Misfiring At High RPM (59 / 15)

Revision: This bulletin replaces bulletin Group 1, #59/15, dated July 2, 2015.

Model Year: **As of 2014**

Vehicle Type: **911 GT3 (991)**

Concerns: **Misfires at high RPM (>7,000 RPM)**

Information:
- **Diagnostic path for fault finding in the event of the complaint "Engine misfire"**
- **Repair scopes and required repair measures**

Diagnostic path for systematic fault finding

Action Required:

Information

The following diagnostic path will assist you to quickly and effectively diagnose "**Misfires at high rpm** (> 7,000 rpm)".
In particular, this involves identifying possible wear on the valve levers which usually occurs at high engine speeds.

If misfires occur even at **considerably lower engine speeds** or **over the entire rpm range** and depending on the fault memory entries stored in the DME control unit fault memory, the **components that are usually affected by this type of fault** (spark plugs, ignition coils. injectors, etc.) must always be checked **first** in accordance with the instructions provided under Guided Fault Finding in the PIWIS Tester.

The recommended procedure for systematic fault finding in the event of the complaint "Misfires at high rpm (> 7,000 rpm)" is described here. For greater clarity, the detailed description includes a condensed overview of the information in the form of a table.

Customer complaint:

- Misfires occur during **full-load acceleration at high rpm** (> 7,000 rpm).
- The **yellow warning message** "Reduced power Driving permitted Consult a workshop" is displayed on the multi-function display in the instrument cluster.
- The **engine warning light** ("Check Engine" symbol) also comes on in the instrument cluster.
- Engine running in **limp-home mode**.

- The engine warning light and warning message disappear after switching off the ignition and then switching it back on again (ignition reset). The engine is running normally again.

Fault verification:

If these symptoms are present, the fault must be verified using the procedure described below.

Information

If misfires occur even at **considerably lower engine speeds** or **over the entire rpm range** and depending on the fault memory entries stored in the DME control unit fault memory, the **components that are usually affected by this type of fault** (spark plugs, ignition coils. injectors, etc.) must always be checked **first** in accordance with the instructions provided under Guided Fault Finding in the PIWIS Tester.

- **Create Vehicle Analysis Log** (VAL) using the PIWIS Tester.
- **Read out the fault memory using the PIWIS Tester**: The fault entry **P0300 – Misfire totals error** together with a fault entry **P0301 ... P0306 (Misfire cylinder 1 ... 6)** is set in the DME control unit fault memory.

- **Test-drive the vehicle until the fault occurs**: Drive with full-load acceleration over a rpm range of 4,000 – 8,500 rpm. Observe all traffic laws. i.e. don't speed.

- **Reproduce the fault**: The fault can be reproduced again - always in the same rpm range (+/- 300 rpm) - as described above.

Action Required:

1 The fault **cannot** be reproduced:

- There is a high probability that fault is intermittent and due to an outside influence, such as poor fuel.

2 **The fault can be reproduced**:

2.1 Swap the ignition coil and spark plug from the "suspect" cylinder with the ignition coil and spark plug from a cylinder that is working perfectly.
For instructions, see ⇒ *Workshop Manual '282020 Removing and installing ignition coils'* and ⇒ *Workshop Manual '287020 Removing and installing spark plugs'*.

2.2 Test-drive the vehicle and try to reproduce the fault again under the conditions specified above.

2.3 Then read out the fault memory of the DME control unit using the PIWIS Tester and check whether the same fault memory entry is stored again, i.e. after swapping the ignition coil and spark plug, the previously suspect cylinder is now working perfectly and the fault occurs instead on the cylinder into which you installed the ignition coil and spark plug from the cylinder that was originally suspect.

- If **YES** (The same fault is stored again): Remove the ignition coil from the cylinder that is now suspect and install it again in the cylinder that was originally suspect. Leave the spark plug in the cylinder that is now suspect. Then test-drive the vehicle again and reproduce the fault again in order to clearly identify the component that is causing the fault.

- If **NO** (The cylinder that was originally suspect is still suspect): Remove the cylinder head cover on the suspect cylinder bank and check the camshafts and valve levers for visible signs of wear. For instructions, see section ⇒ *Technical Information '1X0000 Checking camshafts and valve levers for wear'*.

