

Service

Chassis ID	Path 284/Diagnostics//Engine control module (ECM), diagnostic trouble codes
Model	Identity 140225418
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Engine control module (ECM), diagnostic trouble codes

Note: More information about diagnostic trouble codes is available in Tech Tool.

Diagnostic Trouble Code	DTC Name	Failure Type	Pin on ECU	Failure Description	Additional Information
P001676	Crankshaft Position - Camshaft Position Correlation	Wrong Mounting Position	A14. EA:45 A14. EA:46	Event: Phase error due to incorrect angle between cam and flywheel Behavior: No information available	Root Cause: – Flywheel not correctly mounted Workshop action: Check: – Flywheel
P003A00	Turbocharger /Supercharger Boost Control "A" Position Exceeded Learning Limit	No Sub-type Information	N/A	Event: Self calibration failure detected by Turbocharger/Supercharger A Behavior: No information available	Root Cause: – Calibration of Turbocharger /Supercharger A failed Workshop action: Check: – Calibration of Turbocharger /Supercharger A
P004607	Turbocharger /Supercharger Boost Control "A" Circuit Range /Performance	Mechanical Failures	N/A	Event: Failure detected by Turbocharger /Supercharger A Behavior: Low power	Root Cause: – Turbocharger /Supercharger A is not following command Workshop action: Check: – Turbocharger /Supercharger A If fault is not detected: Fault trace according to Tech Tool fault tree
P006964	Manifold Absolute Pressure - Barometric Pressure Correlation	Signal Plausibility Failure	A14. EA:22	Event: Boost pressure compared to reference pressure below -15kPa OR Boost pressure compared to reference pressure above 15kPa Behavior: No information available	Root Cause: – Sensor failure Workshop action: Check: – Sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P006E00	Turbocharger /Supercharger Boost Control A Supply Voltage Circuit	No Sub-type Information	N/A	Event: Low voltage detected by Turbocharger /Supercharger A Behavior: Low power	Root Cause: – Low voltage detected by Turbocharger /Supercharger A

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					Workshop action: Check: – Low voltage detected by Turbocharger /Supercharger A
P007015	Ambient Air Temperature Sensor A	Circuit short to battery or open	N/A	Event: Sensor voltage above 4.5V Behavior: No information available	Root Cause: – Faulty sensor – Wiring harness – Ambient temperature below -30 degC (-22degF) Workshop action: Check: – Sensor – Wiring harness – Ambient temperature
P007164	Ambient Air Temperature Sensor Range /Performance	Signal Plausibility Failure	N/A	Event: Difference during Precrank between mean value of (Engine Exhaust Temperature, HC Heat Temperature, DPF Temperature) and Ambient Air Temperature above 40°C Behavior: No information available	Root Cause: – Malfunctioning Ambient Air Temperature Sensor Workshop action: Check: – Ambient Air Temperature Sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P007200	Ambient Air Temperature Circuit Low	No Sub-type Information	N/A	Event: Sensor voltage below 0.5 V Behavior: No information available	Root Cause: – Current above normal – Short circuit to ground Workshop action: Check: – Short circuit to ground If fault is not detected: Fault trace according to Tech Tool fault tree
P008700	Fuel Rail /System Pressure - Too Low Bank 1	No Sub-type Information	N/A	Event: The rail pressure below 260 bar above conditions must remain valid for 4s Behavior: Engine cranks but does not start	Root Cause: – Injector leakage – High pressure pipe leakage – Inlet metering valve with damaged connector/wiring harness – Bad fuel quality – Air leak in low

					<p>pressure system</p> <ul style="list-style-type: none"> - Empty fuel tank - High pressure pump damaged - Low fuel pressure circuit <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Any type of leak - Inlet metering valve with connector /harness - Fuel quality and level - High pressure pump - Low fuel pressure circuit <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P008A00	Low Pressure Fuel System Pressure - Too Low	No Sub-type Information	N/A	<p>Event: Aftertreatment 1 Fuel Pressure 1 below (200kPa + Offset dependent on fuel value and Engine Speed) OR Aftertreatment 1 Fuel Pressure 1 below (100kPa + Offset dependent on fuel value and Engine Speed)</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Fuel tank ventilation clogged or stuck closed - Fuel leak, e.g. leaking fuel lines - Air ingress in low-pressure circuit - AHI fuel pressure sensor malfunction - Clogged fuel filter, if the pressure sensor is placed between the fuel pump and the fuel filter - Fuel pump malfunction - Overflow valve stuck open <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Fuel tank ventilation - Fuel leak, e.g. leaking fuel lines - Air ingress in low-pressure circuit - AHI fuel pressure sensor - Fuel filter - Fuel pump - Overflow valve
P008B00	Low Pressure	No Sub-type	N/A	Event:	Root Cause:

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	Fuel System Pressure - Too High	Information		<p>Aftertreatment 1 Fuel Pressure 1 above (700kPa + Offset dependent on fuel value and Engine Speed)</p> <p>Behavior: No information available</p>	<ul style="list-style-type: none"> - Overflow valve stuck closed - Low Pressure - Fuel System Pressure Sensor malfunction (if this sensor is used) - Exhaust Aftertreatment Fuel Pressure Sensor malfunction (if this sensor is used) <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Overflow valve - Low Pressure - Fuel System Pressure Sensor (if this sensor is used) - Exhaust Aftertreatment Fuel Pressure Sensor (if this sensor is used) <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P009400	Fuel System Leak Detected - Small Leak	No Sub-type Information	N/A	<p>Event: During engine shutdown, an abnormal fuel pressure drop in the rail is observed during evaluation period</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Leaking fuel pressure release valve - Leaking high pressure fuel system - Rail fuel pressure sensor <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Fuel pressure release valve - High pressure fuel system - Rail fuel pressure sensor <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P009513	Intake Air Temperature Sensor 2 Bank 1	Circuit Open	A14. EA:47	<p>Event: Voltage on A:47 above 4.91V OR Voltage on A:47 above 0.15V and Voltage on A:47 below 0.29V</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action: Check:</p>

				Behavior: No information available	<ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P009664	Intake Air Temperature Sensor 2 Circuit Range /Performance (Bank 1)	Signal Plausibility Failure	A14. EA:47	Event: Difference during Pre crank between Boost Temperature and mean value of (EGR Temperature, Compressor Temperature, Engine Coolant Temperature) above 40°C Behavior: No information available	Root Cause: <ul style="list-style-type: none"> - Malfunctioning Intake Manifold Air Temperature Sensor Workshop action: Check: <ul style="list-style-type: none"> - Intake Manifold Air Temperature Sensor
P009700	Intake Air Temperature Sensor 2 Circuit Low (Bank 1)	No Sub-type Information	A14. EA:47	Event: Voltage on A:47 below 0.15V Behavior: No information available	Root Cause: <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P009A00	Engine Air Intake Temperature - Correlation	No Sub-type Information	A14. EA:47	Event: Difference between Sensed Boost Temperature and Modeled Boost Temperature below -45°C OR Difference between sensed boost temperature and modeled boost temperature above 45°C Behavior: No information available	Root Cause: <ul style="list-style-type: none"> - Temperature sensor drifting - Temperature sensor biased high or low - Temperature sensor broken Workshop action: Check: <ul style="list-style-type: none"> - Temperature sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P009B13	Fuel Pressure Relief Control	Circuit Open	A14. EA:17 A14. EA:18	Event: Either short circuit to battery, or open circuit is detected Behavior: Engine derate	Root Cause: <ul style="list-style-type: none"> - Open circuit in wiring harness, actuator or connector. - Short circuit to battery wiring harness, actuator or connector Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Actuator - Connector
P009C00	Fuel Pressure Relief Control Circuit Low	No Sub-type Information	A14. EA:17 A14.	Event: Short circuit to ground is detected	Root Cause: <ul style="list-style-type: none"> - Wiring harness, actuator or connector

			EA:18	Behavior: Engine derate	is short circuited to ground voltage Workshop action: Check: - Wiring harness - Actuator - Connector
P009D00	Fuel Pressure Relief Control Circuit High	No Sub-type Information	A14. EA:17 A14. EA:18	Event: Short circuit to battery is detected Behavior: Engine derate	Root Cause: - Wiring harness, actuator or connector is short circuited to battery voltage. Workshop action: Check: - Wiring harness - Actuator - Connector
P009E73	Fuel Pressure Relief Control Performance / Stuck Off	Actuator Stuck Closed	N/A	Event: Fuel Pressure Relief Valve is considered stuck closed when the fuel rail pressure deviates from the expected after a requested opening of the valve Behavior: Engine derate	Root Cause: - Fuel Pressure Relief Valve stuck closed - Fuel Pressure Relief Valve wiring harness or connector - Injection Pump Fuel Valve stuck open - Injection Pump Fuel Valve wiring harness or connector - Rail Pressure Sensor faulty Workshop action: Check: - Fuel Pressure Relief Valve - Injection Pump Fuel Valve - Rail pressure sensor - Wiring harness and connector If fault is not detected: Fault trace according to Tech Tool fault tree
P00AF00	Turbocharger /Supercharger Boost Control "A" Module Performance	No Sub-type Information	N/A	Event: Internal failure detected by Turbocharger/Supercharger A Behavior: Low power	Root Cause: - Internal actuator fault in Turbocharger /Supercharger A Workshop action: Check: - Turbocharger

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					/Supercharger A If fault is not detected: Fault trace according to Tech Tool fault tree
P00C600	Fuel Rail Pressure Too Low - Engine Cranking	No Sub-type Information	N/A	<p>Event: The rail pressure during cranking phase below 285 bar above conditions must remain valid for 15s</p> <p>Behavior: Engine cranks but does not start</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Injector leakage - High pressure pipe leakage - Inlet metering valve with damaged connector/wiring harness - Bad fuel quality - Air leak in low pressure system - Empty fuel tank - High pressure pump damaged - Low fuel pressure circuit <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Injector - High pressure pipe - Inlet metering valve with connector/wiring harness - Bad fuel quality - Air leak in low pressure system - Empty fuel tank - High pressure pump - Low fuel pressure circuit
P010513	Manifold Absolute Pressure /Barometric Pressure Sensor	Short Circuit to Battery	A14. EA:22	<p>Event: Voltage on A:22 above 4.70V and Voltage on A:22 below 4.85V OR Voltage on A:22 below 0.29V</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P010800	Manifold Absolute Pressure /Barometric Pressure Sensor Circuit High	No Sub-type Information	A14. EA:22	<p>Event: Voltage on A:22 above 4.85V</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness

					<ul style="list-style-type: none"> - Sensor - ECU
P011013	Intake Air Temperature Sensor 1 Bank 1	Circuit Open	A14. EB:43	Event: Voltage on B:43 above 0.75V OR Voltage on B:43 above 0.06V and voltage on B:43 below 0.17V Behavior: No information available	Root Cause: <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P011164	Intake Air Temperature Sensor 1 Circuit Range /Performance Bank 1	Signal Plausibility Failure	A14. EB:43	Event: Difference during Pre crank between Compressor Temperature and mean value of (EGR Temperature, Engine Coolant Temperature, Boost Temperature) above 40°C Behavior: No information available	Root Cause: <ul style="list-style-type: none"> - Malfunctioning Compressor Discharge Temperature Sensor Workshop action: Check: <ul style="list-style-type: none"> - Compressor Discharge Temperature Sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P011200	Intake Air Temperature Sensor 1 Circuit Low Bank 1	No Sub-type Information	A14. EB:43	Event: Voltage on B:43 below 0.06V Behavior: No information available	Root Cause: <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P011513	Engine Coolant Temperature Sensor 1	Circuit Open	A14. EB:27	Event: Voltage on B:27 above 4.91V OR Voltage on B:27 above 0.15V and voltage on B:27 below 0.23V Behavior: No information available	Root Cause: <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P01162A	Engine Coolant Temperature Circuit Range /Performance	Signal Stuck In Range	A14. EB:27	Event: Difference during Pre crank between Engine Coolant Temperature and mean value of (EGR Temperature, Compressor Temperature, Boost Temperature) above 40°C	Root Cause: <ul style="list-style-type: none"> - Malfunctioning engine coolant temperature sensor Workshop action: Check:

				<p>Behavior: Engine cooling fan does not shut off Engine does not reach normal operating temperature Engine cooling fan inoperative Engine overheating</p>	<p>– Engine coolant temperature sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P011700	Engine Coolant Temperature Circuit Low	No Sub-type Information	A14. EB:27	<p>Event: Voltage on B:27 below 0.15V</p> <p>Behavior: No information available</p>	<p>Root Cause: – Wiring harness fault – Sensor fault – ECU fault</p> <p>Workshop action: Check: – Wiring harness – Sensor – ECU</p>
P012200	Throttle/Pedal Position Sensor /Switch "A" Circuit Low	No Sub-type Information	N/A	<p>Event: Sensor voltage below 0.38 V</p> <p>Behavior: Poor accelerator pedal response</p>	<p>Root Cause: – Throttle/Pedal Position Sensor /Switch "A" input is short to ground – Throttle/Pedal Position Sensor /Switch "A" input is open circuit – Pedal is broken</p> <p>Workshop action: Check: – Throttle/Pedal Position Sensor /Switch "A" – Pedal If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P012300	Throttle/Pedal Position Sensor /Switch "A" Circuit High	No Sub-type Information	N/A	<p>Event: Sensor voltage above 4.25 V</p> <p>Behavior: Poor accelerator pedal response</p>	<p>Root Cause: – Throttle/Pedal Position Sensor /Switch "A" input is short to battery – Pedal is broken</p> <p>Workshop action: Check: – Throttle/Pedal Position Sensor /Switch "A" – Pedal If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P012800	Coolant	No Sub-type Information	N/A	<p>Event:</p>	<p>Root Cause:</p>

	Thermostat (Coolant Temp Below Thermostat Regulating Temperature)	Information		<p>Engine Coolant Temperature below Table derived value dependent on Average Engine Torque (typically 71 C)</p> <p>Behavior: Engine does not reach normal operating temperature</p>	<p>– Coolant thermostat leaking or blocked open – Coolant temperature sensor offset</p> <p>Workshop action: Check: – Coolant thermostat – Coolant temperature sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P016E00	Closed Loop Fuel Pressure Control At Limit - Pressure Too High	No Sub-type Information	N/A	<p>Event: Average rail pressure deviation above 140 bar above conditions must remain valid for 5s.</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Rotated cam profile – Leaking fuel pressure release valve – Fuel pressure regulator – Low fuel pressure system – Bad fuel quality – Pressure release valve stuck closed</p> <p>Workshop action: Check: – Rotated cam profile – Fuel pressure release valve – Fuel pressure regulator – Low fuel pressure system – Fuel quality If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P016F00	Closed Loop Fuel Pressure Control At Limit - Pressure Too Low	No Sub-type Information	N/A	<p>Event: Average rail pressure deviation below -140 bar above conditions must remain valid for 5s.</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Inlet metering valve with damaged connector/wiring harness – Leaking fuel pressure release valve – Leaking high pressure fuel system – High fuel pressure pump – Fuel pressure regulator – Low fuel pressure</p>

					<p>system, fuel supply</p> <p>Workshop action: Check: – Inlet metering valve – Fuel pressure release valve – High pressure fuel system – High fuel pressure pump – Fuel pressure regulator – Low fuel pressure system, fuel supply If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P019013	Fuel Rail Pressure Sensor Bank 1	Circuit Open	A14. EA:19	<p>Event: Voltage on A:19 above 4.88V OR Voltage on A:19 above 0.15V and Voltage on A:19 below 0.37V</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Wiring harness fault – Sensor fault – ECU fault</p> <p>Workshop action: Check: – Wiring harness – Sensor – ECU</p>
P019164	Fuel Rail Pressure Sensor Circuit Range /Performance Bank 1	Signal Plausibility Failure	A14. EA:19	<p>Event: Evaluation performed before engine start: Rail pressure above (150bar + Offset dependent on coolant temperature drop and Time since engine was running) OR Rail pressure below -100bar OR Evaluation performed while engine running: rail pressure fluctuation less than expected</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Fuel Rail Pressure Sensor Bank 1: Connector and/or pins corroded – Fuel Rail Pressure Sensor Bank 1: Damaged insulation on the sensor wiring harness – Fuel Rail Pressure Sensor Bank 1: Broken</p> <p>Workshop action: Check: – Fuel rail pressure sensor bank 1 – Connector and wiring harness If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P019200	Fuel Rail Pressure	No Sub-type Information	A14. EA:19	<p>Event: Voltage on A:19 below 0.15V</p>	<p>Root Cause: – Wiring harness fault</p>

