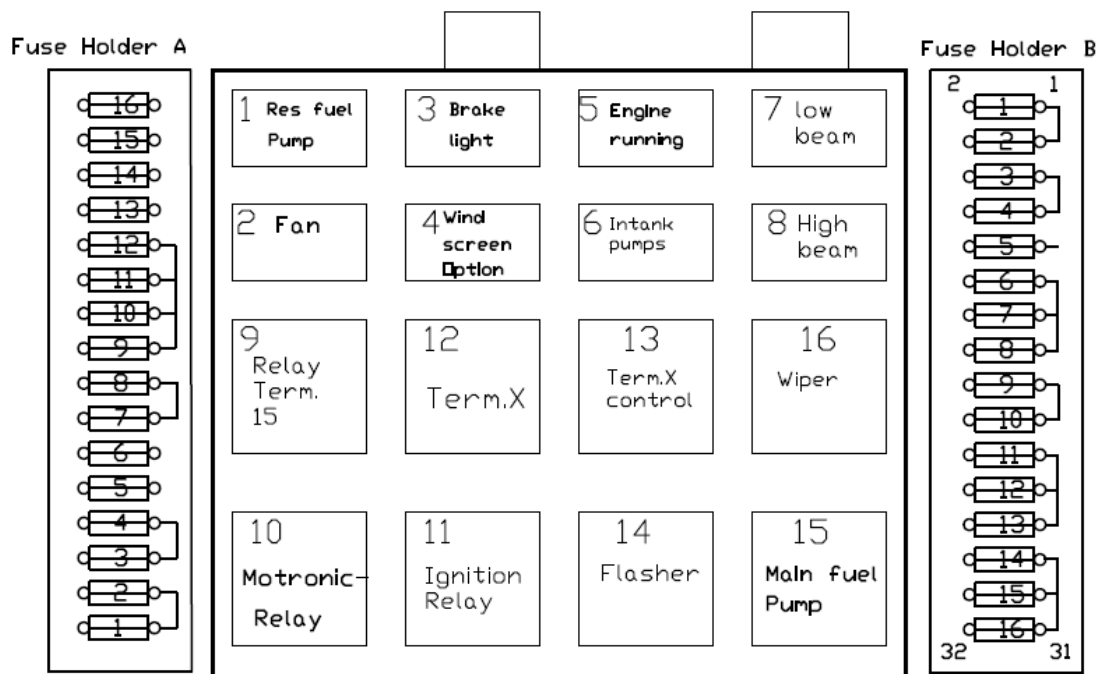
- If problems with the TC occur, first try to get rid of them by altering the target slip. The target slip is dependant on the race track.
- Under normal conditions, the controller does not need to be recalibrated. It is suited to the car prior to the racetrack.
- Do one step after another, one variable at a time!
- Beware of doing huge steps in calibration. A D-component multiplied by two will lead to instability of the controller and strong oscillations in the drivetrain. Calibration of a PID-controller needs a lot expertise in control engineering!



- If you are not sure about your calibration, go back to the neutral values.
- Watch the recorded data and compare to this manual to find solutions to your problem!
- If the TC doesn't work fine, first check the incoming signals:
 - accx, accz, accy correct?
 - yaw and steer sensor correct?
 - vrad_fl, vrad_fr, vrad_rl, vrad_rr on the same level on the straight?

10.12. Relay- and fuse assignment

10.12.1. Fuse holder

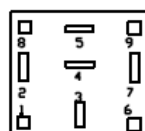


997 GT3 R
2010

Fuseholder A	Ampere
1 High Beam R	7,5
2 High Beam L	7,5
3 Parking Light R	7,5
4 Parking Light L	7,5
5 Rear Fog Light	7,5
6 Additional Headlight	25
7 Low Beam R	7,5
8 Low Beam L	7,5
9 SP Data Term.15	7,5
10 Break Lights Term.15	15
11 Intankpumps 1/2	10
12 Intankpumps 3/4	10
13 Motec Term.30	7,5
14 Motor Controller Term.15	15
15 ABS SG Term.15	10
16 La - Sensors	5

Fuseholder B	Ampere
1 Rel Eng run Term.15	7,5
2 Servo Pump Term.15	7,5
3 Relay Motronic Term.30	30
4 Relay Main Pump Term.30	25
5 Relay Res Pump Term.30	25
6 Wiper System Term.X	25
7 Fan Switch Term.X	7,5
8 Daytime Running Light Term.X	10
9 ABS Term.30	30
10 SP Data Term.30	7,5
11 Option (Oil Level)	7,5
12 Relay Fan Term.30	30
13 Hazard Warning Signal Term.30	15
14 Memory	7,5
15 ABS Term.30	10
16 Relais Window Heater Term.30	25

