

**971 – Fuel Delivery and Suspected Fuel Vapor Lock**

**Vehicles Affected**

Models	Model Year	Model Type	VIN Range	Vehicle-Specific Equipment
Panamera	As of 2017	971	N/A	N/A

**Revision History**

Revision	Release Date	Changes
0	November 29, 2021	Original document

**Condition**

Customer complains of a check engine light resulting from faults in the **DME** (e.g. DME V8 TFSI (ULEV/C6B)) for: P008700\_ Fault 000B16 "Fuel high-pressure system, pressure – below limit value" and/or P01C800\_ Fault 00403E "Fuel high-pressure system, bank 2, pressure – below limit value" accompanied by misfires, stalling and or a rough idling engine.

**Technical Background**

Controlled spark ignition over a wide-range of operating conditions (e.g. temperatures, altitudes) necessitates the altering of a fuel's volatility, or its vapor-forming characteristic as a function of temperature. Emissions reduction is also an optimization parameter considered for fuel formulation. The standard imposed by the Environmental Protection Agency to establish volatility tolerancing, establishes limits based on geographic region and calendar month. Design requirements for fuel delivery systems allow for such in fuel volatility; nonetheless, large deviations from allowed tolerances can cause delivery and injection issues resulting from a condition referred to as vapor lock. Vapor lock, characterized here as the premature vaporization of fuel in the delivery system prior to combustion, can cause the symptoms described in the 'Condition' section above. During colder months in colder regions, fuel volatility (vapor pressure) will be higher as compared against months where the average temperature is warmer. If this volatility exceeds established tolerances, especially at higher ambient temperatures and or higher altitudes, vapor lock can result, causing a loss of fuel pressure, thereby disrupting delivery.

However, it is important to first diagnose and rule out other causes before deeming vapor lock the suspected culprit.

Service Information

In an ideal diagnostic scenario, complaints for G2 vehicles consistent with the information provided above will be reproducible; and the same gasoline will be in the fuel tank as when the initial error experienced by the customer occurred. To reproduce suspected vapor lock, the engine should be idling at operating temperature, standing safely in an area that is warmer and without wind to support convection cooling of the radiator and other thermal components. The vehicle may need to idle for 15 min or more at operating temperature to develop possible vapor lock. If the issue is reproducible, logging with tester is useful to check both the low-pressure and high-pressure delivery circuits for possible causes before proceeding into diagnosis.