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	Sensor Circuit Low Bank 1			Behavior: Engine derate	<ul style="list-style-type: none"> - Sensor fault - ECU fault Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P019400	Fuel Rail Pressure Sensor Circuit Intermittent /Erratic Bank 1	No Sub-type Information	A14. EA:19	Event: Significant rail pressure signal transition when none or minor expected Behavior: Engine derate	Root Cause: <ul style="list-style-type: none"> - Fuel Rail Pressure Sensor Bank 1: Connector and/or pins corroded - Fuel Rail Pressure Sensor Bank 1: Damaged insulation on the sensor wiring harness - Fuel Rail Pressure Sensor Bank 1: Broken Workshop action: Check: <ul style="list-style-type: none"> - Fuel rail pressure sensor bank 1 - Connector and wiring harness If fault is not detected: Fault trace according to Tech Tool fault tree
P019513	Engine Oil Temperature Sensor "A"	Circuit Open	A14. EA:31	Event: Voltage on A:31 above 4.93V Behavior: No information available	Root Cause: <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P019664	Engine Oil Temperature Sensor Range /Performance	Signal Plausibility Failure	A14. EA:31	Event: Difference during Pre crank between Oil Temperature and mean value of (EGR Temperature, Boost Temperature, Compressor Temperature, Engine Coolant Temperature) above 40°C Behavior: No information available	Root Cause: <ul style="list-style-type: none"> - Oil temperature sensor failure Workshop action: Check: <ul style="list-style-type: none"> - Oil temperature sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P019700	Engine Oil	No Sub-type	A14.	Event:	Root Cause:

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	Temperature Sensor Circuit Low	Information	EA:31	Voltage on A:31 below 0.10V Behavior: No information available	<ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P01991F	Engine Oil Temperature Sensor Circuit Intermittent /Erratic	Circuit Intermittent	A14. EA:31	Event: Abnormally high rate of change of the oil temperature sensor signal. Intermittent fault. Behavior: No information available	Root Cause: <ul style="list-style-type: none"> - Sensor fault - Wiring fault - ECU fault Workshop action: Check: <ul style="list-style-type: none"> - Replace the combined oil level and temperature sensor in the oil pan.
P020113	Cylinder 1 Injector "A"	Circuit Open	A14. EA:62 A14. EA:20	Event: Current driving the injector rises too slowly Behavior: Engine derate	Root Cause: <ul style="list-style-type: none"> - Wiring harness issue - Actuator broken - Connector detached Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Actuator - Connector
P020213	Cylinder 2 Injector "A"	Circuit Open	A14. EA:62 A14. EA:12	Event: Current driving the injector rises too slowly Behavior: Engine derate	Root Cause: <ul style="list-style-type: none"> - Wiring harness - Actuator broken - Connector detached Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Actuator - Connector
P020313	Cylinder 3 Injector "A"	Circuit Open	A14. EA:62 A14. EA:28	Event: Current driving the injector rises too slowly Behavior: Engine derate	Root Cause: <ul style="list-style-type: none"> - Wiring harness - Actuator broken - Connector detached Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Actuator - Connector
P020413	Cylinder 4 Injector "A"	Circuit Open	A14. EA:61 A14.	Event: Current driving the injector rises too slowly	Root Cause: <ul style="list-style-type: none"> - Wiring harness - Actuator broken

			EA:52	Behavior: Engine derate	– Connector detached Workshop action: Check: – Wiring harness – Actuator – Connector
P020513	Cylinder 5 Injector "A"	Circuit Open	A14. EA:61 A14. EA:44	Event: Current driving the injector rises too slowly Behavior: Engine derate	Root Cause: – Wiring harness – Actuator broken – Connector detached Workshop action: Check: – Wiring harness – Actuator – Connector
P020613	Cylinder 6 Injector "A"	Circuit Open	A14. EA:61 A14. EA:36	Event: Current driving the injector rises too slowly Behavior: Engine derate	Root Cause: – Wiring harness – Actuator broken – Connector detached Workshop action: Check: – Wiring harness – Actuator – Connector
P021700	Engine Coolant Over Temperature Condition	No Sub-type Information	N/A	Event: Engine Coolant Temperature high Behavior: Engine derate	Root Cause: – Extreme driving conditions, resulting in too high temperature – The coolant thermostat is broken – Problems with the fan – The radiator is blocked Workshop action: Check: – Extreme driving conditions – The coolant thermostat – The fan – The radiator
P021800	Transmission Fluid Over Temperature Condition	No Sub-type Information	N/A	Event: Sensor - Gearbox Oil Temperature high Behavior: Engine derate	Root Cause: – Transmission cooler failure – Cooling system problem Workshop action:

					<p>Check:</p> <ul style="list-style-type: none"> - Transmission cooler - Cooling system problem
P021900	Engine Overspeed Condition	No Sub-type Information	N/A	<p>Event: Too high engine speed detected</p> <p>Behavior: Engine shuts off unexpectedly - Only at low speed</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Too high engine speed <p>Workshop action: Check: - Engine speed</p>
P023400	Turbocharger /Supercharger Overboost Condition	No Sub-type Information	N/A	<p>Event: Difference between sensed boost pressure and estimated boost pressure above 45kPa.</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Blocked wastegate - Boost pressure sensor biased high <p>Workshop action: Check: - Wastegate - Boost pressure sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P025614	Injection Pump Fuel Metering Control B	Short Circuit to Ground or Open	A14. EA:59 A14. EA:16	<p>Event: Current driving the injector rises too slowly</p> <p>Behavior: Low power</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness issue - Actuator broken - Connector detached <p>Workshop action: Check: - Wiring harness and connector - Actuator</p>
P025700	Injection Pump Fuel Metering Control "B" Range /Performance (Cam/Rotor /Injector)	No Sub-type Information	N/A	<p>Event: Loss of high fuel pressure pumping capacity</p> <p>Behavior: Engine derate</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - High fuel pressure pump - Rotated cam profile <p>Workshop action: Check: - High fuel pressure pump - Cam profile</p>
P025900	Injection Pump Fuel Metering Control "B" High	No Sub-type Information	A14. EA:59 A14. EA:16	<p>Event: Current driving the injector rises too quickly</p> <p>Behavior: Low power</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness issue - Short circuit to battery - Actuator broken <p>Workshop action: Check: - Wiring harness and</p>

					connector – Actuator
P026200	Cylinder 1 Injector Circuit High	No Sub-type Information	A14. EA:62 A14. EA:20	Event: Current driving the injector rises too quickly Behavior: Engine derate	Root Cause: – Wiring harness issue – Short circuit to battery – Actuator broken Workshop action: Check: – Wiring harness and connector – Actuator
P026500	Cylinder 2 Injector Circuit High	No Sub-type Information	A14. EA:62 A14. EA:12	Event: Current driving the injector rises too quickly Behavior: Engine derate	Root Cause: – Wiring harness issue – Short circuit to battery – Actuator broken Workshop action: Check: – Wiring harness and connector – Actuator
P026800	Cylinder 3 Injector Circuit High	No Sub-type Information	A14. EA:62 A14. EA:28	Event: Current driving the injector rises too quickly Behavior: Engine derate	Root Cause: – Wiring harness issue – Short circuit to battery – Actuator broken Workshop action: Check: – Wiring harness and connector – Actuator
P026A00	Charge Air Cooler Efficiency Below Threshold	No Sub-type Information	N/A	Event: Ratio between Modeled CaC Temp and difference between Modeled Deteriorated and Modeled Nominal CaC Temp below 0.001ratio. Behavior: No information available	Root Cause: – Deteriorated charge air cooler Workshop action: Check: – Charge air cooler If fault is not detected: Fault trace according to Tech Tool fault tree
P026C00	Fuel Injection Quantity Lower Than Expected	No Sub-type Information	N/A	Event: Average of the ratio between estimated and requested fuel quantity above 85%. Behavior: Low power	Root Cause: – Bad quality or incorrect type of fuel being used – Air in fuel – EGR Valve stuck closed – Leak in the exhaust

					<p>system</p> <ul style="list-style-type: none"> - Coolant leak into the air path - Coolant leak into the combustion chamber - Combustion gases leak into the low pressure system - Combustion gases leak into the coolant - Low base engine compression - Fuel injectors injecting low quantity <p>Workshop action:</p> <p>Check:</p> <ul style="list-style-type: none"> - Fuel - Air in fuel - EGR valve - Leak in the exhaust system - Coolant leak - Combustion gases leak - Low base engine compression - Fuel injectors <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P026D00	Fuel Injection Quantity Higher Than Expected	No Sub-type Information	N/A	<p>Event: 128% above Average of the ratio between estimated and requested fuel quantity.</p> <p>Behavior: High fuel consumption</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Leakage from the aftertreatment hydrocarbon injector (AHI) - Oil leakage from the turbocharger - EGR Valve stuck open - Bad quality or incorrect type of fuel being used - Combustion gases leak into the coolant system - Combustion gases leak into the low pressure fuel system - Low base engine compression - Fuel injectors injecting high quantity

					<p>Workshop action: Check: – Leakage from the aftertreatment hydrocarbon injector (AHI) – Oil leakage from the turbocharger – EGR valve – Fuel – Combustion gases leak – Low base engine compression – Fuel injectors If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P027100	Cylinder 4 Injector Circuit High	No Sub-type Information	A14. EA:61 A14. EA:52	<p>Event: Current driving the injector rises too quickly Behavior: Engine derate</p>	<p>Root Cause: – Wiring harness issue – Short circuit to battery – Actuator broken Workshop action: Check: – Wiring harness – Short circuit to battery – Actuator</p>
P027400	Cylinder 5 Injector Circuit High	No Sub-type Information	A14. EA:61 A14. EA:44	<p>Event: Current driving the injector rises too quickly Behavior: Engine derate</p>	<p>Root Cause: – Wiring harness issue – Short circuit to battery – Actuator broken Workshop action: Check: – Wiring harness – Short circuit to battery – Actuator</p>
P027700	Cylinder 6 Injector Circuit High	No Sub-type Information	A14. EA:61 A14. EA:36	<p>Event: Current driving the injector rises too quickly Behavior: Engine derate</p>	<p>Root Cause: – Wiring harness issue – Short circuit to battery – Actuator broken Workshop action: Check: – Wiring harness – Short circuit to</p>

					battery – Actuator
P027E00	Cold Start Fuel Injection Quantity Lower Than Expected	No Sub-type Information	N/A	<p>Event: Average of the ratio between estimated and requested fuel quantity above 85%.</p> <p>Behavior: Low power</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> – Bad quality or incorrect type of fuel being used – Air in fuel – EGR Valve stuck closed – Leak in the exhaust system – Coolant leak into the air path – Coolant leak into the combustion chamber – Combustion gases leak into the low pressure system – Combustion gases leak into the coolant – Low base engine compression – Fuel injectors injecting low quantity <p>Workshop action: Check:</p> <ul style="list-style-type: none"> – Fuel – Air in fuel – EGR valve – Leak in the exhaust system – Coolant leak – Combustion gases leak – Low base engine compression – Fuel injectors <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P027F00	Cold Start Fuel Injection Quantity Higher Than Expected	No Sub-type Information	N/A	<p>Event: 128% above Average of the ratio between estimated and requested fuel quantity.</p> <p>Behavior: High fuel consumption</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> – Leakage from the aftertreatment hydrocarbon injector (AHI) – Oil leakage from the turbocharger – EGR Valve stuck open – Bad quality or incorrect type of fuel being used – Combustion gases

					<p>leak into the coolant system</p> <ul style="list-style-type: none"> - Combustion gases leak into the low pressure fuel system - Low base engine compression - Fuel injectors injecting high quantity <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Leakage from the aftertreatment hydrocarbon injector (AHI) - Oil leakage from the turbocharger - EGR valve - Fuel - Combustion gases leak - Low base engine compression - Fuel injectors <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P029800	Engine Oil Over Temperature	No Sub-type Information	N/A	<p>Event: Engine Oil Temperature (EOT) over temperature</p> <p>Behavior: Engine derate</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Extreme driving conditions <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Driving conditions
P029900	Turbocharger /Supercharger Underboost	No Sub-type Information	N/A	<p>Event: Difference between sensed boost pressure and estimated boost pressure below -45kPa.</p> <p>Behavior: Low power</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Significant leakage in intake air system - Boost pressure sensor biased low <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Leakage in intake air system - Boost pressure sensor <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P02CC00	Cylinder 1 Fuel Injector Offset Learning at Min	No Sub-type Information	N/A	<p>Event: -100 Percentage below Cylinder balancing fueling offset ratios in</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Losses via PTO or other power

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	Limit			percentage of the fault code limit for each injector. Behavior: Uneven torque	consuming equipment – Worn injector – Cracked injector tip – Damaged spray holes in the injector Workshop action: Check: – Losses via PTO or other power consuming equipment – Injector – Injector tip – Spray holes in the injector
P02CD00	Cylinder 1 Fuel Injector Offset Learning at Max Limit	No Sub-type Information	N/A	Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector. Behavior: Uneven torque	Root Cause: – Losses via PTO or other power consuming equipment – VCB valve malfunction – Worn injector cam lobe – Unadjusted tappet clearance for valves or unit injectors – Misaligned or broken valve springs or guides – Cracked valves – Piston/cylinder worn /damaged – Worn injector – Cracked injector tip – Damaged spray holes in the injector Workshop action: Check: – PTO – VCB valve – Injector cam lobe – Valves and unit injectors – Piston/cylinder
P02CE00	Cylinder 2 Fuel Injector Offset Learning at Min Limit	No Sub-type Information	N/A	Event: -100 Percentage below Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector.	Root Cause: – Losses via PTO or other power consuming equipment – Worn injector – Cracked injector tip – Damaged spray holes in the injector

				Behavior: Uneven torque	Workshop action: Check: – PTO – Injector
P02CF00	Cylinder 2 Fuel Injector Offset Learning at Max Limit	No Sub-type Information	N/A	Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector. Behavior: Uneven torque	Root Cause: – Losses via PTO or other power consuming equipment – VCB valve malfunction – Worn injector cam lobe – Unadjusted tappet clearance for valves or unit injectors – Misaligned or broken valve springs or guides – Cracked valves – Piston/cylinder worn/damaged – Worn injector – Cracked injector tip – Damaged spray holes in the injector Workshop action: Check: – PTO or other power consuming equipment – VCB valve – Injector – Clearance for valves or unit injectors – Valve – Piston/cylinder
P02D000	Cylinder 3 Fuel Injector Offset Learning at Min Limit	No Sub-type Information	N/A	Event: -100% below Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector Behavior: Uneven torque	Root Cause: – Losses via PTO or other power consuming equipment – Worn injector – Cracked injector tip – Damaged spray holes in the injector Workshop action: Check: – PTO or other power consuming equipment – Injector
P02D100	Cylinder 3 Fuel Injector Offset	No Sub-type Information	N/A	Event: 100% above Cylinder balancing fueling	Root Cause: – Losses via PTO or

	Learning at Max Limit			<p>offset ratios in percentage of the fault code limit for each injector</p> <p>Behavior: Uneven torque</p>	<p>other power consuming equipment</p> <ul style="list-style-type: none"> - VCB valve malfunction - Worn injector cam lobe - Unadjusted tappet clearance for valves or unit injectors - Misaligned or broken valve springs or guides - Cracked valves - Piston/cylinder worn /damaged - Worn injector - Cracked injector tip - Damaged spray holes in the injector <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - PTO or other power consuming equipment - VCB valve - Injector - Clearance for valves or unit injectors - Valve - Piston/cylinder
P02D200	Cylinder 4 Fuel Injector Offset Learning at Min Limit	No Sub-type Information	N/A	<p>Event: -100% below Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector</p> <p>Behavior: Uneven torque</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Losses via PTO or other power consuming equipment - Worn injector - Cracked injector tip - Damaged spray holes in the injector <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - PTO or other power consuming equipment - Injector
P02D300	Cylinder 4 Fuel Injector Offset Learning at Max Limit	No Sub-type Information	N/A	<p>Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector</p> <p>Behavior: Uneven torque</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Losses via PTO or other power consuming equipment - VCB valve malfunction - Worn injector cam lobe - Unadjusted tappet

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					<p>clearance for valves or unit injectors</p> <ul style="list-style-type: none"> - Misaligned or broken valve springs or guides - Cracked valves - Piston/cylinder worn /damaged - Worn injector - Cracked injector tip - Damaged spray holes in the injector <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - PTO or other power consuming equipment - VCB valve - Injector - Clearance for valves or unit injectors - Valve - Piston/cylinder
P02D400	Cylinder 5 Fuel Injector Offset Learning at Min Limit	No Sub-type Information	N/A	<p>Event: -100% below Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector</p> <p>Behavior: Uneven torque</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Losses via PTO or other power consuming equipment - Worn injector - Cracked injector tip - Damaged spray holes in the injector <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - PTO or other power consuming equipment - Injector
P02D500	Cylinder 5 Fuel Injector Offset Learning at Max Limit	No Sub-type Information	N/A	<p>Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector</p> <p>Behavior: Uneven torque</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Losses via PTO or other power consuming equipment - VCB valve malfunction - Worn injector cam lobe - Unadjusted tappet clearance for valves or unit injectors - Misaligned or broken valve springs or guides - Cracked valves - Piston/cylinder worn

					<p>/damaged</p> <ul style="list-style-type: none"> - Worn injector - Cracked injector tip - Damaged spray holes in the injector <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - PTO or other power consuming equipment - VCB valve - Injector - Clearance for valves or unit injectors - Valve - Piston/cylinder
P02D600	Cylinder 6 Fuel Injector Offset Learning at Min Limit	No Sub-type Information	N/A	<p>Event: -100% below Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector</p> <p>Behavior: Uneven torque</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Losses via PTO or other power consuming equipment - Worn injector - Cracked injector tip - Damaged spray holes in the injector <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - PTO or other power consuming equipment - Injector
P02D700	Cylinder 6 Fuel Injector Offset Learning at Max Limit	No Sub-type Information	N/A	<p>Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector</p> <p>Behavior: Uneven torque</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Losses via PTO or other power consuming equipment - VCB valve malfunction - Worn injector cam lobe - Unadjusted tappet clearance for valves or unit injectors - Misaligned or broken valve springs or guides - Cracked valves - Piston/cylinder worn <p>/damaged</p> <ul style="list-style-type: none"> - Worn injector - Cracked injector tip - Damaged spray holes in the injector <p>Workshop action:</p>