Summary:

Customer complaint

- Misfires occur during full-load acceleration at high rpm (> 7,000 rpm).
- The yellow warning message "Reduced power Driving permitted Consult a workshop" is displayed on the multi-function display in the instrument cluster.
- The engine warning light ("Check Engine" symbol) also comes on in the instrument cluster.
- Engine running in limp-home mode.
- The engine warning light and warning message disappear after switching off the ignition and then switching it back on again (ignition reset). The engine is running normally again.

Fault verification

- **Create Vehicle Analysis Log** (VAL) using the PIWIS Tester.
- **Read out the fault memory using the PIWIS Tester**: The fault entry **P0300 – Misfire totals error** together with a fault entry **P0301 ... P0306 (Misfire cylinder 1 ... 6)** is set in the DME control unit fault memory.
- **Test-drive the vehicle until the fault occurs**: Drive with full-load acceleration over a range of 4,000 – 8,500 rpm. Observe all traffic laws. i.e. don't speed.
- **Reproduce the fault**: The fault can be reproduced again - always in the same rpm range (+/- 300 rpm) - as described above.

Fault can be reproduced	Fault **cannot** be reproduced

• Swap the ignition coil and spark plug from the "suspect" cylinder with the ignition coil and spark plug from a cylinder that is working perfectly. • Test-drive the vehicle and try to reproduce the fault again under the conditions specified above. • Check whether the same fault memory entry is stored again. • If **YES**: Remove the ignition coil from the cylinder that is now suspect and install it again in the cylinder that was originally suspect. Leave the spark plug in the cylinder that is now suspect. Then test-drive the vehicle again and reproduce the fault again in order to clearly identify the component that is causing the fault. • If **NO**: Remove the cylinder head cover on the suspect cylinder bank and check the camshafts and valve levers for visible signs of wear. For instructions, see section ⇒ *Technical Information '1X0000 Checking camshafts and valve levers for wear'*.	• There is a high probability that the fault is intermittent and due to an outside influence, such as poor fuel.

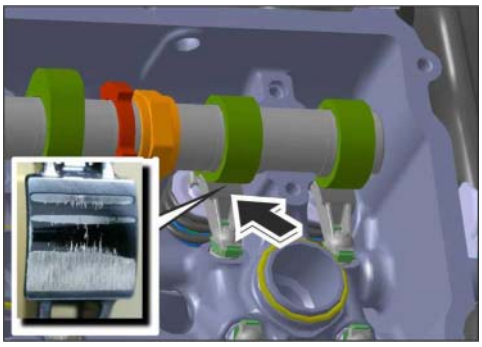
Checking camshafts and valve levers for wear

Work Procedure: 1 Remove cylinder head cover on the affected cylinder bank ⇒ *Workshop Manual '158219 Removing and installing cylinder head cover'*.

2 Check camshafts and valve levers for visible signs of wear.

The following problems indicate a worn valve lever:

- Rough surface on the cams of the cylinder in question. If there is a significant amount of wear, the contour of the tip of the cam will be "square" and will show significant tempering colors (blue/brown discoloration of the material caused by high temperatures).
- The valve lever shows significant signs of linear wear on the contact surface to the cam ⇒ *Wear*



Wear on valve lever

on valve lever **-arrow-** at the edge of the hydraulic valve clearance compensating element ⇒ *Wear on valve lever* **-inset-**. The black coating is worn down and the silver base material can be seen.

3 Take a photo of the relevant damaged areas of the valve lever ⇒*Wear on valve lever* **-arrow-** for documentation purposes. Make sure that the photos clearly show the installation position of the valve levers in question.

Also indicate the installation position of the valve levers in question (e.g. cylinder 6 – intake) or identify the components by labelling them ⇒*Marking valve levers*.

As there are 2 intake and exhaust levers per cylinder, be sure to mark each with a number. For example: "I 5.1" and "I 5.2" would denote the intake levers for cylinder 5, valve 1 and valve 2.

Marking valve levers

4 Attach photos to the PQIS job and be sure to attach the VAL and add a Customer Statement to the job. After this has been done file a PTEC-TLAR.

