

Early Production Vehicle Evaluation (PVE) tests with CANoe.DiVa

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Table of Contents

1	Early PVE tests with CANoe.DiVa.....	3
1.1	Scope of the test.....	3
1.1.1	Supported IDs	3
1.1.2	Malfunctions and correct control of the MIL lamp	3
2	OBD-Test configuration	4
3	Information	6

1 Early PVE tests with CANoe.DiVa

Since CANoe.DiVa 11 it has been possible for OBD-capable ECUs to have specific tests performed automatically during SW validation, as they will later be required for final vehicle acceptance in PVE (Production Vehicle Evaluation).

This enables the ECU developer to check compliance with the communication protocol used in OBDOnUDS, OBD II or WWH-OBD and the correct activation of the MIL (warning lamp) at an early stage, thus avoiding later, cost-intensive troubleshooting corrections.



Figure 1: PVE tests as part of the ECU validation

1.1 Scope of the test

The OBD-specific tests in CANoe.DiVa consist of 2 parts:

- > Checking the supported IDs (PIDs, MIDs, TIDs, InfoTypes)
- > Verify that the MIL warning light is turned on correctly for each monitor

Note: Starting with CANoe.DiVa 17, the automatic execution of J1699-3 conformance tests for OBD2 is supported. From CANoe.DiVa 18, the execution of J1699-5 conformance tests for OBDOnUDS is also possible.

1.1.1 Supported IDs

For these tests the user can use an enclosed diagnostic description (OBDOnUDS, OBD II or WWH-OBD) or a separate diagnostic description (CDD/ ODX) of the OBD scopes of his ECU. The description matching the ECU enables additional completeness checks to be carried out.

1.1.2 Malfunctions and correct control of the MIL lamp

The test generated by CANoe.DiVa checks in six driving cycles whether the monitors recognize the error states (pending, confirmed, permanent) as expected and control the MIL correctly

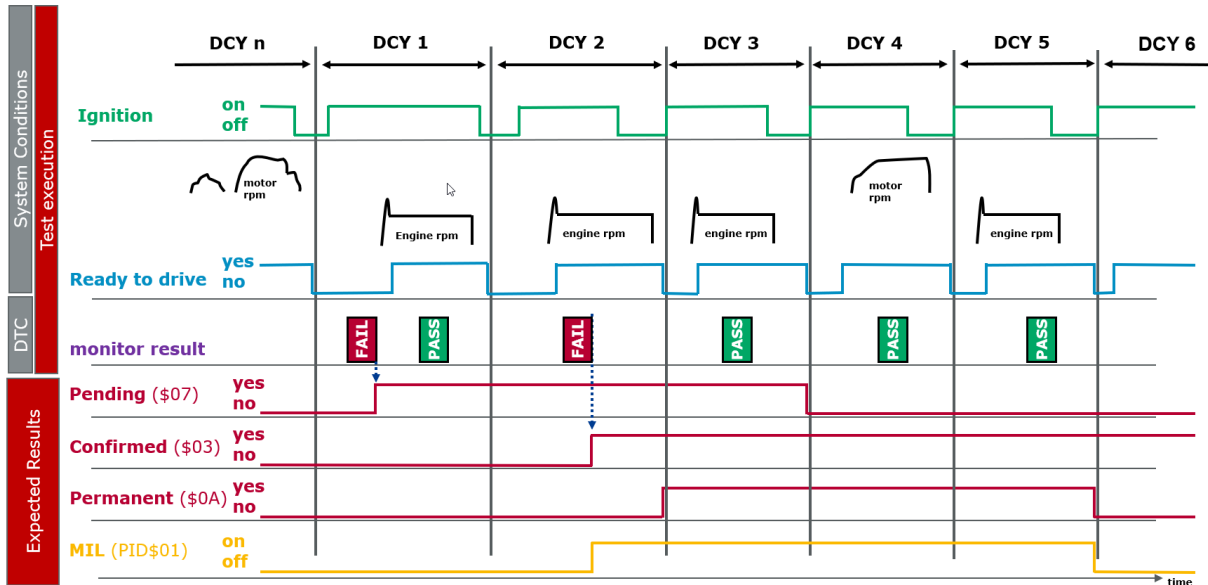


Figure 2: Typical sequence of a monitor test with CANoe.DiVa

2 OBD-Test configuration

To start an OBD CANoe-DiVa project, the user chooses between

- > „OBD“ with diagnostic description specific to the project

Or

- > „Build-In OBDonUDS“, „Build-In OBD“ or „Build-In WWHOBD“ for the generic diagnostic description