					<p>Check:</p> <ul style="list-style-type: none"> - PTO or other power consuming equipment - VCB valve - Injector - Clearance for valves or unit injectors - Valve - Piston/cylinder
P02E013	Diesel Intake Air Flow Control	Circuit Open	A14. EB:5 A14. EB:1	<p>Event: Open circuit fault is detected</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness - Actuator - Connector - Open circuit <p>Workshop action:</p> <p>Check:</p> <ul style="list-style-type: none"> - Wiring harness - Actuator - Connector - Open circuit
P02E200	Diesel Intake Air Flow Control Circuit Low	No Sub-type Information	A14. EB:5 A14. EB:1	<p>Event: Short circuit to ground is detected</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness - Actuator - Connector - Short circuit to ground voltage <p>Workshop action:</p> <p>Check:</p> <ul style="list-style-type: none"> - Wiring harness - Actuator - Connector - Short circuit
P02E300	Diesel Intake Air Flow Control Circuit High	No Sub-type Information	A14. EB:5 A14. EB:1	<p>Event: Short circuit to battery is detected</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness - Actuator - Connector - Short circuit to battery voltage <p>Workshop action:</p> <p>Check:</p> <ul style="list-style-type: none"> - Wiring harness - Actuator - Connector - Short circuit
P02E613	Diesel Intake Air Flow Position Sensor	Circuit Open	A14. EB:24	<p>Event: Voltage on B:24 above 4.76V and voltage on B:24 below 4.85V OR Voltage on B:24 below 0.25V</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action:</p>

				Behavior: No information available	Check: – Wiring harness – Sensor – ECU
P02E900	Diesel Intake Air Flow Position Sensor Circuit High	No Sub-type Information	A14. EB:24	Event: Voltage on B:24 above 4.85V Behavior: No information available	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU
P02EC00	Diesel Intake Air Flow Control System - High Air Flow Detected	No Sub-type Information	N/A	Event: Throttle position - demanded throttle position above 10% Behavior: No information available	Root Cause: – Malfunctioning intake throttle valve Workshop action: Check: – Intake throttle valve
P02ED00	Diesel Intake Air Flow Control System - Low Air Flow Detected	No Sub-type Information	N/A	Event: Demanded throttle position - throttle position above 10% Behavior: No information available	Root Cause: – Malfunctioning intake throttle valve Workshop action: Check: – Intake throttle valve
P02FA97	Diesel Intake Air Flow Position Sensor Minimum /Maximum Stop Performance	Component or System Operation Obstructed or Blocked	N/A	Event: not Maximum Opened Throttle Position between 78.3deg and 84.7deg and not Minimum Closed Throttle Position between -2.8deg and 2.8deg Behavior: No information available	Root Cause: – Malfunctioning intake throttle valve Workshop action: Check: – Intake throttle valve
P030000	Random Misfire Detected	No Sub-type Information	N/A	Event: Total misfire rate above 5%. Behavior: Uneven torque	Root Cause: – Power consuming equipment - such as power take-off, idler wheels, air compressor, power steering pump, air condition pump - are connected in an unsupported way – Air in fuel system – Fuel quality – Cylinder compression – Valve mechanism – Unadjusted injector tappet clearance

					<ul style="list-style-type: none"> - Fuel injectors - Volvo Engine Brake - EGR - Presence of coolant in a combustion chamber <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Power consuming equipment - Air in fuel system - Fuel quality - Cylinder compression - Valve mechanism - Injector - Fuel injectors - Volvo Engine Brake - EGR - Coolant in a combustion chamber <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P030100	Cylinder 1 Misfire Detected	No Sub-type Information	N/A	<p>Event: Misfire rate for cylinder 1 above 80%.</p> <p>Behavior: The engine misfires</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Power consuming equipment - such as power take-off, idler wheels, air compressor, power steering pump, air condition pump - are connected in an unsupported way - Air in fuel system - Fuel quality - Cylinder compression - Valve mechanism - Unadjusted injector tappet clearance - Fuel injectors - Volvo Engine Brake - EGR - Presence of coolant in a combustion chamber <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Power consuming equipment

					<ul style="list-style-type: none"> - Air in fuel system - Fuel quality - Cylinder compression - Valve mechanism - Injector - Fuel injectors - Volvo Engine Brake - EGR - Coolant in a combustion chamber
P030200	Cylinder 2 Misfire Detected	No Sub-type Information	N/A	<p>Event: Misfire rate for cylinder 2 above 80%.</p> <p>Behavior: The engine misfires</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Power consuming equipment - such as power take-off, idler wheels, air compressor, power steering pump, air condition pump - are connected in an unsupported way - Air in fuel system - Fuel quality - Cylinder compression - Valve mechanism - Unadjusted injector tappet clearance - Fuel injectors - Volvo Engine Brake - EGR - Presence of coolant in a combustion chamber <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Power consuming equipment - Air in fuel system - Fuel quality - Cylinder compression - Valve mechanism - Injector - Fuel injectors - Volvo Engine Brake - EGR - Coolant in a combustion chamber
P030300	Cylinder 3 Misfire Detected	No Sub-type Information	N/A	<p>Event: Misfire rate for cylinder 3 above 80%.</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Power consuming equipment - such as

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				<p>Behavior: The engine misfires</p>	<p>power take-off, idler wheels, air compressor, power steering pump, air condition pump - are connected in an unsupported way</p> <ul style="list-style-type: none"> - Air in fuel system - Fuel quality - Cylinder compression - Valve mechanism - Unadjusted injector tappet clearance - Fuel injectors - Volvo Engine Brake - EGR - Presence of coolant in a combustion chamber <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Power consuming equipment - Air in fuel system - Fuel quality - Cylinder compression - Valve mechanism - Injector - Fuel injectors - Volvo Engine Brake - EGR - Coolant in a combustion chamber
P030400	Cylinder 4 Misfire Detected	No Sub-type Information	N/A	<p>Event: Misfire rate for cylinder 4 above 80%.</p> <p>Behavior: The engine misfires</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Power consuming equipment - such as power take-off, idler wheels, air compressor, power steering pump, air condition pump - are connected in an unsupported way - Air in fuel system - Fuel quality - Cylinder compression - Valve mechanism - Unadjusted injector tappet clearance

					<ul style="list-style-type: none"> - Fuel injectors - Volvo Engine Brake - EGR - Presence of coolant in a combustion chamber <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Power consuming equipment - Air in fuel system - Fuel quality - Cylinder compression - Valve mechanism - Injector - Fuel injectors - Volvo Engine Brake - EGR - Coolant in a combustion chamber
P030500	Cylinder 5 Misfire Detected	No Sub-type Information	N/A	<p>Event: Misfire rate for cylinder 5 above 80%.</p> <p>Behavior: The engine misfires</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Power consuming equipment - such as power take-off, idler wheels, air compressor, power steering pump, air condition pump - are connected in an unsupported way - Air in fuel system - Fuel quality - Cylinder compression - Valve mechanism - Unadjusted injector tappet clearance - Fuel injectors - Volvo Engine Brake - EGR - Presence of coolant in a combustion chamber <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Power consuming equipment - Air in fuel system - Fuel quality - Cylinder

					compression – Valve mechanism – Injector – Fuel injectors – Volvo Engine Brake – EGR – Coolant in a combustion chamber
P030600	Cylinder 6 Misfire Detected	No Sub-type Information	N/A	Event: Misfire rate for cylinder 6 above 80%. Behavior: The engine misfires	Root Cause: – Power consuming equipment - such as power take-off, idler wheels, air compressor, power steering pump, air condition pump - are connected in an unsupported way – Air in fuel system – Fuel quality – Cylinder compression – Valve mechanism – Unadjusted injector tappet clearance – Fuel injectors – Volvo Engine Brake – EGR – Presence of coolant in a combustion chamber Workshop action: Check: – Power consuming equipment – Air in fuel system – Fuel quality – Cylinder compression – Valve mechanism – Injector – Fuel injectors – Volvo Engine Brake – EGR – Coolant in a combustion chamber
P033531	Crankshaft Position Sensor "A"	No Signal	A14. EA:38 A14. EA:37	Event: No crank teeth detected between cam teeth by the control unit	Root Cause: – Sensor broken – Connector detached – Sensor incorrectly mounted (e.g. far away from the wheel)

				Behavior: High fuel consumption Uneven torque	Workshop action: Check: – Sensor – Connector
P033638	Crankshaft Position Sensor A Circuit Range /Performance	Signal Frequency Incorrect	A14. EA:38 A14. EA:37	Event: More crank teeth than expected detected between cam teeth by the control unit Behavior: High fuel consumption Uneven torque	Root Cause: – Noisy signal due to wiring harness – Sensor broken – Connector detached Workshop action: Check: – Wiring harness – Sensor – Connector
P033900	Crankshaft Position Sensor A Circuit Intermittent	No Sub-type Information	A14. EA:38 A14. EA:37	Event: Intermittent crank speed signal Behavior: High fuel consumption Uneven torque	Root Cause: – Noisy signal due to wiring harness – Sensor broken – Connector detached Workshop action: Check: – Wiring harness – Sensor – Connector
P034031	Camshaft Position Sensor "A" Bank 1 or Single Sensor	No Signal	A14. EA:45 A14. EA:46	Event: No signal is detected on the cam wheel Behavior: No information available	Root Cause: – Connector detached – Sensor broken – Sensor incorrectly mounted (e.g. far away from the wheel) Workshop action: Check: – Wiring harness – Sensor – Connector
P034138	Camshaft Position Sensor A Circuit Range /Performance	Signal Frequency Incorrect	A14. EA:45 A14. EA:46	Event: Noisy signal detected Behavior: No information available	Root Cause: – Noisy signal due to wiring harness – Sensor broken – Connector detached Workshop action: Check: – Wiring harness – Sensor – Connector
P040100	Engine Exhaust Gas Recirculation 1	No Sub-type Information	N/A	Event: Percentage of Ratio between EGR Mass Flow and Demanded EGR Mass	Root Cause: – EGR system blocked /restricted

	Valve Position Flow Insufficient Detected			Flow below (70% + Offset dependent on Ambient air pressure). Behavior: No information available	– Malfunctioning EGR valve Workshop action: Check: – EGR system – EGR valve If fault is not detected: Fault trace according to Tech Tool fault tree
P040200	Engine Exhaust Gas Recirculation 1 Valve Position Flow Excessive Detected	No Sub-type Information	N/A	Event: Percentage of Ratio between EGR Mass Flow and Demanded EGR Mass Flow above (130% + Offset dependent on Ambient air pressure). Behavior: No information available	Root Cause: – Malfunctioning EGR valve – Malfunctioning VGT Workshop action: Check: – EGR valve – VGT If fault is not detected: Fault trace according to Tech Tool fault tree
P040313	EGR "A" Control	Circuit Open	A14. EB:13 A14. EB:9	Event: Open circuit fault is detected. Behavior: No information available	Root Cause: – Open circuit in wiring harness, actuator or connector. Workshop action: Check: – Wiring harness, actuator and connector If fault is not detected: Fault trace according to Tech Tool fault tree
P040600	Exhaust Gas Recirculation Sensor "A" Circuit High	No Sub-type Information	A14. EA:21	Event: Voltage on A:21 above 4.83V Behavior: No information available	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU
P040913	EGR differential pressure sensor	Circuit Open	A14. EA:21	Event: Voltage on A:21 below 0.21V Behavior: No information available	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness

					<ul style="list-style-type: none"> - Sensor - ECU
P040A13	Exhaust Gas Recirculation Temperature Sensor "A"	Circuit Open	A14. EB:48	<p>Event: Voltage on B:48 above 0.75V OR Voltage on B:48 above 0.06V and Voltage on B:48 below 0.17V</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P040B64	Exhaust Gas Recirculation Temperature Sensor "A" Circuit Range /Performance	Signal Plausibility Failure	A14. EB:48	<p>Event: (Exhaust Gas Recirculation Temperature (EGRT) - Engine Coolant Temperature) below -45°C OR (Exhaust Gas Recirculation Temperature (EGRT) - Engine Coolant Temperature) above 50°C</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Temperature sensor drifting - Temperature sensor biased high or low - Temperature sensor broken <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Temperature sensor
P040C00	Exhaust Gas Recirculation Temperature Sensor "A" Circuit Low	No Sub-type Information	A14. EB:48	<p>Event: Voltage on B:48 below 0.06V</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P042000	Catalyst System Efficiency Below Threshold	No Sub-type Information	N/A	<p>Event: Catalyst System Monitor Failure Event and Ratio of diesel that slipped through the catalyst and oxidized in the Particulate Filter above 1.555 ratio and SCR conversion efficiency below (80% + Offset dependent on Average SCR NOx Catalyst Temperature) OR Empty Can Monitor Failure Event and (The number of quick temperature changes before the catalyst / The number of quick temperature changes after catalyst) below 2.5 ratio.</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Exhaust Aftertreatment Fuel Injector "A" does not deliver as expected - Exhaust Aftertreatment Fuel Injector "A" nozzle is clogged - Catalyst has lost its conversion capability - Catalyst is removed or severely damaged <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Exhaust Aftertreatment Fuel Injector "A" - Catalyst

					If fault is not detected: Fault trace according to Tech Tool fault tree
P042200	Catalyst 2 Efficiency Below Threshold (Bank 1)	No Sub-type Information	N/A	<p>Event: SCR conversion efficiency below (80% + Offset dependent on Average SCR NOx Catalyst Temperature) and Ratio of diesel that slipped through the catalyst and oxidized in the Particulate Filter below 0.60 ratio.</p> <p>Behavior: No information available</p>	<p>Root Cause: – DPF has lost its conversion capability – DPF is removed or severely damaged</p> <p>Workshop action: Check: – DPF</p> <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P046C64	EGR Differential Pressure Sensor Circuit Range /Performance	Signal Plausibility Failure	A14. EA:21	<p>Event: Difference between estimated and real EGR differential pressure below -7 OR Difference between estimated and real EGR differential pressure above 18 OR Engine Exhaust Gas Recirculation 1 Differential Pressure above 2.18kPa</p> <p>Behavior: No information available</p>	<p>Root Cause: – Sensor</p> <p>Workshop action: Check: – Sensor</p>
P048013	Fan 1 Control Circuit	Circuit Open	A14. EB:49	<p>Event: Open circuit fault is detected</p> <p>Behavior: No information available</p>	<p>Root Cause: Open circuit in: – Wiring harness – Actuator – Connector</p> <p>Workshop action: Check: – Wiring harness – Actuator – Connector</p>
P048900	EGR "A" Control Circuit Low	No Sub-type Information	A14. EB:13 A14. EB:9	<p>Event: Short circuit to ground is detected.</p> <p>Behavior: No information available</p>	<p>Root Cause: – Wiring harness, actuator or connector is short circuited to ground voltage</p> <p>Workshop action: Check: – Wiring harness, actuator and connector</p> <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P04D800	Excessive	No Sub-type	N/A	Event:	Root Cause:

	Time To Enter Closed Loop EGR Control	Information		Engine Coolant Temperature below 20° C Behavior: No information available	– Engine coolant temperature sensor stuck below EGR closed loop enable range Workshop action: Check: – Engine coolant temperature sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P04D900	Closed Loop EGR Control At Limit - Flow Too Low	No Sub-type Information	N/A	Event: Difference between demanded and actual burned air fraction above output MAP value dependent on engine speed and engine torque Behavior: No information available	Root Cause: – EGR valve stuck open – VGT control saturated low Workshop action: Check: – EGR valve – VGT control If fault is not detected: Fault trace according to Tech Tool fault tree
P04DA00	Closed Loop EGR Control At Limit - Flow Too High	No Sub-type Information	N/A	Event: Difference between demanded and actual burned air fraction below output MAP value dependent on engine speed and engine torque Behavior: No information available	Root Cause: – EGR valve stuck closed – EGR system restricted – VGT control saturated high Workshop action: Check: – EGR valve – EGR system – VGT control If fault is not detected: Fault trace according to Tech Tool fault tree
P04DB00	Crankcase Ventilation System Disconnected	No Sub-type Information	N/A	Event: Crankcase pressure difference between operation window with high oil pressure and operation window with low pressure below 0.25kPa Behavior: No information available	Root Cause: – Stuck crankcase gas cleaning separator – Disconnected /leaking crankcase ventilation pipe Workshop action: Check: – Crankcase gas cleaning separator