References: ⇒*Workshop Manual '158219 Removing and installing cylinder head cover'*
⇒*Workshop Manual '282020 Removing and installing ignition coils'*
⇒*Workshop Manual '287020 Removing and installing spark plugs'*

Repair stages and required repair measures

Work Procedure: 1 Carry out the repair scope below based on the direction from the Technical Hotline.

Required repair measures if valve lever wear is detected, depending on the technical status of the engine:

Repair scope	Action required
1	Replace engine
2	• Replace both cylinder heads • Replace valve drive components on both cylinder banks (camshafts, valve levers, shims) • Replace coolant regulator

3	• Replace both cylinder heads • Replace valve drive components on both cylinder banks (camshafts, valve levers, shims)
4	Replace valve drive components on both cylinder banks: • Replace camshafts • Replace valve levers • Replace shims

2 During repair work, **also** pay particular attention to the **following points** and **carry out the specified work**.

Repair scope 1 (Replace engine):

- **After** you have **replaced the engine**, re-program the **DME control unit** using the **PIWIS Tester** with PIWIS Tester software version **15.700** (or higher) installed: **DME control unit** > ⇒ **'Programming'** menu >> **'Automatic programming'** function.
- **After** completing the **work**, carry out a **test drive** until the **engine** reaches **operating temperature**.
- **After** carrying out the **test drive**, use the **PIWIS Tester** to create a **Vehicle Analysis Log (VAL)** and select the function ⇒ **'Data management'** > **'VAL data return'** using the PIWIS Tester to **send it to Porsche AG**.

Repair scopes 2, 3 and 4:

- During repair work, **change the engine oil and oil filter** and re-program the **DME control unit** using the **PIWIS Tester** with PIWIS Tester software version **15.700** (or higher) installed: **DME control unit** > ⇒ **'Programming'** menu >> **'Automatic programming'** function.
- See if the DME software level can be added.
- **After** completing the **work**, carry out a **test drive** until the **engine** reaches **operating temperature**.
- **After** the **test drive**, **change the engine oil and oil filter again** to make sure that there are no more residual particles of dirt in the engine.
- Use the **PIWIS Tester** to create a **Vehicle Analysis Log (VAL)** and select the function ⇒ **'Data management'** > **'VAL data return'** using the PIWIS Tester to **send it to Porsche**.

Parts Info:

Part No.	Designation – Use	Qty.	Repair scope			
			1	2	3	4

9A1.100.975.DX	⇒ Replacement engine	1 ea.	X			
999.073.443.01	⇒ Combination screw, M12 x 1.5 x 40 – Threaded joint for diagonal brace	2 ea.	X	X	X	X
999.072.869.01	⇒ Hexagon-head bolt, M12 x 1.5 x 45 – Threaded joint for diagonal brace	2 ea.	X	X	X	X
999.084.123.09	⇒ Hexagon nut, M10 – Threaded joint securing anti-roll bar to connecting link	2 ea.	X	X	X	X
900.076.064.02	⇒ Hexagon nut, M8 – Threaded joint securing anti-roll bar to body	4 ea.	X	X	X	X
999.072.868.01	⇒ Hexagon-head bolt, M12 x 1.5 x 80 – Threaded joint for rear axle cross member	2 ea.	X	X	X	X
999.072.859.01	⇒ Hexagon-head bolt, M12 x 1.5 x 58 – Threaded joint for rear axle cross member	2 ea.	X	X	X	X
999.084.445.01	⇒ Hexagon nut, M12 x 1.5 – Threaded joint for rear axle cross member	4 ea.	X	X	X	X
999.076.053.01	⇒ Hexagon nut, M10 – Threaded joint for transmission support	2 ea.	X	X	X	X
999.086.009.02	⇒ Hexagon nut, M12 – Threaded joint for transmission mount	1 ea.	X	X	X	X
N 908.484.05	⇒ Hexagon nut, M12 x 1.5 – Threaded joint for engine carrier	2 ea.	X	X	X	X
996.106.801.03	⇒ O-ring – Coolant lines	3 ea.	X	X	X	X
999.707.660.40	⇒ O-ring – Desiccator	2 ea.	X	X	X	X
944.573.143.01	⇒ Desiccator	1 ea.	X	X	X	X