Allocation Relay-Base



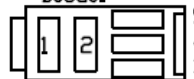
for normally open relay is

- 2 Term.25 at fuel pump relay
- 3 Term.30 position 6
- 4 Term.87a
- 5 Term.87
- 7 Term.86

for flasher relay is

- 2 Term.49
- 5 Term.49a
- 7 Term.31

B05G01



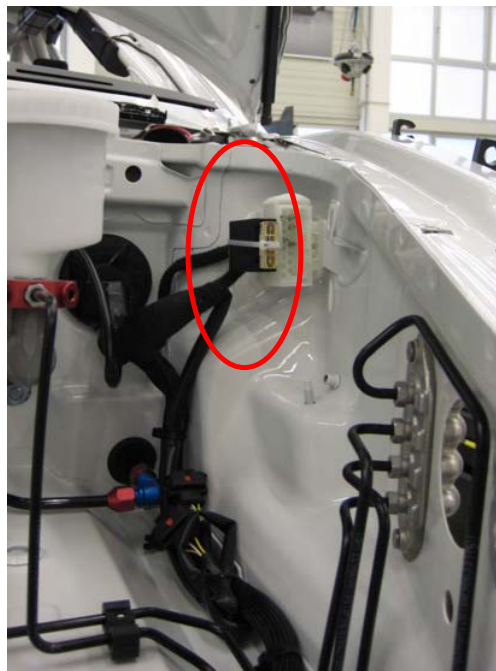
Relay-Holder
Pos. 1

- 1 Term. 30
- 2 Term. 87
- 3 Term. 86
- 4 Term. 87A
- 5 Term. 85

Nr. 1 - 8 Microrelay
Nr. 9 - 16 Standard

10.12.2. Hydraulic control unit ABS

The fuse for the pump of the hydraulic control unit is situated in the front trunk on the left side. The fuse has to be secured by a tie wrap.

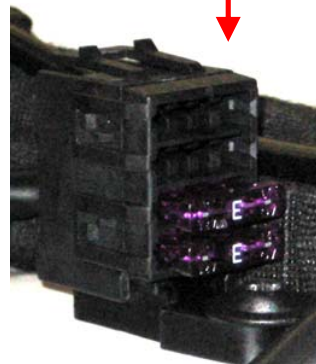


10.12.3. Power steering pump

The fuse for the power steering pump is situated in the front trunk on the right side. The fuse has to be secured by a tie wrap.



10.12.4. MS4 sensor system



11. Car maintenance

Porsche Motorsport recommends that the following minimum maintenance work is carried out after the corresponding mileage:

11.1. After approx. 200 km and/or first test

- Visual inspection of all systems. hoses and cables etc. for leakage. damage or chafing
- Tighten all fasteners to the defined torque:
- All suspension mounting bolts
- Driveshafts
- Engine mountings
- Gearbox mountings

11.2. After every session

- Visual inspection of all systems. hoses and cables etc. for leakage. damage or chafing
- Check the specified torque setting of every safety relevant fastener
- Check dampers for leakage
- Drain the fuel and calculate the fuel consumption
- Check all suspension bearing for play
- Clean coolers
- Clean dust and rubber pick-up from brake discs + calipers
- Bleed brake system
- Bleed clutch (once per weekend)
- Clean pedal box area and check functionality
- Clean and inspect wheel safety mechanism
- Check oil level
- Check driveshaft rubber boots for damage
- Check steering system rubber boots for damage
- Check all system for leakage

11.3. After every race weekend (sprint)

In addition to points in 11.2:

- Engine oil and filter change (after 'hot races' → engine oil > 110° C)
- Check compression and pressure loss of each cylinder
- Clean/replace air filter
- Change brake fluid
- Check brake balance setting
- Clean brake balance system
- Change brake fluid
- Check clutch wear
- Check wheel bearing play
- Check air-jacks for leakage and seated correctly
- Check seat and safety harness
- Check fire extinguisher
- Check flywheel and pulley side rotary shaft seals for leakage

11.4. After 3 - 4 race weekends (sprint)

- Rebuild brake calipers
- Replace fuel pumps and filter
- Overhaul dampers
- Check driveshaft CV joints

11.5. After 30 hours running time



- Gearbox rebuild
- Engine rebuild



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