					<ul style="list-style-type: none"> - Crankcase ventilation pipe <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P04DD00	Cold Start EGR "A" Flow Insufficient Detected	No Sub-type Information	N/A	<p>Event: Percentage of Ratio between EGR Mass Flow and Demanded EGR Mass Flow below (70% + Offset dependent on Ambient air pressure)</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - EGR system blocked /restricted - Malfunctioning EGR valve <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - EGR system - EGR valve <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P050013	Vehicle Speed Sensor A	Circuit Open	N/A	<p>Event: Sensor current below 0.1 mA</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness issue - Connector issue - Sensor detached - Sensor issue - VECU issue <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness - Connector - Sensor - VECU <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P050200	Vehicle Speed Sensor "A" Circuit Low	No Sub-type Information	N/A	<p>Event: Sensor voltage below 2.5 V</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Sensor detached - Sensor issue - VECU issue <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Sensor - VECU <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P050600	Idle Control System - RPM Lower Than Expected	No Sub-type Information	N/A	<p>Event: Average engine speed during the evaluation period below 450rpm</p> <p>Behavior: Uneven engine speed during idle</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Power consuming equipment - such as power take-off, idler wheels, air compressor, power steering pump, air

					<p>condition pump - active</p> <ul style="list-style-type: none"> - Blocked exhaust system, including turbo - Blocked inlet system - Bad fuel quality - Air in fuel system - Broken valve spring - Rocker arms - Bad injector trim codes - Unadjusted valves or unit injectors - Bad fuel injectors <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Power consuming equipment - Exhaust system, including turbo - Inlet system - Fuel quality - Fuel system - Valve spring - Rocker arms - Injector trim codes - Valves or unit injectors - Fuel injectors <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P050700	Idle Control System - RPM Higher Than Expected	No Sub-type Information	N/A	<p>Event: Average engine speed during the evaluation period above 800rpm</p> <p>Behavior: Uneven engine speed during idle</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Oil residue in the inlet system - Power consuming equipment - such as power take-off, idler wheels, air compressor, power steering pump, air condition pump - active - Fuel quality - Air in fuel system - Broken valve spring - Rocker arms - Bad injector trim codes - Unadjusted tappet clearance for valves

					<p>or unit injectors</p> <ul style="list-style-type: none"> - Bad fuel injectors <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Inlet system - Power consuming equipment - Fuel quality - Fuel system - Valve spring - Rocker arms - Injector trim codes - Valves or unit injectors - Fuel injectors <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P051A13	Crankcase Pressure Sensor	Circuit Open	A14. EB:28	<p>Event: Voltage on B:28 above 4.76V and Voltage on B:28 below 4.85V OR Voltage on B:28 below 0.31V</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P051B64	Crankcase Pressure Sensor Circuit Range /Performance	Signal Plausibility Failure	A14. EB:28	<p>Event: Crankcase pressure compared to reference pressure below -15kPa OR Crankcase pressure compared to reference pressure above 15kPa</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Sensor failure <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Sensor failure <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P051D00	Crankcase Pressure Sensor Circuit High	No Sub-type Information	A14. EB:28	<p>Event: Voltage on B:28 above 4.85V</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P052013	Engine oil pressure sensor /switch "A"	Circuit Open	A14. EB:11	<p>Event: Voltage on B:11 above 4.79V and Voltage on B:11 below 4.85V OR</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault

				Voltage on B:11 below 0.21V Behavior: No information available	Workshop action: Check: - Wiring harness - Sensor - ECU
P052164	Engine Oil Pressure Sensor/Switch Range /Performance	Signal Plausibility Failure	A14. EB:11	Event: Engine oil pressure above 100kPa OR Engine oil pressure above 600kPa OR Engine oil pressure below 230kPa Behavior: No information available	Root Cause: - Oil pressure sensor failure Workshop action: Check: - Oil pressure sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P052300	Engine Oil Pressure Sensor/Switch Circuit High	No Sub-type Information	A14. EB:11	Event: Voltage on B:11 above 4.85V Behavior: No information available	Root Cause: - Wiring harness fault - Sensor fault - ECU fault Workshop action: Check: - Wiring harness - Sensor - ECU
P052400	Engine Oil Pressure Too Low	Engine Oil Pressure Too Low	N/A	Event: Engine oil pressure below output from a look-up table with input engine RPM - TECU Behavior: Engine shuts off unexpectedly – Only at low speed	Root Cause: - Oil leakage - The oil pump is broken - The oil system is clogged Workshop action: Check: - Oil leakage - The oil pump - The oil system
P052712	Fan Speed Sensor Circuit Range /Performance	Short Circuit to Battery	A14. EA:35	Event: Current engine cooling fan speed sensed equals to 0 rpm Behavior: Engine cooling fan does not shut off	Root Cause: - Fan speed sensor malfunctioning Workshop action: Check: - Fan speed sensor
P053E00	Crankcase Pressure Too High	No Sub-type Information	N/A	Event: Difference between ambient air pressure and crank case pressure too high. Behavior: Engine derate	Root Cause: - The pressure difference between crankcase pressure and ambient air pressure is/was above limit Workshop action:

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					<p>Check:</p> <ul style="list-style-type: none"> - Pressure difference between crankcase pressure and ambient air pressure is/was above limit
P05407E	Intake Air Heater "A" Control	Actuator Stuck On	A14. EB:7	<p>Event: The preheat element is active when there is no preheat activation request.</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Preheat relay problem - Wiring harness defect <p>Workshop action: Check: - Preheat relay - Wiring harness</p>
P054100	Intake Air Heater A Circuit Low	No Sub-type Information	A14. EB:7	<p>Event: Voltage on B:7 above (0.72V * (Battery Voltage / 24.0V)) and Voltage on B:7 below (2.86V * (Battery Voltage / 24.0V))</p> <p>Behavior: Engine is difficult to start - Only cold conditions</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action: Check: - Wiring harness - Sensor - ECU</p>
P054300	Intake Air Heater A Circuit Open	No Sub-type Information	A14. EB:7	<p>Event: Voltage on B:7 above (25.14V * (Battery Voltage / 24.0V)) OR Voltage on B:7 above (2.86V * (Battery Voltage / 24.0V)) and Voltage on B:7 below (20.56V * (Battery Voltage / 24.0V))</p> <p>Behavior: Engine is difficult to start - Only cold conditions</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action: Check: - Wiring harness - Sensor - ECU</p>
P054E00	Idle Control System - Fuel Quantity Lower Than Expected	No Sub-type Information	N/A	<p>Event: Average fuel quantity in each injection for the evaluation period below 5mg</p> <p>Behavior: Uneven engine speed during idle</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Power consuming equipment - such as power take-off, idler wheels, air compressor, power steering pump, air condition pump - active - Blocked exhaust system, including turbo - Blocked inlet system - Bad fuel quality

					<ul style="list-style-type: none"> - Air in fuel system - Broken valve spring - Rocker arms - Bad injector trim codes - Unadjusted valves or unit injectors - Bad fuel injectors <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Power consuming equipment - Exhaust system, including turbo - Inlet system - Fuel quality - Fuel system - Valve spring - Rocker arms - Injector trim codes - Valves and unit injectors - Fuel injectors <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P054F00	Idle Control System - Fuel Quantity Higher Than Expected	No Sub-type Information	N/A	<p>Event: Average fuel quantity in each injection for the evaluation period above 140mg</p> <p>Behavior: Uneven engine speed during idle - Low power</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Oil residue in the inlet system - Power consuming equipment - such as power take-off, idler wheels, air compressor, power steering pump, air condition pump - active - Fuel quality - Air in fuel system - Broken valve spring - Rocker arms - Bad injector trim codes - Unadjusted tappet clearance for valves or unit injectors - Bad fuel injectors <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Inlet system - Power consuming

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					<p>equipment</p> <ul style="list-style-type: none"> - Fuel quality - Fuel system - Valve spring - Rocker arms - Injector trim codes - Valves or unit injectors - Fuel injectors <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P055A13	Engine Oil Pressure Sensor/Switch "B"	Circuit Open	A14. EB:19	<p>Event: Voltage on B:19 above 4.79V and Voltage on B:19 below 4.85V OR Voltage on B:19 below 0.21V</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P055B64	Piston Cooling Oil Pressure Sensor Range /Performance	Signal Plausibility Failure	A14. EB:19	<p>Event: Difference between demanded piston cooling pressure and measured piston cooling pressure between -30kPa and 30kPa OR Piston Cooling Oil Pressure above 30kPa</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Piston cooling pressure sensor failure <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Piston cooling pressure sensor <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P055D00	Piston Cooling Oil Pressure Sensor Circuit High	No Sub-type Information	A14. EB:19	<p>Event: Voltage on B:19 above 4.85V</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P055F00	Engine Oil Pressure Out of Range	No Sub-type Information	N/A	<p>Event: Difference between estimated oil pressure and real oil pressure below -100kPa</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Low oil pressure <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Low oil pressure <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P056E92	Cold Start	Performance	N/A	<p>Event:</p>	<p>Root Cause:</p>

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	Turbocharger /Supercharger Boost Control "A" Performance	or incorrect operation		Any Fault reported from VGT to ECM during Cold Start Mode Behavior: No information available	– VGT Malfunctioning Workshop action: Check: – VGT If fault is not detected: Fault trace according to Tech Tool fault tree
P05E400	Park Brake Sensor/Switch Circuit Low	No Sub-type Information	N/A	Event: Sensor voltage below 0.1 V Behavior: No information available	Root Cause: – Current above normal or short circuit Workshop action: Check: – Current above normal or short circuit If fault is not detected: Fault trace according to Tech Tool fault tree
P05EB00	Cold Start SCR NOx Catalyst Inlet Temperature Too Low	No Sub-type Information	N/A	Event: EATS heating efficiency below 30% Behavior: No information available	Root Cause: – Exhaust Aftertreatment Fuel Injector "A" does not deliver fuel as expected – Exhaust Aftertreatment Fuel Injector "A" nozzle is clogged – Diesel Oxygen Catalyst has lost its conversion capability – Diesel Oxygen Catalyst is removed or damaged Workshop action: Check: – Exhaust Aftertreatment Fuel Injector "A" – Diesel Oxygen Catalyst If fault is not detected: Fault trace according to Tech Tool fault tree
P05FD00	Turbocharger /Supercharger Boost Control "A" Temperature Too High	No Sub-type Information	N/A	Event: High temperature failure detected by Turbocharger/Supercharger A. Behavior: No information available	Root Cause: – High temperature in Turbocharger /Supercharger A Workshop action: Check:

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					<ul style="list-style-type: none"> – Turbocharger /Supercharger A If fault is not detected: Fault trace according to Tech Tool fault tree
P060100	Internal Control Module Memory Check Sum Error	No Sub-type Information	N/A	<p>Event: Internal Control Module Memory Check Sum Error</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Corrupted dataset or software</p> <p>Workshop action: Check: – Dataset or software If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P061700	Starter Relay Circuit High	No Sub-type Information	A14. EB:29	<p>Event: Short circuit to battery is detected.</p> <p>Behavior: Starter motor does not run</p>	<p>Root Cause: – Wiring harness, actuator or connector is short circuited to battery voltage</p> <p>Workshop action: Check: – Wiring harness, actuator and connector – Short circuit to battery voltage If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P063051	VIN Not Programmed or Incompatible - ECM/PCM	Not Programmed	N/A	<p>Event: The Vehicle Identification Number is missing or incorrectly written</p> <p>Behavior: No information available</p>	<p>Root Cause: – The Vehicle Identification Number is missing or is incorrectly written</p> <p>Workshop action: Check: – Vehicle Identification Number</p>
P064200	Sensor Reference Voltage "A" Circuit Low	No Sub-type Information	N/A	<p>Event: Sensor voltage below 4 V</p> <p>Behavior: Poor accelerator pedal response</p>	<p>Root Cause: – Throttle/Pedal Position Sensor /Switch "A"/"B" – Sensor reference voltage "A" from VECU is shorted to ground – Hardware error in VECU</p> <p>Workshop action:</p>

					<p>Check:</p> <ul style="list-style-type: none"> - Throttle/Pedal Position Sensor /Switch "A"/"B" - Sensor Reference Voltage "A" from VECU - Short circuit to ground - Hardware error in VECU <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P064300	Sensor Reference Voltage "A" Circuit High	No Sub-type Information	N/A	<p>Event: Sensor voltage above 4.5V</p> <p>Behavior: Poor accelerator pedal response</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Throttle/Pedal Position Sensor /Switch "A"/"B" - Sensor reference voltage "A" from VECU is shorted to battery - Hardware error in VECU <p>Workshop action:</p> <p>Check:</p> <ul style="list-style-type: none"> - Throttle/Pedal Position Sensor /Switch "A"/"B" - Sensor Reference Voltage ""A"" from VECU - Short circuit to battery - Hardware error in VECU <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P065200	Sensor Reference Voltage "B" Circuit Low	No Sub-type Information	N/A	<p>Event: Sensor voltage below 0.1 V</p> <p>Behavior: Poor accelerator pedal response</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - VECU input Sensor Reference Voltage "B" is short to ground - VECU hardware error <p>Workshop action:</p> <p>Check:</p> <ul style="list-style-type: none"> - VECU input Sensor Reference Voltage

					"B" is short to ground – VECU hardware error
P066613	Control Module Internal Temperature Sensor "A"	Circuit Open	N/A	Event: Voltage on ECU internal above 0.15V and Voltage on ECU internal below 1.12V Behavior: No information available	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU
P066800	PCM/ECM /TCM Internal Temperature Sensor Circuit Low	No Sub-type Information	N/A	Event: Voltage on ECU internal below 0.15V Behavior: No information available	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU
P069100	Fan 1 Control Circuit Low	No Sub-type Information	A14. EB:49	Event: Short circuit to ground is detected. Behavior: No information available	Root Cause: – Wiring harness, actuator or connector is short circuited to ground voltage Workshop action: Check: – Wiring harness, actuator and connector – Short circuit to ground voltage
P069200	Fan 1 Control Circuit High	No Sub-type Information	A14. EB:49	Event: Short circuit to battery is detected. Behavior: No information available	Root Cause: – Wiring harness, actuator or connector is short circuited to battery voltage Workshop action: Check: – Wiring harness, actuator and connector – Short circuit to battery voltage
P06B100	Sensor Power Supply A Circuit Low	No Sub-type Information	A14. EA:7	Event: Voltage on A:7 below 4.5V	Root Cause: – Wiring harness fault – Sensor fault – ECU fault

				Behavior: Engine derate	Workshop action: Check: - Wiring harness - Sensor - ECU If fault is not detected: Fault trace according to Tech Tool fault tree
P06B200	Sensor Power Supply A Circuit High	No Sub-type Information	A14. EA:7	Event: Voltage on A:7 above 5.5V Behavior: Engine derate	Root Cause: - Wiring harness fault - Sensor fault - ECU fault Workshop action: Check: - Wiring harness - Sensor - ECU If fault is not detected: Fault trace according to Tech Tool fault tree
P06B400	Sensor Power Supply B Circuit Low	No Sub-type Information	A14. EB:17	Event: Voltage on B:17 below 4.5V Behavior: No information available	Root Cause: - Wiring harness fault - Sensor fault - ECU fault Workshop action: Check: - Wiring harness - Sensor - ECU If fault is not detected: Fault trace according to Tech Tool fault tree
P06B500	Sensor Power Supply B Circuit High	No Sub-type Information	A14. EB:17	Event: Voltage on B:17 above 5.5V Behavior: No information available	Root Cause: - Wiring harness fault - Sensor fault - ECU fault Workshop action: Check: - Wiring harness - Sensor - ECU If fault is not detected: Fault trace according to Tech Tool fault tree
P06DD00	Engine Oil Pressure Control Circuit Performance /Stuck Off	No Sub-type Information	N/A	Event: Difference in Oil Pressure (Piston Cooling Valve forced open) and Oil Pressure (Piston Cooling Valve	Root Cause: - Oil pump regulation valve failure Workshop action:

				forced closed) above 180kPa Behavior: No information available	Check: – Oil pump regulation valve If fault is not detected: Fault trace according to Tech Tool fault tree
P06E700	Sensor Power Supply "C" Circuit Low	No Sub-type Information	A14. EA:1	Event: Voltage on A:1 below 4.5V Behavior: Engine cooling fan inoperative	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU If fault is not detected: Fault trace according to Tech Tool fault tree
P06E800	Sensor Power Supply "C" Circuit High	No Sub-type Information	A14. EA:1	Event: Voltage on A:1 above 5.5V Behavior: Engine cooling fan inoperative	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU If fault is not detected: Fault trace according to Tech Tool fault tree
P06FE00	Cold Start Diesel Intake Air Flow Control Performance	No Sub-type Information	N/A	Event: Throttle position - demanded throttle position above 10% OR Demanded throttle position - throttle position above 10% Behavior: No information available	Root Cause: – Malfunctioning intake throttle valve Workshop action: Check: – Intake throttle valve
P100113	Engine stop switch	Circuit Open	A14.A:27	Event: Voltage on A:27 above (24.42V * (Battery Voltage / 24.0V)) OR Voltage on A:27 above (20.30V * (Battery Voltage / 24.0V)) and Voltage on A:27 below (23.56V * (Battery Voltage / 24.0V)) OR Voltage on A:27 above (2.86V * (Battery Voltage / 24.0V))	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU