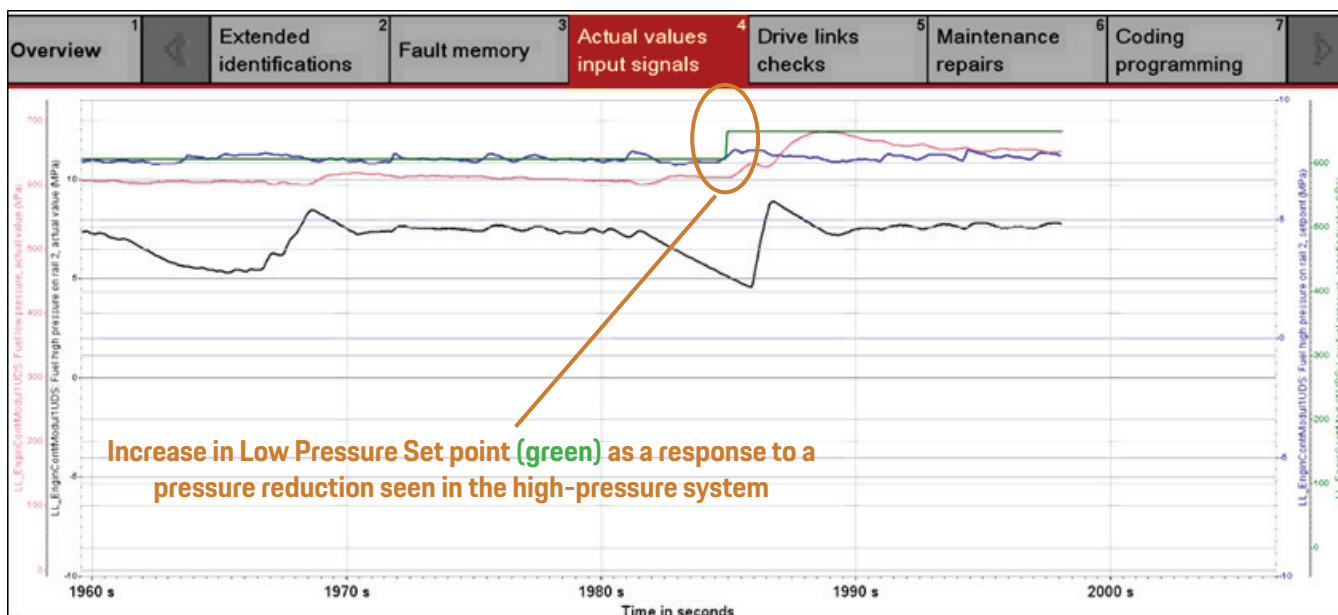


Figure 1 - Fuel Pressure Operation at Idle of a G2.I Configured with V8

Actual: Low-pressure fuel (≈ 5.5 – 6.5 bar)

Set point: Low-pressure fuel (6 – 6.5 bar)

Actual: High-pressure fuel bank (≈ 70 bar at idle)

Set point: high-pressure fuel bank 2 (≈ 70 bar at idle)

The plot in Figure 1 illustrates the behavior of the low-pressure circuit as controlled by the DME when significant drops in high-pressure occur (this specific function exists in V8 equipped order types). Specifically, we see the step-change in the low-pressure set point from 6 to 6.5 bar (green) to better supply the high-pressure circuit. The result in this instance is a correction to both the low- and high-pressure fuel systems, as witnessed by their respective actual values. In instances of extreme fuel volatility, vapor lock can otherwise result (see Figure 2). The design countermeasure exhibited in Figure 1 can be helpful, but may not remedy all, highly volatile situations. Figure 1 cites an example of properly functioning high and low pressure fuel circuits. It is important to first diagnose the high- and low-pressure circuits individually, starting with the low-pressure side, to rule out any physical issues with the systems (e.g. a blockage and or a faulty fuel pump).

Control unit	Type	Name	Value	Unit
DME V8 GTS 4.0L USA (LEV3)	Bank 2	Fuel high pressure on rail 2, actual value	0.6460	MPa
		Fuel high pressure rail 2, control deviation	16.3835	MPa
		Fuel high pressure on rail 2, setpoint	22.5080	MPa
	Bank 1	Fuel high pressure, actual value	0.6480	MPa
		High fuel pressure, control deviation	16.3835	MPa
		High fuel pressure, specified value	22.3020	MPa
Low Pressure okay ✓		Fuel low pressure, actual value	648.3	kPa
		Low fuel pressure, specified value	650.0	kPa
		Fuel temperature	101.3	°C
		Coolant temperature	105	°C

Figure 2 - Significant High Pressure Deviations, Banks 1 and 2

In contrast to Figure 1, the example in Figure 2 suggests the low-pressure fuel supply is functioning properly, but both high-pressure supplies for banks 1 and 2 are not.

If both the high- and low-pressure fuel delivery systems function as intended when trying to replicate the issue, but do not alleviate the concern, then please log the behavior of the system consistent with the signals and method used in Figure 1 (i.e. four fuel channels displayed in one graph). If the fuel quality is suspect, please collect a sample from the fuel in the vehicle for testing in accordance with ATI 2130. Please remove the suspect fuel from the tank and refill with fuel from a known, trusted and reliable source. Alternatively, from a pump or gas station used regularly by the business in its service and repair of Porsche vehicles. Please repeat the same diagnostic test used to replicate the suspected vapor lock, ensuring the issue is resolved. Please also collect a fuel sample from the known, 'good' source per ATI 2130.