N 906.651.01	⇒ Cheese head bolt, M10 x 1 x 29 – Threaded joint securing flywheel to crankshaft	10 ea.	X	X	X	X
999.385.009.01	⇒ Hexagon round-head bolt, M12 x 1.5 x 55 – Threaded joint securing transmission to engine	6 ea.	X	X	X	X
999.073.517.01	⇒ Cheese head bolt, M10 x 1 x 46.5 – Threaded joint securing drive shaft to transmission	12 ea.	X	X	X	X
997.111.336.90	⇒ Clamp – For securing front silencer to catalytic converter flange	2 ea.	X	X	X	X
900.380.005.01	⇒ Hexagon nut, M8 – For securing front muffler holder	4 ea.	X			
900.067.362.01	⇒ Cheese head bolt, M8 x 50 – Threaded joint for restraining straps for rear muffler	2 ea.	X			
999.651.401.01	⇒ Line bracket – For securing control line for exhaust flaps to engine carrier	4 ea.	X			
999.512.707.00	⇒ Hose clamp – For securing control line for exhaust flaps to vacuum unit	2 ea.	X	X	X	X
N 100.988.11	⇒ Hexagon-head bolt, M6 x 16 – Threaded joint for heat shield on engine carrier	3 ea.	X			
9A1.104.911.93	⇒ Cylinder head, complete - cyl. 1–3	1 ea.		X	X	
9A1.104.912.93	⇒ Cylinder head, complete - cyl. 4–6	1 ea.		X	X	
946.105.155.75	⇒ Friction plate – Camshaft	4 ea.		X	X	X
9A1.104.149.00	⇒ Cylinder-head gasket for cyl. 1–3 – Cylinder head	1 ea.		X	X	
9A1.104.148.00	⇒ Cylinder-head gasket for cyl. 4–6 – Cylinder head	1 ea.		X	X	
9A1.104.191.00	⇒ Cylinder head screw – Cylinder head	4 ea.		X	X	
9A1.104.191.02	⇒ Cylinder head screw – Cylinder head	12 ea.		X	X	

900.219.006.01	⇒ Screw plug, M12 x 1.5 – Cylinder head	4 ea.		X	X	
900.123.161.20	⇒ Sealing ring, D12 x 16 – Cylinder head	4 ea.		X	X	
900.385.009.01	⇒ Hexagon round-head bolt, M6 x 16 – Threaded joint for heat protection on valve cover	8 ea.		X	X	
900.385.041.01	⇒ Hexagon round-head bolt, M6 x 12 – Threaded joint for valve cover	12 ea.		X	X	
9A1.107.313.01	⇒ Torx screw, M6 x 25 – Threaded joint for valve cover	40 ea.		X	X	
900.385.108.02	⇒ Hexagon round-head bolt, M6 x 80 – Threaded joint for cylinder head	2 ea.		X	X	
900.123.160.30	⇒ Sealing ring – Stopper for cylinder head	2 ea.				X
999.707.495.40	⇒ O-ring – Spark plug bore	6 ea.				X
9A1.105.035.91	⇒ Valve lever, intake	12 ea.		X	X	X
9A1.105.036.91	⇒ Valve lever, exhaust	12 ea.		X	X	X
9A1.105.425.93	⇒ Shim – Valve lever	24 ea.		X	X	X
9A1.105.275.93	⇒ Intake camshaft for cyl. 1-3	1 ea.		X	X	X
9A1.105.276.93	⇒ Intake camshaft for cyl. 4-6	1 ea.		X	X	X
9A1.105.277.93	⇒ Exhaust camshaft for cyl. 1-3	1 ea.		X	X	X
9A1.105.278.93	⇒ Exhaust camshaft for cyl. 4-6	1 ea.		X	X	X
06L.109.311	⇒ Tappet – Camshaft	2 ea.		X	X	X
999.701.506.41	⇒ Sealing ring – Camshaft controller	4 ea.		X	X	X
946.105.154.75	⇒ Sleeve – Camshaft controller	4 ea.		X	X	X
9A1.105.731.90	⇒ Seal – Valve cover for cyl. 1-3	1 ea.				X
9A1.105.732.90	⇒ Seal – Valve cover for cyl. 4-6	1 ea.				X
9A1.105.157.03	⇒ Chain tensioner – Timing chain	2 ea.		X	X	X