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				and Voltage on A:27 below (18.14V * (Battery Voltage / 24.0V)) Behavior: No information available	
P101100	Cold Start Cylinder 1 Fuel Injector Offset Learning at Max Limit	No Sub-type Information	N/A	Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector. Behavior: Uneven torque	Root Cause: – Losses via PTO or other power consuming equipment – VCB valve malfunction – Worn injector cam lobe – Unadjusted tappet clearance for valves or unit injectors – Misaligned or broken valve springs or guides – Cracked valves – Piston/cylinder worn /damaged – Worn injector – Cracked injector tip – Damaged spray holes in the injector Workshop action: Check: – PTO and other power consuming equipment – VCB valve – Injector – Valves and unit injectors – Valve springs or guides – Valves – Piston/cylinder – Injector
P101200	Cold Start Cylinder 1 Fuel Injector Offset Learning at Min Limit	No Sub-type Information	N/A	Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector. Behavior: Uneven torque	Root Cause: – Losses via PTO or other power consuming equipment – Worn injector – Cracked injector tip – Damaged spray holes in the injector Workshop action: Check:

					<ul style="list-style-type: none"> - PTO and other power consuming equipment - Injector
P101300	Cold Start Cylinder 2 Fuel Injector Offset Learning at Max Limit	No Sub-type Information	N/A	<p>Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector.</p> <p>Behavior: Uneven torque</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Losses via PTO or other power consuming equipment - VCB valve malfunction - Worn injector cam lobe - Unadjusted tappet clearance for valves or unit injectors - Misaligned or broken valve springs or guides - Cracked valves - Piston/cylinder worn /damaged - Worn injector - Cracked injector tip - Damaged spray holes in the injector <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - PTO and other power consuming equipment - VCB valve - Injector - Valves and unit injectors - Valve springs or guides - Valves - Piston/cylinder - Injector
P101400	Cold Start Cylinder 2 Fuel Injector Offset Learning at Min Limit	No Sub-type Information	N/A	<p>Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector.</p> <p>Behavior: Uneven torque</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Losses via PTO or other power consuming equipment - Worn injector - Cracked injector tip - Damaged spray holes in the injector <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - PTO and other power consuming

					equipment – Injector
P101D00	Cold Start Cylinder 3 Fuel Injector Offset Learning at Max Limit	No Sub-type Information	N/A	<p>Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector.</p> <p>Behavior: Uneven torque</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> – Losses via PTO or other power consuming equipment – VCB valve malfunction – Worn injector cam lobe – Unadjusted tappet clearance for valves or unit injectors – Misaligned or broken valve springs or guides – Cracked valves – Piston/cylinder worn /damaged – Worn injector – Cracked injector tip – Damaged spray holes in the injector <p>Workshop action: Check:</p> <ul style="list-style-type: none"> – PTO and other power consuming equipment – VCB valve – Injector – Valves and unit injectors – Valve springs or guides – Valves – Piston/cylinder – Injector
P102111	Volvo Compression Brake (VCB) Control Circuit	Short Circuit to Ground	A14. EB:37 A14. EB:30	<p>Event: Short circuit to ground is detected</p> <p>Behavior: Engine starts but does not continue to run</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> – Wiring harness, actuator or connector is short circuited to ground voltage <p>Workshop action: Check:</p> <ul style="list-style-type: none"> – Wiring harness – Actuator – Connector – Short circuit to ground voltage
P102112	Volvo Compression	Short Circuit to Battery	A14. EB:37	<p>Event: Short circuit to battery is detected</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> – Wiring harness,

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	Brake (VCB) Control Circuit		A14. EB:30	Behavior: Auxiliary brakes, low performance (reduced engine braking)	actuator or connector is short circuited to battery voltage Workshop action: Check: – Wiring harness – Actuator – Connector – Short circuit to battery voltage
P102113	Volvo Compression Brake (VCB) Control Circuit	Circuit Open	A14. EB:37 A14. EB:30	Event: Open circuit fault is detected Behavior: Auxiliary brakes, low performance (reduced engine braking)	Root Cause: – Open circuit in wiring harness, actuator or connector Workshop action: Check: – Wiring harness – Actuator – Connector – Open circuit
P102300	Cold Start Cylinder 3 Fuel Injector Offset Learning at Min Limit	No Sub-type Information	N/A	Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector. Behavior: Uneven torque	Root Cause: – Losses via PTO or other power consuming equipment – Worn injector – Cracked injector tip – Damaged spray holes in the injector Workshop action: Check: – PTO and other power consuming equipment – Injector
P102400	Cold Start Cylinder 4 Fuel Injector Offset Learning at Max Limit	No Sub-type Information	N/A	Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector. Behavior: Uneven torque	Root Cause: – Losses via PTO or other power consuming equipment – VCB valve malfunction – Worn injector cam lobe – Unadjusted tappet clearance for valves or unit injectors – Misaligned or broken valve springs or guides – Cracked valves – Piston/cylinder worn

					<p>/damaged</p> <ul style="list-style-type: none"> - Worn injector - Cracked injector tip - Damaged spray holes in the injector <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - PTO and other power consuming equipment - VCB valve - Injector - Valves and unit injectors - Valve springs or guides - Valves - Piston/cylinder - Injector
P102500	Cold Start Cylinder 4 Fuel Injector Offset Learning at Min Limit	No Sub-type Information	N/A	<p>Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector.</p> <p>Behavior: Uneven torque</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Losses via PTO or other power consuming equipment - Worn injector - Cracked injector tip - Damaged spray holes in the injector <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - PTO and other power consuming equipment - Injector
P102600	Cold Start Cylinder 5 Fuel Injector Offset Learning at Max Limit	No Sub-type Information	N/A	<p>Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector.</p> <p>Behavior: Uneven torque</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Losses via PTO or other power consuming equipment - VCB valve malfunction - Worn injector cam lobe - Unadjusted tappet clearance for valves or unit injectors - Misaligned or broken valve springs or guides - Cracked valves - Piston/cylinder worn/damaged - Worn injector

					<ul style="list-style-type: none"> - Cracked injector tip - Damaged spray holes in the injector <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - PTO and other power consuming equipment - VCB valve - Injector - Valves and unit injectors - Valve springs or guides - Valves - Piston/cylinder - Injector
P102700	Cold Start Cylinder 5 Fuel Injector Offset Learning at Min Limit	No Sub-type Information	N/A	<p>Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector.</p> <p>Behavior: Uneven torque</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Losses via PTO or other power consuming equipment - Worn injector - Cracked injector tip - Damaged spray holes in the injector <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - PTO and other power consuming equipment - Injector
P102800	Cold Start Cylinder 6 Fuel Injector Offset Learning at Max Limit	No Sub-type Information	N/A	<p>Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector.</p> <p>Behavior: Uneven torque</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Losses via PTO or other power consuming equipment - VCB valve malfunction - Worn injector cam lobe - Unadjusted tappet clearance for valves or unit injectors - Misaligned or broken valve springs or guides - Cracked valves - Piston/cylinder worn /damaged - Worn injector - Cracked injector tip - Damaged spray

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					<p>holes in the injector</p> <p>Workshop action: Check: – PTO and other power consuming equipment – VCB valve – Injector – Valves and unit injectors – Valve springs or guides – Valves – Piston/cylinder – Injector</p>
P102900	Cold Start Cylinder 6 Fuel Injector Offset Learning at Min Limit	No Sub-type Information	N/A	<p>Event: 100% above Cylinder balancing fueling offset ratios in percentage of the fault code limit for each injector.</p> <p>Behavior: Uneven torque</p>	<p>Root Cause: – Losses via PTO or other power consuming equipment – Worn injector – Cracked injector tip – Damaged spray holes in the injector</p> <p>Workshop action: Check: – PTO and other power consuming equipment – Injector</p>
P103100	Particulate Matter Sensor Clogged Tip	No Sub-type Information	N/A	<p>Event: Particulate Matter Sensor Tip Clogged Fault</p> <p>Behavior: No information available</p>	<p>Root Cause: – Debris on sensor exhaust intake</p> <p>Workshop action: Check: – Sensor exhaust intake</p>
P103200	Particulate Matter Sensor Removed from Exhaust	No Sub-type Information	N/A	<p>Event: Particulate Matter Sensor Removed From Exhaust Fault</p> <p>Behavior: No information available</p>	<p>Root Cause: – Particulate Matter Sensor removed from exhaust stream</p> <p>Workshop action: Check: – Particulate Matter Sensor</p>
P103400	Particulate Matter Sensor System Voltage Too High	No Sub-type Information	N/A	<p>Event: Particulate Matter Sensor Module System Voltage Too High</p>	<p>Root Cause: – Bad battery or generator or wiring harness</p>

				<p>Behavior: No information available</p>	<p>Workshop action: Check: – Battery, generator and wiring harness</p>
P103600	Cold Start Closed Loop Fuel Pressure Control At Limit - Pressure Too Low	No Sub-type Information	N/A	<p>Event: Average rail pressure deviation below -140bar above conditions must remain valid for 5s</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Inlet metering valve with damaged connector/wiring harness – Leaking fuel pressure release valve – Leaking high pressure fuel system – High fuel pressure pump – Fuel pressure regulator – Low fuel pressure system, fuel supply</p> <p>Workshop action: Check: – Inlet metering valve with connector/wiring harness – Pressure Release Valve – High pressure fuel system – High fuel pressure pump – Fuel pressure regulator – Low fuel pressure system, fuel supply</p>
P103700	Cold Start Closed Loop Fuel Pressure Control At Limit - Pressure Too High	No Sub-type Information	N/A	<p>Event: Average rail pressure deviation above 140 bar above conditions must remain valid for 5s</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Rotated cam profile – Leaking fuel pressure release valve – Fuel pressure regulator – Low fuel pressure system – Bad fuel quality – Pressure release valve stuck closed</p> <p>Workshop action: Check: – Cam profile – Fuel pressure release valve – Fuel pressure</p>

					regulator – Low fuel pressure system – Fuel quality – Pressure release valve
P103B00	Reagent Dosing Valve Inducement	No Sub-type Information	N/A	Event: Stored reagent pump duty-cycle during high dosing and Stored reagent pump duty-cycle during low dosing shall have a difference smaller than: 3.5 and It can take up to 60 minutes before reporting fail on the monitor Behavior: Engine derate	Root Cause: – Reductant dosing valve blocked or clogged Workshop action: Check: – Reductant dosing valve
P103C00	NOx Catalyst Efficiency Inducement, Selective Catalytic Reduction (SCR) Unit	No Sub-type Information	N/A	Event: Filtered urea efficiency below 75% and The evaluation of urea efficiency used for dilution detection may be required to be repeated a few times to set the fault. Time required depends on engine load and the NOx flow. With all enable conditions fulfilled, it normally takes no more than a few minutes. Behavior: Engine derate	Root Cause: – Reductant quality and concentration – Exhaust leakage – Sulfur poisoning – Reductant delivery – SCR catalyst – Upstream NOx sensor – Downstream NOx sensor Workshop action: Check: – Reductant quality and concentration – Exhaust leakage – SCR catalyst – Upstream NOx sensor – Downstream NOx sensor
P108600	Oil Level Moderately Low	No Sub-type Information	N/A	Event: If calculated value for oil level below 4% and Engine must be in prerunning during a specific time, defined by output from map with input Engine Oil Temperature (EOT) Behavior: Engine shuts off unexpectedly – Only at low speed	Root Cause: – Low oil level – Oil leakage Workshop action: Check: – Oil level – Oil leakage
P10E100	Particulate Filter Differential Pressure Critically High	No Sub-type Information	N/A	Event: Compensated Diesel Particulate Filter Differential Pressure high	Root Cause: – Chunk of ice is influencing measure values of the sensor – Muck soot in the

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				<p>Behavior: Engine derate</p>	<p>particle filter – The filter is broken</p> <p>Workshop action: Check: – Chunk of ice is influencing measure values of the sensor – Muck soot in the particle filter – The filter</p>
P10E200	Particulate Filter Differential Pressure Moderately High	No Sub-type Information	N/A	<p>Event: Compensated Diesel Particulate Filter Differential Pressure high</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Chunk of ice is influencing measure values of the sensor – Muck soot in the particle filter – The filter is broken</p> <p>Workshop action: Check: – Chunk of ice is influencing measure values of the sensor – Muck soot in the particle filter – The filter</p>
P10EB00	EGR Differential Pressure Sensor "A" Circuit Below Range	No Sub-type Information	N/A	<p>Event: Engine Exhaust Gas Recirculation 1 Differential Pressure below -1.6kPa</p> <p>Behavior: No information available</p>	<p>Root Cause: – Sensor</p> <p>Workshop action: Check: – Sensor</p>
P10EC00	EGR Differential Pressure Sensor "A" Circuit Above Range	No Sub-type Information	N/A	<p>Event: Engine Exhaust Gas Recirculation 1 Differential Pressure above 1.6kPa</p> <p>Behavior: No information available</p>	<p>Root Cause: – Sensor</p> <p>Workshop action: Check: – Sensor</p>
P10FE00	Particulate Filter Restriction - Soot Accumulation Moderately High Bank 1	No Sub-type Information	N/A	<p>Event: High soot load in aftertreatment diesel particulate filter</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – High soot load in aftertreatment diesel particulate filter – High ash load in aftertreatment diesel particulate filter – Clogging of aftertreatment diesel particulate filter – Faulty aftertreatment diesel particulate filter differential pressure</p>

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					<p>sensor</p> <ul style="list-style-type: none"> - Faulty boost pressure sensor - Faulty exhaust gas recirculation differential pressure sensor <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - High soot load in aftertreatment diesel particulate filter - High ash load in aftertreatment diesel particulate filter - Aftertreatment diesel particulate filter - Aftertreatment diesel particulate filter differential pressure sensor - Boost pressure sensor - Exhaust gas recirculation differential pressure sensor
P110D00	Engine Stop Switch Circuit High	No Sub-type Information	A14. EA:27	<p>Event: Voltage on A:27 above (23.56V * (Battery Voltage / 24.0V)) and Voltage on A:27 below (24.42V * (Battery Voltage / 24.0V))</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P110E00	Engine Stop Switch Circuit Low	No Sub-type Information	A14. EA:27	<p>Event: Voltage on A:27 above (1.33V * (Battery Voltage / 24.0V)) and Voltage on A:27 below (2.86V * (Battery Voltage / 24.0V))</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P110F9E	Engine Stop Switch Stuck	Stuck On	N/A	<p>Event: Stop button is active during start-up OR Stop button becomes active when vehicle speed > 0</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Problems with plausibility check of the stop button, stop button stuck

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				<p>Behavior: No information available</p>	<p>Workshop action: Check: – Problems with plausibility check of the stop button, stop button stuck</p>
P111A00	Intake Manifold Temperature Too High	No Sub-type Information	N/A	<p>Event: Inlet Manifold Air Temperature (IMAT) high</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Poor cooling – Extreme running conditions</p> <p>Workshop action: Check: – Cooling – Running conditions If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P111C00	Compressor Discharge Temperature Too High	No Sub-type Information	N/A	<p>Event: Estimated air temperature out from compressor high</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Extreme driving conditions</p> <p>Workshop action: Check: – Extreme driving conditions</p>
P111D00	Engine Coolant Level Moderately Low	No Sub-type Information	N/A	<p>Event: Engine Coolant Level low</p> <p>Behavior: No information available</p>	<p>Root Cause: – Sensor out of range</p> <p>Workshop action: Check: – Sensor out of range</p>
P111E00	Engine Coolant Temperature Moderately High	No Sub-type Information	N/A	<p>Event: Engine Coolant Temperature high</p> <p>Behavior: No information available</p>	<p>Root Cause: – Extreme driving conditions, resulting in too high temperature – The coolant thermostat is broken – Problems with the fan – The radiator is blocked</p> <p>Workshop action: Check: – Extreme driving conditions, resulting in too high temperature – Coolant thermostat – Fan – Radiator</p>
P112100	EGR	No Sub-type Information	N/A	<p>Event:</p>	<p>Root Cause:</p>

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	Temperature Too High	Information		Exhaust Gas Recirculation Temperature (EGRT) high Behavior: Engine derate	– Extreme driving conditions – EGR cooler problems Workshop action: Check: – Extreme driving conditions – EGR cooler
P112198	EGR Temperature Too High	Component or System Overheating	N/A	Event: Exhaust Gas Recirculation Temperature (EGRT) high Behavior: Engine derate	Root Cause: – Extreme driving conditions – EGR cooler problems Workshop action: Check: – Extreme driving conditions – EGR cooler
P112200	EGR Temperature Moderately High	No Sub-type Information	N/A	Event: Exhaust Gas Recirculation Temperature (EGRT) high Behavior: Engine derate	Root Cause: – Extreme driving conditions – EGR cooler problems Workshop action: Check: – Extreme driving conditions – EGR cooler
P112500	Engine Oil Temperature Moderately High	No Sub-type Information	N/A	Event: Engine Oil Temperature (EOT) high Behavior: Engine derate	Root Cause: – Extreme driving conditions Workshop action: Check: – Driving conditions
P112900	Transmission Fluid Temperature Moderately High	No Sub-type Information	N/A	Event: Sensor Gearbox Oil Temperature high Behavior: Engine derate	Root Cause: – Transmission cooler failure – Cooling system problem Workshop action: Check: – Transmission cooler – Cooling system
P113500	Crankcase Pressure Relative to Ambient	No Sub-type Information	N/A	Event: Difference between ambient air pressure and crank case pressure too high.	Root Cause: – Too high difference between ambient air pressure and crank