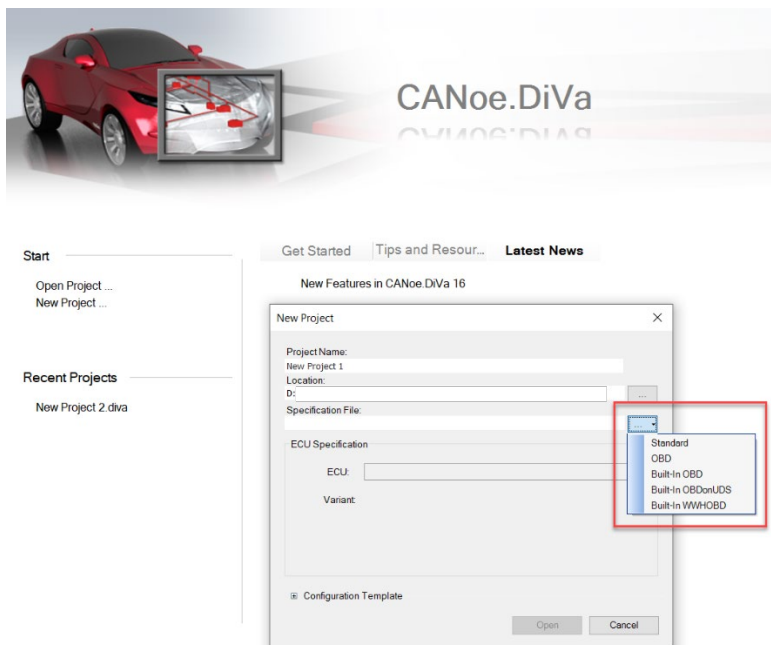


Figure 3: Selection of the underlying diagnostic specification for OBD tests

For each identifier it can be selected at test configuration time whether it should be tested.

PVE-My ECU.diva - Vector CANoe.DiVa

File Project Configuration Report View ?

File Generate Specification

OBD

Communication

- Test Timings
- ECU Node
- Tests

Diagnostic Services

- Services**
- Undefined Services
- Tests

Diagnostic Application

- DTCs
- Parameters
- Tests

Project Configuration

Test Configuration

Test Specification

ReportAnalysis

Select the services to test. Configure request and expected response values

Service	Signature	Protocol Service
☒ (PID \$00) PID supported, \$01 - \$20 Read current	0x01 00	Service \$01 - Request Current Powertrain Diagnostic Data
☒ (PID \$00) PID supported, \$01 - \$20 Request Freeze Frame	0x02 00	Service \$02 - Request Powertrain Freeze Frame Data
☐ (PID \$01) Status of monitors Read current	0x01 01	Service \$01 - Request Current Powertrain Diagnostic Data
☒ (PID \$01) Status of monitors Request Freeze Frame	0x02 01	Service \$02 - Request Powertrain Freeze Frame Data
☒ (PID \$02) DTC that Caused Freeze Frame Storage Read current	0x01 02	Service \$01 - Request Current Powertrain Diagnostic Data
☐ (PID \$02) DTC that Caused Freeze Frame Storage Request Freeze Frame	0x02 02	Service \$02 - Request Powertrain Freeze Frame Data
☒ (PID \$03) Fuel System Status Read current [...]	0x01 03	Service \$01 - Request Current Powertrain Diagnostic Data
☒ ValidRequest [...]		