999.707.346.40	⇒ O-ring – Screw on tensioning rail	3 ea.		X	X	
9A1.110.331.91	⇒ High-pressure line – Fuel collection pipe	1 ea.		X	X	
9A1.110.332.91	⇒ High-pressure line – Fuel collection pipe	1 ea.		X	X	
980.111.561.00	⇒ Seal – Exhaust manifold	2 ea.	X	X	X	X
9A1.111.107.90	⇒ Exhaust manifold seal	2 ea.		X	X	X
999.084.642.02	⇒ Hexagon nut, M8 – Exhaust system	18 ea.		X	X	X
9A1.106.225.02	⇒ Thermostat insert	1 ea.		X		
9A1.106.305.00	⇒ Seal – Thermostat	1 ea.		X		
999.707.625.40	⇒ O-ring – Thermostat insert	1 ea.		X		
9A1.106.558.00	⇒ Sealing ring – Thermostat	1 ea.		X		
900.123.007.30	⇒ Sealing ring – Screw plug for water guide housing	1 ea.		X		
9A1.110.215.01	⇒ Seal – Intake distributor	6 ea.		X	X	
9A1.107.203.90	⇒ Oil filter	2 ea. *		X	X	X

* **In the course of repair scopes 2, 3 and 4**, the **engine oil** and **oil filter must be changed** both during repairs **and** after the test drive.
Given this, **two oil filters** are always required **for each vehicle**.

Materials: **Required materials** (usually already available in the Porsche parts department, only order if additional materials are required):

Part No.	**Designation – Use**	**Qty.**	**Repair scope**			
			1	**2**	**3**	**4**
000.043.020.00	Optimoly TA mounting paste – Wheel centering surface on wheel hub	100g tube (approx. 5–10 grams required per vehicle)	X	X	X	X

000.043.205.93	Klüberplus Gel grease – For coating O-rings and coolant hoses	100g tube (approx. 5 grams required per vehicle)	X	X	X	X
000.043.301.48	Antifreeze	20-liter container (approx. 5 liters required per vehicle)	X	X	X	X
000.043.004.00	Optimoly HT mounting grease – For greasing clamp securing front muffler to catalytic converter flange	90g tube (approx. 10 grams required per vehicle)	X	X	X	X
000.043.204.17	Optimol Optipit extreme-pressure grease	100g tube (approx. 10 grams required per vehicle)		X	X	X
000.043.301.21	Engine oil	20-liter container (approx. 15 liters required per vehicle) *		X	X	X

* **In the course of repair scope 2, 3 and 4**, the **engine oil** and **oil filter must be changed** both during repairs **and** after the test drive.
Given this, **approx. 15 liters of engine oil** will always be required **for each vehicle**.

Tools:

- **Auxiliary tool:**

Part No.	Designation – Location	Qty.	Repair scope			
			1	2	3	4
9A1.101.213.00	Transport eyebolt – For lifting engine	1 for every Porsche Dealer (only if not already available)	X	X	X	X

- **Special tools:**

Designation / Comment	Purpose	Repair scope			
		1	2	3	4
9818 - PIWIS Tester II Battery charger (current rating of at least 40 A), e.g. **VAS 5907 - battery charger 45A**	Creating VAL / On-board diagnosis	X	X	X	X

9453 - Access ramps Only if required (depending on type of lifting platform)	Moving the vehicle onto the lifting platform	X	X	X	X
9794 - Assembly aid **9796 - Socket wrench** Torque wrench, 150 – 800 Nm (111 – 592 ftlb.), e.g. **V.A.G 1601 - Torque wrench, 150 - 800 Nm (111 - 592 ftlb.)**	Removing and fitting rear wheels	X	X	X	X
Suitable air-conditioning service unit, e.g. **VAS 6456A - A/C service station with rinsing device**	Draining and filling refrigerant in the air conditioning system	X	X	X	X
Disassembly tool, e.g. **VAS 6933 - Disassembly tool**	Disconnecting parking lock cable from PDK transmission	X	X	X	X
9822 - Assembly tool	Opening and fitting air conditioning lines	X	X	X	X
9443 - Oil filter wrench Oil collection container	Removing oil filter	X	X	X	X
Assembly pliers for spring band clamps, e.g. **VAS 6856 - Spring band clamp pliers** **VAS 6832 - Master Gear unit elevating platform** **9769 - Retainer plate** **9769/1 - Support** Suitable tension strap for securing the engine on the lifting platform during removal, e.g. **9454 - strapping belts**	Removing and installing engine	X	X	X	X
Workshop crane, e.g. **VAS 6100 - Workshop crane** Suitable lifting equipment, e.g. cross member with carabiner hook and lifting straps	Lifting the engine	X	X	X	X