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	Pressure Too High			Behavior: Engine derate	case pressure. Workshop action: Check: – Difference between ambient air pressure and crank case pressure
P113600	NOx Sensor 1 /2 Correlation Calibration Error Bank 1	No Sub-type Information	N/A	Event: not Upstream NOx Sensor available in ECM or not Downstream NOx Sensor available in ECM Behavior: No information available	Root Cause: – Wrong configuration in ECM – Upstream /Downstream NOx Sensors configuration in (control part) do not match setup in (diagnostic part) Workshop action: Check: – Configuration in ECM – Upstream /Downstream NOx sensor configurations
P113711	Oil Thermostat	Short Circuit to Ground	A14.B: 53	Event: Short circuit to ground is detected. Behavior: No information available	Root Cause: – Wiring harness, actuator or connector is short circuited to ground voltage. Workshop action: Check: – Wiring harness, actuator and connector – Short circuit to ground voltage
P113712	Oil Thermostat	Short Circuit to Battery	A14.B: 53	Event: Short circuit to battery is detected. Behavior: No information available	Root Cause: – Wiring harness, actuator or connector is short circuited to battery voltage. Workshop action: Check: – Wiring harness, actuator and connector – Short circuit to battery voltage
P113713	Oil Thermostat	Circuit Open	A14.B: 53	Event: Open circuit fault is detected.	Root Cause: – Open circuit in

				Behavior: No information available	wiring harness, actuator or connector Workshop action: Check: – Open circuit – Wiring harness, actuator and connector
P113F11	Buffered Idle Validation Switch Wire - VECU Side	Short Circuit to Ground	N/A	Event: VECU input IVS1 is high (close to battery voltage) and VECU output BUFFIVS is low (close to ground) Behavior: No information available	Root Cause: – Wiring harness issue on the buffered idle validation switch – Short circuit to ground on VECU connector Workshop action: Check: – Wiring harness on the buffered idle validation switch – Short circuit to ground
P113F12	Buffered Idle Validation Switch Wire - VECU Side	Short Circuit to Battery	N/A	Event: VECU input IVS1 is low (close to ground) and VECU output BUFFIVS is high (close to battery voltage) Behavior: No information available	Root Cause: – Wiring harness issue on the buffered idle validation switch – Short circuit to battery on VECU connector Workshop action: Check: – Wiring harness on the buffered idle validation switch – Short circuit to battery
P114000	Volvo Compression Brake (VCB) Control Oil Temperature Too Low	No Sub-type Information	N/A	Event: Engine oil temperature is too low when engine brake is demanded Behavior: Auxiliary brakes, low performance (reduced engine braking)	Root Cause: No fault, only for driver information: – Low engine oil temperature when engine brake is requested Workshop action: No fault, only for driver information: – Low engine oil

					temperature when engine brake is requested
P114113	Buffered Idle Validation Switch Wire, Engine Control Module (ECM) Side	Circuit Open	A14. EB:15	Event: Voltage on B:15 above (7.64V * (Battery Voltage / 24.0V)) and Voltage on B:15 below (18.30V * (Battery Voltage / 24.0V)) Behavior: No information available	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU
P114123	Buffered Idle Validation Switch Wire - ECM Side	Signal Stuck Low	A14. EB:15	Event: Calculated pedal position percentage above 50% and Buffered IVS Switch Status equal to 0 Behavior: No information available	Root Cause: – Signal stuck high/low Workshop action: Check: – Signal stuck high/low
P114124	Buffered Idle Validation Switch Wire - ECM Side	Signal Stuck High	A14. EB:15	Event: Calculated pedal position percentage below 1% and Buffered IVS Switch Status equal to 1 Behavior: No information available	Root Cause: – Signal stuck high/low Workshop action: Check: – Signal stuck high/low
P114212	Fan Thermal Switch	Short Circuit to Battery	A14. EA:5	Event: Voltage on A:5 above 3.99V and Voltage on A:5 below 4.20V Behavior: No information available	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU
P114213	Fan Thermal Switch	Circuit Open	A14. EA:5	Event: Voltage on A:5 above 0.82V and Voltage on A:5 below 3.99V Behavior: No information available	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU
P114500	Reductant Level Moderately Low	No Sub-type Information	N/A	Event: Reductant level below 12% must remain valid for 45s Behavior: Engine derate	Root Cause: – Reductant level low Workshop action: Check:

					<p>– Reductant level</p> <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P114800	Lost Communication With ECM According To Turbocharger /Supercharger Control Module "A"	No Sub-type Information	N/A	<p>Event: Communication failure detected by Turbocharger/Supercharger A.</p> <p>Behavior: Low power</p>	<p>Root Cause: – Disturbance on CAN</p> <p>Workshop action: Check: – Disturbance on CAN If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P115000	Throttle/Pedal Position Sensor /Switch "A"/"D" Voltage Correlation	No Sub-type Information	N/A	<p>Event: 2 different occasions can set this code: (VECU input IVS1 is low AND VECU input IVS2 is high AND accelerator sensor voltage below 0.65V) OR (VECU input IVS1 is high AND VECU input IVS2 is low AND accelerator pedal sensor voltage above 1.2V)</p> <p>Behavior: No information available</p>	<p>Root Cause: – VECU input Throttle /Pedal Position Sensor /Switch "D" is short to battery – VECU input Throttle /Pedal Position Sensor /Switch "D" is short to ground</p> <p>Workshop action: Check: – VECU input Throttle /Pedal Position Sensor /Switch "D"</p>
P115100	Aftertreatment System Over Temperature	No Sub-type Information	N/A	<p>Event: Temperature in the aftertreatment system high</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Extreme driving conditions may result in high temperatures – High soot load in aftertreatment diesel particulate filter may result in high temperatures – Exhaust gas temperature sensor bank 1 sensor 1 may be faulty – Exhaust gas temperature sensor bank 1 sensor 2 may be faulty – Exhaust gas temperature sensor bank 1 sensor 3 may be faulty</p> <p>Workshop action: Check:</p>

					<ul style="list-style-type: none"> - Driving conditions - High soot load in aftertreatment diesel particulate filter - Exhaust gas temperature sensor bank 1 sensor 1 - Exhaust gas temperature sensor bank 1 sensor 2 may - Exhaust gas temperature sensor bank 1 sensor 3
P115300	Diesel Intake Air Flow Position Sensor Exceeded Learning Limit	No Sub-type Information	N/A	<p>Event: Calibration requested and no calibration performed</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Intake throttle valve calibration not performed <p>Workshop action: Check: - Intake Throttle Valve calibration</p>
P115400	Body Control Module "A" Lost Communication With Instrument Panel Cluster (IPC) Control Module	No Sub-type Information	N/A	<p>Event: Lost communication between IPC and BCM on medium speed CAN communication bus</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - IPC not powered <p>Workshop action: Check: - IPC If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P115500	Lost Communication with Aftertreatment Diesel Particulate Filter Regeneration Inhibit Switch	No Sub-type Information	N/A	<p>Event: Lost communication with IPC on medium speed CAN communication bus</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - IPC not powered - Software incompatibility with IPC <p>Workshop action: Check: - IPC not powered - Software</p>
P117600	Starter Motor Deactivated - Over Temperature	No Sub-type Information	N/A	<p>Event: Starter motor is overheated when start is requested</p> <p>Behavior: Starter motor does not run</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Starter motor is overheated <p>Workshop action: Check: - Starter motor</p>
P117700	Starter Motor Deactivated - Transmission Not in Neutral	No Sub-type Information	N/A	<p>Event: Gear box is not in neutral position when start is requested</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Gear box is not in neutral position <p>Workshop action:</p>

				<p>Behavior: Starter motor does not run</p>	<p>Check: – Gear box</p>
P117900	Starter Motor Deactivated - PTO Active	No Sub-type Information	N/A	<p>Event: The starter motor is stopped due to PTO</p> <p>Behavior: Starter motor does not run</p>	<p>Root Cause: – PTO shuts down the starter motor</p> <p>Workshop action: Check: – PTO</p>
P200200	Diesel Particulate Filter Efficiency Below Threshold (Bank 1)	No Sub-type Information	N/A	<p>Event: Number of Particulate Matter Sensor evaluations exceeding 380s divided by total number of Particulate Matter Sensor evaluations below 0.100000001490116 ratio.</p> <p>Behavior: No information available</p>	<p>Root Cause: – Damaged Diesel Particulate Filter</p> <p>Workshop action: Check: – Diesel Particulate Filter</p>
P203B00	Aftertreatment Reagent Level Warning	No Sub-type Information	N/A	<p>Event: Deviation between highest and lowest urea tank level measurements during diagnosis below 10mm</p> <p>Behavior: No information available</p>	<p>Root Cause: – Reductant level sensor stuck – Clogged reductant delivery system – Incompatible reductant tank installed</p> <p>Workshop action: Check: – Reductant level sensor – Reductant delivery system – Incompatible reductant tank installed</p>
P203F00	Reductant Level Low	No Sub-type Information	N/A	<p>Event: Reductant level below 0.1% must remain valid for 30s.</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Reductant tank empty</p> <p>Workshop action: Check: – Reductant tank If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P205B64	Reductant Tank Temperature Sensor Circuit Range /Performance	Signal Plausibility Failure	N/A	<p>Event: Absolute difference between urea tank temperature and urea quality temperature above 9s</p>	<p>Root Cause: – Malfunctioning DEF Tank Temperature Sensor</p> <p>Workshop action:</p>

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				<p>Behavior: No information available</p>	<p>Check: – Tank Temperature Sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P206B64	Reductant Quality Sensor Range /Performance	Signal Plausibility Failure	N/A	<p>Event: If a DTC in the "Inhibited by the following DTCs"-list is failed or not evaluated, it might inhibit this DTC and Reductant concentration below 18% and Difference between the filtered NOx conversion and the expected NOx conversion, based on reductant concentration, above 5% and Catalyst Efficiency above -1% OR Reductant concentration above fault limit for plausibility high</p> <p>Behavior: No information available</p>	<p>Root Cause: – Reductant quality sensor</p> <p>Workshop action: Check: – Reductant quality sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P207F00	Reductant Quality	No Sub-type Information	N/A	<p>Event: Increased reductant flow has not improved conversion efficiency and the flow cannot be increased further and Reductant concentration below 18% and Conversion efficiency has decreased rapidly</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Reductant quality and concentration – Exhaust leakage – Sulfur poisoning – Reductant delivery – SCR catalyst – Upstream NOx sensor – Downstream NOx sensor</p> <p>Workshop action: Check: – Reductant quality and concentration – Exhaust leakage – Sulfur poisoning – Reductant delivery – SCR catalyst – Upstream NOx sensor – Downstream NOx sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P208064	Exhaust Gas	Signal	N/A	<p>Event:</p>	<p>Root Cause:</p>

	Temperature Sensor Circuit Range /Performance Bank 1 Sensor 1	Plausibility Failure		<p>Evaluation performed before engine start: Difference between Exhaust Gas Temperature Sensor 1 and Sensor 2 and 3 above 40°C OR Exhaust gas temperature sensor 1 above 70°C OR Evaluation between the sensors performed while engine running: Difference between Exhaust Gas Temperature Sensor 1 and Sensor 2 above 70°C and Difference between Exhaust Gas Temperature Sensor 1 and Sensor 3 above 70°C OR Exhaust gas temperature sensor 1 below 100°C</p> <p>Behavior: Manual regeneration not possible</p>	<p>– Exhaust Gas Temperature Sensor 1 Not Mounted Exhaust Gas Temperature Sensor 1 Broken – All three exhaust gas temperature sensors not mounted correctly, tampering with distances</p> <p>Workshop action: Check: – Exhaust Gas Temperature Sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P208464	Exhaust Gas Temperature Sensor Circuit Range /Performance (Bank 1 Sensor 2)	Signal Plausibility Failure	N/A	<p>Event: Evaluation performed before engine start: Difference between exhaust gas temperature sensor 2 and sensor 1 and 3 above 40°C OR Exhaust Gas Temperature Sensor 2 above 70°C OR Evaluation between the sensors performed while engine running: Difference between Exhaust Gas Temperature Sensor 1 and Sensor 2 above 70°C and Difference between Exhaust Gas Temperature Sensor 2 and Sensor 3 above 70°C OR Exhaust Gas Temperature Sensor 2 below 100°C</p> <p>Behavior: No information available</p>	<p>Root Cause: – Exhaust gas temperature sensor 2 not mounted – Exhaust gas temperature sensor 2 broken – All three exhaust gas temperature sensors not mounted correctly, tampering with distances</p> <p>Workshop action: Check: – Exhaust gas temperature sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P208E00	Aftertreatment Reagent Dosing Valve Clogged	No Sub-type Information	N/A	<p>Event: Stored reagent pump duty-cycle during high dosing and</p>	<p>Root Cause: – Reductant dosing valve blocked or clogged</p>

				<p>Stored reagent pump duty-cycle during low dosing shall have a difference smaller than: 18.5</p> <p>Behavior: No information available</p>	<p>Workshop action: Check: – Reductant dosing valve If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P20CF7A	Exhaust Aftertreatment Fuel Injector "A" Stuck Open	Fluid Leak or Seal Failure	A14. EB:62 A14. EB:45	<p>Event: Aftertreatment 1 Fuel Pressure 1 below fuel pressure limit used for the fuel leakage (FL) evaluation.</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause: – Exhaust Aftertreatment Fuel Injector Stuck Closed</p> <p>Workshop action: Check: – Exhaust Aftertreatment Fuel Injector If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P20D000	Exhaust Aftertreatment Fuel Injector "A" Stuck Closed	No Sub-type Information	A14. EB:62 A14. EB:45	<p>Event: Aftertreatment 1 Fuel Pressure 1 above 140kPa and not Aftertreatment 1 Fuel Pressure 1 below 25kPa and Aftertreatment 1 Fuel Pressure 1 below 300kPa OR Aftertreatment 1 Fuel Pressure 1 above 200kPa and Aftertreatment 1 Fuel Pressure 1 above 200kPa</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause: – Exhaust Aftertreatment Fuel Injector Stuck Closed</p> <p>Workshop action: Check: – Exhaust Aftertreatment Fuel Injector If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P20D713	Exhaust Aftertreatment Fuel Supply Control	Circuit Open	A14. EB:2	<p>Event: Open circuit fault is detected</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause: – Wiring harness – Actuator – Connector</p> <p>Workshop action: Check: – Wiring harness – Actuator – Connector</p>
P20D900	Exhaust Aftertreatment	No Sub-type Information	A14. EB:2	<p>Event: Short circuit to ground is detected.</p>	<p>Root Cause: – Wiring harness, actuator or connector is short circuited to</p>

	Fuel Supply Control Circuit Low			<p>Behavior: Manual regeneration not possible</p>	<p>ground voltage</p> <p>Workshop action: Check: – Wiring harness – Actuator – Connector – Short circuit to ground voltage</p>
P20DA00	Exhaust Aftertreatment Fuel Supply Control Circuit High	No Sub-type Information	A14. EB:2	<p>Event: Short circuit to battery is detected.</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause: – Wiring harness, actuator or connector is short circuited to battery voltage.</p> <p>Workshop action: Check: – Wiring harness – Actuator – Connector – Short circuit to battery voltage</p>
P20DC00	Exhaust Aftertreatment Fuel Supply Control Stuck Closed	No Sub-type Information	N/A	<p>Event: Monitor A Failure Event IDTC_ATI1_FP_PL and Aftertreatment 1 Fuel Pressure 1 below 100kPa and not Aftertreatment 1 Fuel Pressure 1 below 25kPa and Aftertreatment 1 Fuel Pressure 1 below 300kPa OR Aftertreatment 1 Fuel Pressure 1 above 200kPa and Aftertreatment 1 Fuel Pressure 1 above 200kPa OR Monitor B Failure Event IDTC_ATI1_FP_PL and Fuel Pressure In The Exhaust Aftertreatment Fuel Injector below 0kPa must remain valid for 60s</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause: – Exhaust aftertreatment fuel supply control valve stuck closed</p> <p>Workshop action: Check: – Exhaust aftertreatment fuel supply control valve If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P20DD13	Exhaust aftertreatment fuel pressure	Circuit Open	A14. EA:50	<p>Event: Voltage on A:50 above 4.79V and</p>	<p>Root Cause: – Wiring harness fault – Sensor fault</p>