Request Parameter	Raw	Symbolic	Sweep
SIDRQ	0x01	0x01	
PID	0x03	0x03	

Response Parameter	Raw	Symbolic
SIDPR	0x41	0x41
PID	0x03	0x03
Fuel system status.B - Open loop - has not yet satisfied conditions to go ...		
Fuel system status.B - Closed loop - using all oxygen sensor(s) as feedbac...		
Fuel system status.B - Open loop due to driving conditions (Bank 1 or bo...		
Fuel system status.B - Open loop - due to detected system fault (Bank 1 ...		
Fuel system status.B - Closed loop, but fault with at least one oxygen sen...		
Fuel system status.B - Open loop - has not yet satisfied conditions to go ...		
Fuel system status.B - Open loop due to driving conditions (Bank 2)		
Fuel system status.B - Open loop - due to detected system fault (Bank 2)		
Fuel system status.A - Open loop - has not yet satisfied conditions to go ...		
Fuel system status.A - Closed loop - using all oxygen sensor(s) as feedbac...		
Fuel system status.A - Open loop due to driving conditions (Bank 1 or bo...		
Fuel system status.A - Open loop - due to detected system fault (Bank 1 ...		
Fuel system status.A - Closed loop, but fault with at least one oxygen sen...		
Fuel system status.A - Open loop - has not yet satisfied conditions to go ...		
Fuel system status.A - Open loop due to driving conditions (Bank 2)		
Fuel system status.A - Open loop - due to detected system fault (Bank 2)		

Figure 4: Choice of the Identifiers to be tested

The stimulation of the respective OBD events and vehicle conditions can be individually adapted to the available test environment.

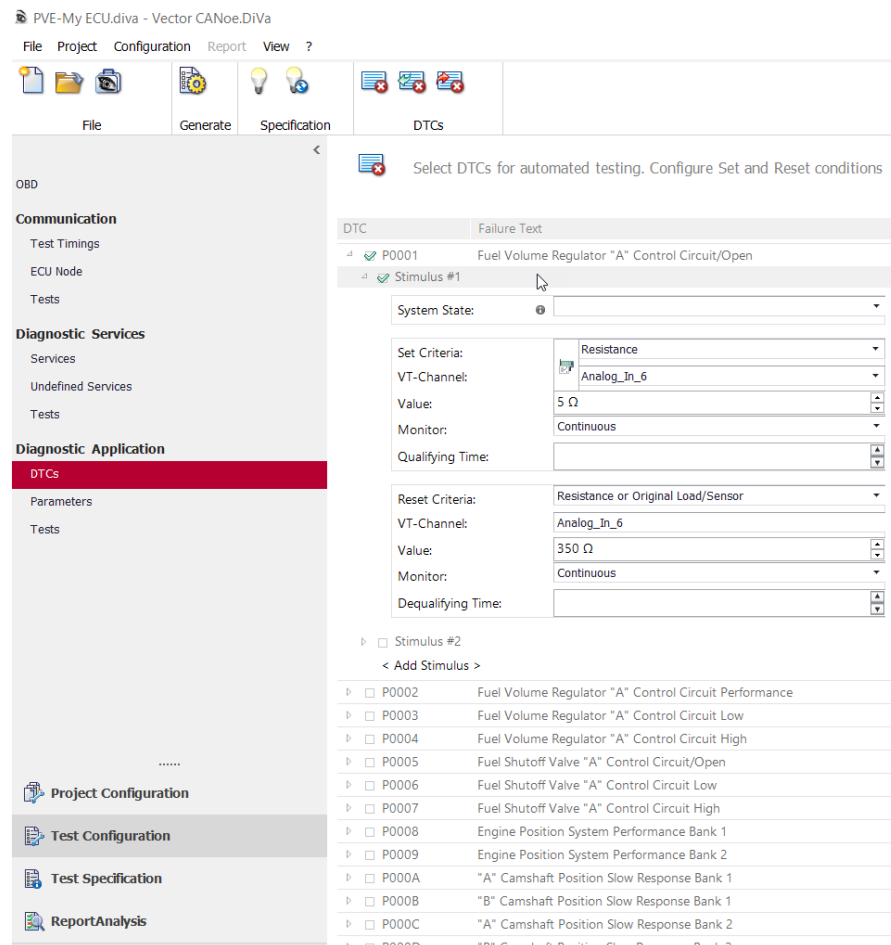


Figure 5: Configuration of stimulation for OBD events

In addition, thanks to the available [Vector Connection Utilities](#), CANoe.DiVa makes it easy to record OBD tests in an integrated test environment (i.e. Jenkins) and to run them automatically, e.g. promptly at night or later during a regression test.

More details can be found in the CANoe.DiVa online help under "OBD".

3 Information

- > For further questions please contact: canoe.diva-support@de.vector.com
- > Recorded Webinars on "Automated testing of diagnostic protocol implementation and integration in ECUs" can be found on CANoe.DiVa website: www.vector.com/diva or in with the following link: <https://www.vector.com/int/en/products/products-a-z/software/canoediva/#c6499>



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