VAS 6766 - Counter-hold tool **9321 - Centring pins** Torque angle torque wrench for tightening the fastening screws for the flywheel to a tightening torque of 25 Nm (19 ftlb.) and torque angle of 120°, e.g. **VAS 6942 - Torque / torque angle screw tool**	Removing and installing flywheel	X			
VAS 6199 - Pliers for hose clamp with side cutters	Removing and fitting hose clamps on the control line for exhaust flaps	X	X	X	X
Coolant collection container	Draining coolant	X	X	X	X
9696 - Filling device	Filling coolant and bleeding the cooling system	X	X	X	X
9595 / 1 - Locating pins	Setting valve timing		X	X	X
9773 - Turning device	For turning the engine at the threaded joint for the pulley.		X	X	X
9863 - Socket wrench for camshaft	Socket wrench for camshaft		X	X	X
9863 / 2 - Counter-hold tool	Camshaft controller threaded joint		X	X	X
9863 / 3 - Open-ended wrench, a / f 39	For countering when loosening camshaft controller threaded joint		X	X	X
9875 - Chain tensioner	Auxiliary chain tensioner for setting valve timing		X	X	X
9876 - Mounting saddles	Additional mounting saddles for removing / installing camshafts		X	X	X
9877 - Holding-down device	Auxiliary tool for removing / installing valve cover		X	X	X
9879 - Staking tool	Staking tool for setting valve timing		X	X	X

- **Other tools:**

Designation / Comment	**Repair scope**			
	1	**2**	**3**	**4**
Torque screwdriver, 1.5 – 3 Nm (1 – 2 ftlb.), e.g. **VAS 6494 - Torque screwdriver**	X	X	X	X
Torque wrench, 4 – 20 Nm (3 – 15 ftlb.), e.g. **WE1052 - Torque wrench V.A.G. 1410 / 1576**	X	X	X	X
Torque wrench, 6 – 50 Nm (4.5 – 37 ftlb.), e.g. **V.A.G 1331 - Torque wrench, 6-50 Nm (4.5-37 ftlb.)**	X	X	X	X

Torque wrench, 40 – 200 Nm (30 – 148 ftlb.), e.g. **V.A.G 1332 - Torque wrench, 40-200 Nm (30-148 ftlb.)**	X	X	X	X
Torque angle torque wrench, 4 – 400 Nm (3 – 296 ftlb.), e.g. **VAS 6942 - Torque / torque angle screw tool**	X	X	X	X
Insert for torque wrench, Torx E18	X	X	X	X
Ring insert for torque wrench, a/f 18	X	X	X	X
Insert for torque wrench **9792 - Insert for torque wrench**		X	X	X
Crow foot wrench, a/f 17		X	X	X
Permanent magnet		X	X	X

References:
⇒ *Workshop Manual '100119 Removing and installing engine'*
⇒ *Workshop Manual '373427 Removing and mounting Porsche Doppelkupplung (PDK)'*
⇒ *Workshop Manual '150519 Removing and installing camshafts (includes setting timing)'*
⇒ *Workshop Manual '157019 Removing and installing cylinder head'*
⇒ *Workshop Manual '157037 Disassembling and assembling cylinder head'*
⇒ *Workshop Manual '157037 Removing and installing coolant regulator'*

For invoicing and documentation using PQIS, enter the following coding:

Location (FES5)	15050	Camshaft
Damage type (SA4)	1824	severe wear

Dealership Distribution Routing
Service Manager _____ Shop Foreman _____ Service Technician _____ _____ _____ _____
Asst. Manager _____ Warranty Admin. _____ Service Technician _____ _____ _____ _____