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	sensor			<p>Voltage on A:50 below 4.85V OR Voltage on A:50 below 0.21V</p> <p>Behavior: Manual regeneration not possible</p>	<p>– ECU fault</p> <p>Workshop action: Check: – Wiring harness – Sensor – ECU</p>
P20DE00	Exhaust Aftertreatment Fuel Pressure Sensor Circuit Range /Performance	No Sub-type Information	A14. EA:50	<p>Event: Aftertreatment 1 Fuel Pressure 1 below 25kPa and Aftertreatment 1 Fuel Pressure 1 below 300kPa OR Aftertreatment 1 Fuel Pressure 1 above 200kPa and Aftertreatment 1 Fuel Pressure 1 above 200kPa</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause: – Sensor Stuck Or Out Of Range</p> <p>Workshop action: Check: – Sensor S</p>
P20E000	Exhaust Aftertreatment Fuel Pressure Sensor Circuit High	No Sub-type Information	A14. EA:50	<p>Event: Voltage on A:50 above 4.85V</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause: – Wiring harness fault – Sensor fault – ECU fault</p> <p>Workshop action: Check: – Wiring harness – Sensor – ECU</p>
P20EE00	SCR NOx Catalyst Efficiency Below Threshold (Bank 1)	No Sub-type Information	N/A	<p>Event: If a DTC in the "Inhibited by the following DTCs"-list is failed or not evaluated, it might inhibit this DTC and Reductant concentration above 30% and Filtered NOx conversion below 79.5%.</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Reductant quality and concentration – Exhaust leakage – Sulfur poisoning – Reductant delivery – SCR catalyst – Upstream NOx sensor – Downstream NOx sensor</p> <p>Workshop action: Check: – Reductant quality and concentration – Exhaust leakage – Sulfur poisoning – Reductant delivery – SCR catalyst – Upstream NOx</p>

					<p>sensor</p> <ul style="list-style-type: none"> - Downstream NOx sensor <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P20F400	DEF (Diesel Exhaust Fluid) Consumption Too Low	No Sub-type Information	N/A	<p>Event: Calculated reductant consumption below -101%</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Reductant level sensor stuck - Clogged reductant delivery system - Incompatible reductant tank installed <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Reductant level sensor - Reductant delivery system - Incompatible reductant tank installed <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P20FE9A	Reductant Metering Unit Performance	Component or System Operating Conditions	N/A	<p>Event: If a DTC in the "Inhibited by the following DTCs"-list is failed or not evaluated, it might inhibit this DTC and Reductant concentration below 18% and Filtered NOx conversion below 71% OR Reductant concentration above fault limit for high concentration.</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Reductant quality and concentration - Reductant quality sensor - Exhaust leakage - Sulfur poisoning - Reductant delivery - SCR catalyst - Upstream NOx sensor - Downstream NOx sensor <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Quality sensor - Exhaust leakage - Sulfur poisoning - Delivery SCR catalyst - Upstream NOx sensor - Downstream NOx sensor
P210900	Throttle/Pedal	No Sub-type	N/A	Event:	Root Cause:

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	Position Sensor "A" Minimum Stop Performance	Information		Sensor voltage between 0.38V and 0.65 V Behavior: Poor accelerator pedal response	– Throttle/Pedal Position Sensor /Switch "A"/"B" – Sensor is broken – VECU input Throttle /Pedal Position Sensor /Switch "C" is short to battery – VECU hardware error (sensor supply) Workshop action: Check: – Throttle/Pedal Position Sensor /Switch "A"/"B" – Sensor – VECU input Throttle /Pedal Position Sensor /Switch "C" – VECU hardware error (sensor supply) If fault is not detected: Fault trace according to Tech Tool fault tree
P213600	Throttle/Pedal position sensor /switch "A"/"C" Voltage Correlation	No Sub-type Information	N/A	Event: Sensor voltage above 6 V Behavior: No information available	Root Cause: – VECU input Throttle /Pedal Position Sensor /Switch "C" is short to battery – VECU input Throttle /Pedal Position Sensor /Switch "C" is short to ground Workshop action: Check: – VECU input Throttle /Pedal Position Sensor /Switch "C"
P215A64	Vehicle Speed - Wheel Speed Correlation	Signal Plausibility Failure	N/A	Event: Difference between vehicle speed and ABS above 12 km/h Behavior: No information available	Root Cause: – Sensor broken Workshop action: Check: – Sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P216300	Throttle/Pedal Position	No Sub-type Information	N/A	Event: Sensor voltage between 1.2 V and 4.25 V	Root Cause: – Throttle/Pedal Position Sensor /Switch "A"/"B"

	Sensor "A" Maximum Stop Performance			<p>Behavior: Poor accelerator pedal response</p>	<p>– Sensor is broken – VECU input Throttle /Pedal Position Sensor /Switch "C" is short to ground – VECU hardware error (sensor supply)</p> <p>Workshop action: Check: – Throttle/Pedal Position Sensor /Switch "A"/"B" – Sensor – VECU input Throttle /Pedal Position Sensor /Switch "C" – VECU hardware error (sensor supply) If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P220013	NOx Sensor Bank 1 Sensor 1	Circuit Open	N/A	<p>Event: Internal open circuit signal containing status and error byte received from upstream NOx sensor evaluated as NOT_RELIABLE</p> <p>Behavior: No information available</p>	<p>Root Cause: – Upstream NOx sensor – Open circuit (internal sensor fault)</p> <p>Workshop action: Check: – Upstream NOx sensor – Open circuit (internal sensor fault) If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P220164	NOx Sensor Bank 1 Sensor 1	Signal Plausibility Failure	N/A	<p>Event: The Upstream NOx Difference (upstream NOx sensor measured NOx flow – modeled NOx flow) is compared to a low and high fault threshold map (NOx flow threshold as a function of modeled NOx flow). The difference must be below low limit or above high limit repeatedly 4 times. Evaluation time for each repeated evaluation is 4.5s.</p> <p>Behavior: No information available</p>	<p>Root Cause: – Upstream NOx sensor</p> <p>Workshop action: Check: – Upstream NOx sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P220300	NOx Sensor Circuit High	No Sub-type Information	N/A	<p>Event: Internal short circuit signal containing</p>	<p>Root Cause: – Upstream NOx</p>

	Bank 1 Sensor 1			status and error byte received from upstream NOx sensor evaluated as NOT_RELIABLE Behavior: No information available	Sensor Short Circuit (Internal sensor fault) Workshop action: Check: – Upstream NOx sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P220513	NOx Sensor Gas Outlet Open Circuit	Circuit Open	N/A	Event: Temperature Of Heater Element in NOx Sensor Upstream not reached and Internal Open Circuit signal from Upstream NOx sensor is equal to "Open Wire Detected" Behavior: No information available	Root Cause: – Upstream NOx Sensor Heater Element Open Circuit (Internal sensor fault) Workshop action: Check: – Upstream NOx Sensor Heater Element
P220600	NOx Sensor Heater Control Circuit Low, Bank 1 Sensor 1	No Sub-type Information	N/A	Event: Temperature Of Heater Element in NOx Sensor Upstream not reached and Internal Short Circuit Low signal from Upstream NOx sensor is equal to "Short Wire Detected" Behavior: No information available	Root Cause: – Upstream NOx Sensor Heater Element Short Circuit Low (Internal sensor fault) Workshop action: Check: – NOx Sensor Heater Element
P220800	NOx Sensor Heater Sense Circuit, Bank 1 Sensor 1	No Sub-type Information	N/A	Event: Temperature Of Heater Element in NOx Sensor Upstream not reached Behavior: No information available	Root Cause: – Temperature of Heater (NOx Sensor In Heater Element) – Upstream not reached – Internal sensor fault Workshop action: Check: – Temperature of Heater (NOx Sensor In Heater Element) – Sensor
P220A1C	NOx Sensor Supply Voltage Circuit (Bank 1 Sensor 1)	Circuit Voltage Out of Range	N/A	Event: Internal supply voltage signal containing status and error byte received from upstream NOx sensor evaluated as NOT_RELIABLE	Root Cause: – Faulty Upstream NOx Sensor Supply. (Internal sensor fault) Workshop action: Check:

				<p>Behavior: No information available</p>	<p>– Upstream NOx Sensor Supply. If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P220B1C	NOx Sensor Supply Voltage Circuit Bank 1 Sensor 2	Circuit Voltage Out of Range	N/A	<p>Event: Internal supply voltage signal containing status and error byte received from downstream NOx sensor evaluated as NOT_RELIABLE</p> <p>Behavior: No information available</p>	<p>Root Cause: – Faulty downstream NOx sensor supply (internal sensor fault)</p> <p>Workshop action: Check: – Downstream NOx Sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P220E93	NOx Sensor Heater Control Circuit Range /Performance (Bank 1 Sensor 1)	No Operation	N/A	<p>Event: Internal status and error byte received from Upstream NOx sensor not evaluated as GOOD within a reasonable time.</p> <p>Behavior: No information available</p>	<p>Root Cause: – Faulty upstream NOx sensor – Incorrect start-up behavior</p> <p>Workshop action: Check: – Upstream NOx sensor – Start-up behavior If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P220F93	NOx Sensor Heater Control Circuit Range /Performance Bank 1 Sensor 2	No Operation	N/A	<p>Event: Internal status and error byte received from downstream NOx sensor not evaluated as GOOD within a reasonable time.</p> <p>Behavior: No information available</p>	<p>Root Cause: – Faulty downstream NOx sensor – Incorrect start-up behavior</p> <p>Workshop action: Check: – Downstream NOx sensor – Start-up behavior If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P221A00	NOx Sensor 1 /2 Correlation Bank 1	No Sub-type Information	N/A	<p>Event: Difference between Upstream and Downstream NOx sensor lambda above 1 lambda and Lambda difference must be greater than Limit repeatedly this number of times: 11 During this time each: 0.6s</p>	<p>Root Cause: – Upstream NOx sensor – Downstream NOx sensor</p> <p>Workshop action: Check:</p>

				Behavior: No information available	– Upstream NOx sensor – Downstream NOx sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P222613	Barometric Pressure Circuit	Circuit Open	N/A	Event: Voltage on ECU internal below 0.12V Behavior: No information available	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU
P222764	Barometric Pressure Sensor "A" Circuit Range /Performance	Signal Plausibility Failure	N/A	Event: Ambient air pressure below 44kPa OR Ambient air pressure above 114kPa OR Ambient air pressure compared to reference pressure below -15kPa OR Ambient air pressure compared to reference pressure above 15kPa Behavior: No information available	Root Cause: – Sensor failure Workshop action: Check: – Sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P222900	Barometric Pressure Circuit High	No Sub-type Information	N/A	Event: Voltage on ECU internal above 4.96V Behavior: No information available	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU
P225C00	NOx Sensor Performance - Signal Stuck High Bank 1 Sensor 1	No Sub-type Information	N/A	Event: Upstream NOx level above 50 ppm and A filter is applied to the NOx level that may require the evaluation to be repeated a few times to set the fault. Behavior: No information available	Root Cause: – Upstream NOx sensor Workshop action: Check: – Upstream NOx sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P225D00	NOx Sensor Performance -	No Sub-type Information	N/A	Event: The upstream NOx Sensor considered	Root Cause: – Upstream NOx

	Signal Stuck Low Bank 1 Sensor 1			removed from the exhaust system when the sensor measure too high Lambda value or too low NOx value during high engine speed and high load. The fault evaluation need to be repeated for a number of times to take a decision, and report the IDTC Behavior: No information available	sensor has been removed from exhaust flow Workshop action: Check: – Upstream NOx sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P225E00	NOx Sensor Performance - Signal Stuck High Bank 1 Sensor 2	No Sub-type Information	N/A	Event: Downstream NOx level above 50ppm and a filter is applied to the NOx level that may require the evaluation to be repeated a few times to set the fault Behavior: No information available	Root Cause: – Downstream NOx sensor – Excessive reductant delivery causing NH3 slip Workshop action: Check: – Downstream NOx sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P225F00	NOx Sensor Performance - Signal Stuck Low Bank 1 Sensor 2	No Sub-type Information	N/A	Event: The downstream NOx sensor is considered removed from the exhaust system when the sensor measure too high Lambda value or too low NOx value during high engine speed and high load. The fault evaluation need to be repeated for a number of times to take a decision, and report the IDTC Behavior: No information available	Root Cause: – Downstream NOx sensor has been removed from exhaust flow Workshop action: Check: – Downstream NOx sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P226600	Water In Fuel Indicator Circuit Low	No Sub-type Information	A14. EB:8	Event: Voltage on B:8 below 0.21V Behavior: No information available	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU
P226C00	Turbocharger Boost Control "A" Slow Response	No Sub-type Information	N/A	Event: Sensed Boost Pressure too low after the engine has been operated in a low boost operating window followed by a high boost operating window below a	Root Cause: – Boost Pressure Sensor signal stuck in operating range

				<p>fault limit dependent on Ambient air pressure.</p> <p>Behavior: Low power</p>	<p>Workshop action: Check: – Boost pressure sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P228E00	Fuel Pressure Regulator 1 Exceeded Learning Limits - Too Low	No Sub-type Information	N/A	<p>Event: Fuel pressure controller adjustment value saturated low</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Leaking fuel pressure release valve – High fuel pressure pump – Fuel pressure regulator – Low fuel pressure system – Rotated cam profile</p> <p>Workshop action: Check: – Fuel pressure release valve – High fuel pressure pump – Fuel pressure regulator – Low fuel pressure system – Rotated cam profile If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P228F00	Fuel Pressure Regulator 1 Exceeded Learning Limits - Too High	No Sub-type Information	N/A	<p>Event: Fuel pressure controller adjustment value saturated high</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Leaking fuel pressure release valve – High fuel pressure pump – Fuel pressure regulator – Low fuel pressure system, fuel supply – Rotated cam profile</p> <p>Workshop action: Check: – Fuel pressure release valve – High fuel pressure pump – Fuel pressure regulator – Low fuel pressure system, fuel supply</p>

					<p>– Rotated cam profile If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P229E13	NOx Sensor Bank 1 Sensor 2	Circuit Open	N/A	<p>Event: Internal open circuit signal containing status and error byte received from downstream NOx sensor evaluated as NOT_RELIABLE</p> <p>Behavior: No information available</p>	<p>Root Cause: – Downstream NOx sensor open circuit (internal sensor fault)</p> <p>Workshop action: Check: – Downstream NOx sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P229F64	NOx Sensor Gas Outlet Removed	Signal Plausibility Failure	N/A	<p>Event: The sensor will respond to tip-in events (sudden power increase). Maximum and minimum NOx levels are saved during evaluation events. When 5 events have passed, the sensor is considered stuck low if the difference between the highest and lowest value is lower than 5.</p> <p>Behavior: No information available</p>	<p>Root Cause: – Downstream NOx sensor</p> <p>Workshop action: Check: – Downstream NOx sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P22A100	NOx Sensor Circuit High Bank 1 Sensor 2	No Sub-type Information	N/A	<p>Event: Internal short circuit signal containing status and error byte received from downstream NOx sensor evaluated as NOT_RELIABLE</p> <p>Behavior: No information available</p>	<p>Root Cause: – Downstream NOx sensor – Short circuit (internal sensor fault)</p> <p>Workshop action: Check: – Downstream NOx sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P22A313	NOx Sensor Heater Control Bank 1 Sensor 2	Circuit Open	N/A	<p>Event: Temperature Of Heater Element in NOx Sensor Downstream not reached and Internal Open Circuit signal from Downstream NOx sensor is equal to "Open Wire Detected"</p> <p>Behavior: No information available</p>	<p>Root Cause: – Downstream NOx Sensor Heater Element – Open circuit (internal sensor fault)</p> <p>Workshop action: Check: – Downstream NOx Sensor Heater Element</p>

P22A400	NOx Sensor Heater Control Circuit Low, Bank 1 Sensor 2	No Sub-type Information	N/A	<p>Event: Temperature Of Heater Element in NOx Sensor Downstream not reached and Internal Short Circuit Low signal from Downstream NOx sensor is equal to "Short Wire Detected"</p> <p>Behavior: No information available</p>	<p>Root Cause: – Downstream NOx Sensor Heater Element – Short Circuit Low (Internal sensor fault)</p> <p>Workshop action: Check: – Downstream NOx Sensor Heater Element</p>
P22A600	NOx Sensor Heater Sense Circuit, Bank 1 Sensor 2	No Sub-type Information	N/A	<p>Event: Temperature Of Heater Element in NOx Sensor Downstream not reached</p> <p>Behavior: No information available</p>	<p>Root Cause: – Temperature of Heater (NOx Sensor In Heater Element) – Downstream not reached – Internal sensor fault</p> <p>Workshop action: Check: – Temperature of Heater (NOx Sensor In Heater Element) – Sensor</p>
P22FB92	NOx Sensor Performance - Sensing Element Bank 1 Sensor 1	Performance or incorrect operation	N/A	<p>Event: Internal status and error byte received from upstream NOx sensor evaluated as bad sensor quality</p> <p>Behavior: No information available</p>	<p>Root Cause: – Faulty upstream NOx sensor (internal sensor fault)</p> <p>Workshop action: Check: – Upstream NOx sensor If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P22FE00	NOx Sensor Performance - Sensing Element Bank 1 Sensor 2	No Sub-type Information	N/A	<p>Event: Internal status and error byte received from downstream NOx sensor evaluated as bad sensor quality</p> <p>Behavior: No information available</p>	<p>Root Cause: – Faulty downstream NOx sensor (internal sensor fault)</p> <p>Workshop action: Check: – Downstream NOx sensor. (internal sensor fault) If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P240F00	EGR Slow Response	No Sub-type Information	N/A	<p>Event: EGR valve fails to follow command.</p>	<p>Root Cause: – EGR valve stuck</p>