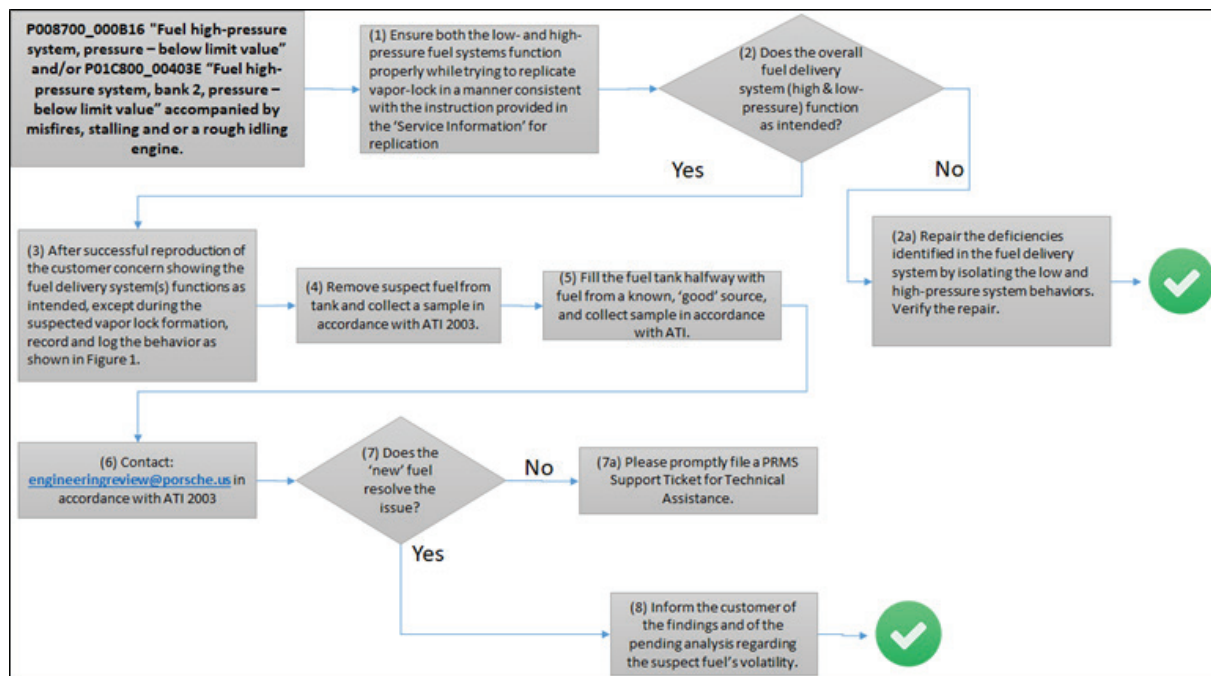


Figure 3 - Fault Tree for Diagnosing Suspected Vapor Lock

Upon arriving at 'Steps (4) and (5)' of Figure 2 please consult ATI 2130.

**Warranty**

As always, please document the repair completely in PQIS.

For this repair, please code the "cause" as follows:

Cause location: 20030 Fuel  
 Cause symptom: 5061 pressure too low

Use the following troubleshooting labor operation:

20029599 Checking low- and high-pressure fuel systems (100 TU)  
 20031750 Fuel drain and fill (78 TU)

**Search Items**

Vapor lock, vaporization, low-pressure fuel system, high-pressure fuel system, P008700\_000B16 "Fuel high-pressure system, pressure – below limit value" and/or P01C800\_00403E "Fuel high-pressure system, bank 2, pressure – below limit value", vapor pressure, winter fuel blend

**Important Notice:** Technical Bulletins issued by Porsche Cars North America, Inc. are intended only for use by professional automotive technicians who have attended Porsche service training courses. They are written to inform those technicians of conditions that may occur on some Porsche vehicles, or to provide information that could assist in the proper servicing of a vehicle. Porsche special tools may be necessary in order to perform certain operations identified in these bulletins. Use of tools and procedures other than those Porsche recommends in these bulletins may be detrimental to the safe operation of your vehicle, and may endanger the people working on it. Properly trained Porsche technicians have the equipment, tools, safety instructions, and know-how to do the job properly and safely. Part numbers listed in these bulletins are for reference only. The work procedures updated electronically in the Porsche PIWIS diagnostic and testing device take precedence and, in the event of a discrepancy, the work procedures in the PIWIS Tester are the ones that must be followed.