				Behavior: No information available	Workshop action: Check: – EGR valve If fault is not detected: Fault trace according to Tech Tool fault tree
P242800	Exhaust Gas Temperature Too High	No Sub-type Information	N/A	Event: Engine Exhaust Gas Temperature high Behavior: Engine derate	Root Cause: – High exhaust back pressure. – Extreme driving conditions. Workshop action: Check: – Exhaust back pressure – Driving conditions
P242B64	Exhaust Gas Temperature Sensor Circuit Range /Performance (Bank 1 Sensor 3)	Signal Plausibility Failure	N/A	Event: Evaluation performed before engine start: Difference between exhaust gas temperature sensor 3 and sensor 1 and 2 above 40°C OR Exhaust Gas Temperature Sensor 3 above 70°C OR Evaluation between the sensors performed while engine running: Difference between Exhaust Gas Temperature Sensor 1 and Sensor 3 above 70°C and Difference between Exhaust Gas Temperature Sensor 2 and Sensor 3 above 70°C OR Exhaust Gas Temperature Sensor 3 below 100°C Behavior: No information available	Root Cause: – Exhaust gas temperature sensor 3 not mounted – Exhaust gas temperature sensor 3 broken – All three exhaust gas temperature sensors not mounted correctly, tampering with distances Workshop action: Check: – Exhaust gas temperature sensor If fault is not detected: Fault trace according to Tech Tool fault tree
P244B00	Aftertreatment 1 Diesel Particulate Filter Differential Pressure Too High (Bank 1)	No Sub-type Information	N/A	Event: Measured differential pressure as percentage of modeled differential pressure above 350 %. Behavior: No information available	Root Cause: – DPF melted – DPF filled with soot – Hose to differential pressure sensor not mounted Workshop action: Check: – DPF

					<p>– Hose to differential pressure sensor not mounted</p> <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P245364	Diesel Particulate Filter Pressure Sensor "A" Circuit Range /Performance	Signal Plausibility Failure	N/A	<p>Event: Failure event for diagnosis in After Run and Compensated Diesel Particulate Filter Differential Pressure above 1.75kPa OR Failure event for diagnosis during high load and Compensated Diesel Particulate Filter Differential Pressure below 1.25kPa</p> <p>Behavior: No information available</p>	<p>Root Cause: Sensor broken</p> <p>Workshop action: Check: – Sensor</p> <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P245700	Exhaust Gas Recirculation Cooler Efficiency Below Threshold	No Sub-type Information	N/A	<p>Event: Ratio (modeled exhaust manifold temp - EGR temp) / (modeled exhaust manifold temp - engine coolant temp) below 0.82 ratio</p> <p>Behavior: No information available</p>	<p>Root Cause: – Deteriorated EGR cooler</p> <p>Workshop action: Check: – EGR cooler</p> <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P245900	Diesel Particulate Filter Regeneration Frequency (Bank 1)	No Sub-type Information	N/A	<p>Event: Difference between pressure based and Kalman filter based soot models above 0.6 ratio and Time since last regeneration above 16400s and Number of too frequent regenerations in a row above 2</p> <p>Behavior: No information available</p>	<p>Root Cause: – Faulty aftertreatment diesel particulate filter differential pressure sensor.</p> <p>Workshop action: Check: – Aftertreatment diesel particulate filter</p> <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P246300	Particulate Filter Restriction - Soot Accumulation Bank 1	No Sub-type Information	N/A	<p>Event: Moderately high soot load in aftertreatment diesel particulate filter</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – High soot load in aftertreatment diesel particulate filter – High ash load in aftertreatment diesel particulate filter – Clogging of aftertreatment diesel</p>

					<p>particulate filter</p> <ul style="list-style-type: none"> - Faulty aftertreatment diesel particulate filter differential pressure sensor - Faulty boost pressure sensor - Faulty exhaust gas recirculation differential pressure sensor <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Aftertreatment diesel particulate filter - Aftertreatment diesel particulate filter differential pressure sensor - Boost pressure sensor - Exhaust gas recirculation differential pressure sensor
P249C00	Excessive Time To Enter Closed Loop Reductant Injection Control	No Sub-type Information	N/A	<p>Event: Average SCR NOx Catalyst Temperature below 215°C</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Exhaust leakage between Engine and Exhaust Aftertreatment System - Exhaust Gas Temperature Sensor 3 stuck low <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Exhaust leakage between Engine and Exhaust Aftertreatment System - Exhaust gas temperature sensor 3 <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P249F00	Excessive Time to Enter Closed Loop DPF Regeneration Control	No Sub-type Information	N/A	<p>Event: Exhaust aftertreatment fuel injection control forced in open loop 0.5 ratio of the time.</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Regeneration target temperature cannot be reached. - Exhaust Aftertreatment Fuel

				Behavior: No information available	Injection Quantity Wrong. Workshop action: Check: – Regeneration target temperature – Exhaust Aftertreatment Fuel Injection Quantity If fault is not detected: Fault trace according to Tech Tool fault tree
P24A000	Closed Loop DPF Regeneration Control at Limit - Temperature Too Low	No Sub-type Information	N/A	Event: Closed loop exhaust aftertreatment fuel injection control at maximum limit 0.7 ratio of the time. Regeneration temperature too low. Behavior: No information available	Root Cause: – Regeneration target temperature cannot be reached – Exhaust Aftertreatment Fuel Injector Too Low Workshop action: Check: – Regeneration target temperature – Exhaust Aftertreatment Fuel Injector If fault is not detected: Fault trace according to Tech Tool fault tree
P24A100	Closed Loop DPF Regeneration Control At Limit - Temperature Too High	No Sub-type Information	N/A	Event: Closed loop exhaust aftertreatment fuel injection control at minimum limit 0.7 ratio of the time. Regeneration temperature too low. Behavior: No information available	Root Cause: – Temperature too high during particulate filter regeneration – Exhaust Aftertreatment Fuel Injector Too High Workshop action: Check: – Temperature too high during particulate filter regeneration – Exhaust Aftertreatment Fuel Injector If fault is not detected: Fault trace according to Tech Tool fault tree
P24A200	Diesel Particulate Filter	No Sub-type Information	N/A	Event: Too small reduction of actual diesel particulate filter soot loading	Root Cause: – Exhaust aftertreatment system

	<p>Regeneration Incomplete (Bank 1)</p>			<p>OR Differential pressure percent after parked diesel particulate filter regeneration above 150%.</p> <p>Behavior: No information available</p>	<p>needs cleaning – High ash load in aftertreatment diesel particulate filter – Clogging of aftertreatment diesel particulate filter</p> <p>Workshop action: Check: – Exhaust aftertreatment system – High ash load in aftertreatment diesel particulate filter – Clogging of aftertreatment diesel particulate filter If fault is not detected: Fault trace according to Tech Tool fault tree</p>
<p>P24A400</p>	<p>Diesel Particulate Filter Restriction - Soot Accumulation Too High (Bank 1)</p>	<p>No Sub-type Information</p>	<p>N/A</p>	<p>Event: The aftertreatment diesel particulate filter load is considered critically high</p> <p>Behavior: High fuel consumption</p>	<p>Root Cause: – Critically high soot load in aftertreatment diesel particulate filter – High ash load in aftertreatment diesel particulate filter – Clogging of aftertreatment diesel particulate filter – Faulty aftertreatment diesel particulate filter differential pressure sensor – Faulty boost pressure sensor – Faulty engine exhaust gas recirculation differential pressure sensor</p> <p>Workshop action: Check: – Aftertreatment diesel particulate filter – Aftertreatment diesel particulate filter differential pressure sensor – Boost pressure</p>

					sensor – Engine exhaust gas recirculation differential pressure sensor
P24AE13	Particulate Matter Sensor	Circuit Open	N/A	Event: Particulate Matter Sensor Electrodes Open Circuit Fault Behavior: No information available	Root Cause: – Particulate Matter Sensor Heater Open Circuit Workshop action: Check: – Particulate Matter Sensor Heater
P24AF00	Particulate Matter Sensor Circuit Range /Performance	No Sub-type Information	N/A	Event: Particulate Matter Sensor Module Boost Voltage Out of Range OR Particulate Matter Sensor Heater Current Leakage Fault OR Particulate Matter Sensor Module Voltage Reference Out of Range OR Particulate Matter Sensor Gain Too High Fault. Behavior: No information available	Root Cause: – Internal circuit fault on Particulate Matter Sensor Workshop action: Check: – Particulate Matter Sensor
P24B000	Particulate Matter Sensor Circuit Low	No Sub-type Information	N/A	Event: Particulate Matter Sensor Electrodes Short to Ground Fault Behavior: No information available	Root Cause: – Particulate Matter Sensor short circuit. Workshop action: Check: – Particulate Matter Sensor – Replace Sensor
P24B100	Particulate Matter Sensor Circuit High	No Sub-type Information	N/A	Event: Particulate Matter Sensor Electrodes Short to Supply Voltage Fault OR Particulate Matter Sensor Internal Short Circuit Fault Behavior: No information available	Root Cause: – Particulate Matter Sensor shortcut internal circuit. Workshop action: Check: – Particulate Matter Sensor – Replace Sensor
P24B492	Particulate Matter Sensor Heater Control Circuit Range /Performance	Performance or incorrect operation	N/A	Event: Particulate Matter Sensor Controller Current Out of Range	Root Cause: – Particulate Matter Sensor Heater Out Of Range Fault

				Behavior: No information available	Workshop action: Check: – Particulate Matter Sensor Heater Out Of Range Fault
P24B500	Particulate Matter Sensor Heater Control Circuit Low	No Sub-type Information	N/A	Event: Particulate Matter Sensor Regeneration Supply Voltage Fault Behavior: No information available	Root Cause: – Particulate Matter Sensor Regeneration Supply Voltage Too Low Workshop action: Check: – Particulate Matter Sensor
P24B700	Particulate Matter Sensor Heater Resistance	No Sub-type Information	N/A	Event: Particulate Matter Sensor Fixed Resistance Fault. Behavior: No information available	Root Cause: – Particulate Matter Sensor bypassed by resistor or debris Workshop action: Check: – Particulate Matter Sensor – Replace Sensor
P24D000	Particulate Matter Sensor Supply Voltage Circuit Low	No Sub-type Information	N/A	Event: Particulate Matter Sensor Module System Voltage Too Low Behavior: No information available	Root Cause: – Bad battery – Generator – Wiring harness Workshop action: Check: – Battery – Generator – Wiring harness
P24D100	Particulate Matter Sensor Regeneration Incomplete	No Sub-type Information	N/A	Event: Particulate Matter Sensor Regeneration Timeout Fault Behavior: No information available	Root Cause: – Debris on Particulate Matter Sensor element Workshop action: Check: – Particulate Matter Sensor
P24DA00	Particulate Matter Sensor Exhaust Sample Error Bank 1	No Sub-type Information	N/A	Event: Particulate Matter Sensor Tip Clogged Fault OR Particulate Matter Sensor Removed From Exhaust Fault. Behavior: No information available	Root Cause: – Particulate Matter Sensor Not Able To Measure Soot – Particulate Matter Sensor Not In Exhaust Stream – Particulate Matter Sensor Tip Clogged

					<p>Workshop action: Check: – Particulate Matter Sensor</p>
P24F600	Exhaust Aftertreatment Fuel Air Purge Valve Stuck Open	No Sub-type Information	<p>A14. EB:42 A14. EB:40</p>	<p>Event: Aftertreatment 1 Fuel Pressure 1 above 40kPa and not Aftertreatment 1 Fuel Pressure 1 below 25kPa and Aftertreatment 1 Fuel Pressure 1 below 300kPa OR Aftertreatment 1 Fuel Pressure 1 above 200kPa and Aftertreatment 1 Fuel Pressure 1 above 200kPa</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause: – Exhaust aftertreatment fuel injection air purge valve stuck open – Exhaust aftertreatment fuel supply control valve stuck open – Exhaust Aftertreatment Fuel Injector Nozzle Clogged</p> <p>Workshop action: Check: – Exhaust Aftertreatment Fuel Injection If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P24F700	Exhaust Aftertreatment Fuel Air Purge Valve Stuck Closed	No Sub-type Information	<p>A14. EB:42 A14. EB:40</p>	<p>Event: Aftertreatment 1 Fuel Pressure 1 below 33kPa and not Aftertreatment 1 Fuel Pressure 1 below 25kPa and Aftertreatment 1 Fuel Pressure 1 below 300kPa OR Aftertreatment 1 Fuel Pressure 1 above 200kPa and Aftertreatment 1 Fuel Pressure 1 above 200kPa</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause: – No air supply to the exhaust aftertreatment fuel injection system – Pipe to the Exhaust Aftertreatment Fuel Injection Nozzle not Connected or Leakage – Exhaust Aftertreatment Fuel Injection Air Purge Valve is not Opening</p> <p>Workshop action: Check: – Exhaust Aftertreatment Fuel Injection System If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P24F813	Exhaust Aftertreatment	Circuit Open	<p>A14. EB:42 A14. EB:40</p>	<p>Event: Open circuit fault is detected.</p>	<p>Root Cause: – Open circuit in wiring harness, actuator or connector</p>

	Fuel Air Purge Valve Control Circuit			<p>Behavior: Manual regeneration not possible</p>	<p>– Short circuit to battery in wiring harness, actuator or connector</p> <p>Workshop action: Check: – Open circuit in wiring harness, actuator or connector – Short circuit to battery in wiring harness, actuator or connector</p>
P24FA00	Exhaust Aftertreatment Fuel Air Purge Valve Control Circuit Low	No Sub-type Information	A14. EB:42 A14. EB:40	<p>Event: Short circuit to ground is detected.</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause: – Wiring harness, actuator or connector is short circuited to ground voltage.</p> <p>Workshop action: Check: – Wiring harness – Actuator – Connector – Short circuit to ground voltage If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P24FB00	Exhaust Aftertreatment Fuel Air Purge Valve Control Circuit High	No Sub-type Information	A14. EB:42 A14. EB:40	<p>Event: Short circuit to battery is detected</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause: – Wiring harness, actuator or connector is short circuited to battery voltage</p> <p>Workshop action: Check: – Wiring harness – Actuator – Connector – Short circuit to battery voltage</p>
P24FC00	Particulate Matter Sensor Heater Control Circuit Driver Current /Temperature Too High	No Sub-type Information	N/A	<p>Event: Particulate Matter Sensor Module Heater Over Temperature</p> <p>Behavior: No information available</p>	<p>Root Cause: – Particulate Matter Sensor Heater Over temperature</p> <p>Workshop action: Check: – Particulate Matter Sensor Heater</p>
P250A13	Engine Oil	Circuit Open	A14.	<p>Event:</p>	<p>Root Cause:</p>

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	Level Sensor		EB:3 A14. EB:4	Voltage on B:4 above 4.85V Behavior: No information available	<ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P250C00	Engine Oil Level Circuit Low	No Sub-type Information	A14. EB:3 A14. EB:4	Event: Voltage on B:4 below 0.05V Behavior: No information available	Root Cause: <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU
P250F00	Engine Oil Level Too Low	No Sub-type Information	N/A	Event: If calculated value for oil level below -5% and Engine must be in prerunning during a specific time, defined by output from map with input Engine Oil Temperature (EOT) Behavior: Engine shuts off unexpectedly – Only at low speed	Root Cause: <ul style="list-style-type: none"> - Critically low oil level - Oil leakage Workshop action: Check: <ul style="list-style-type: none"> - Oil level - Oil leakage
P255613	Engine Coolant Level Sensor /Switch	Circuit Open	A14. EB:23	Event: Voltage on B:23 above (24.42V * (Battery Voltage / 24.0V)) OR Voltage on B:23 above (15.95V * (Battery Voltage / 24.0V)) and Voltage on B:23 below (23.56V * (Battery Voltage / 24.0V)) OR Voltage on B:23 above (11.09V * (Battery Voltage / 24.0V)) and Voltage on B:23 below (13.58V * (Battery Voltage / 24.0V)) OR Voltage on B:23 above (6.57V * (Battery Voltage / 24.0V)) and Voltage on B:23 below (8.72V * (Battery Voltage / 24.0V)) OR Voltage on B:23 above (2.86V * (Battery Voltage / 24.0V))	Root Cause: <ul style="list-style-type: none"> - Wiring harness fault - Sensor fault - ECU fault Workshop action: Check: <ul style="list-style-type: none"> - Wiring harness - Sensor - ECU

				and Voltage on B:23 below (4.47V * (Battery Voltage / 24.0V)) Behavior: No information available	
P255800	Engine Coolant Level Circuit Low	No Sub-type Information	A14. EB:23	Event: Voltage on B:23 below (2.86V * (Battery Voltage / 24.0V)) Behavior: No information available	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU
P255900	Engine Coolant Level Circuit High	No Sub-type Information	A14. EB:23	Event: Voltage on B:23 above (23.56V * (Battery Voltage / 24.0V)) and Voltage on B:23 below (24.42V * (Battery Voltage / 24.0V)) Behavior: No information available	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU
P256000	Engine Coolant Level Low	No Sub-type Information	N/A	Event: Engine Coolant Level low Behavior: No information available	Root Cause: – Coolant level below range Workshop action: Check: – Coolant level below range
P257831	Turbocharger Speed Sensor	No Signal	N/A	Event: Turbo Speed below 0rpm Behavior: No information available	Root Cause: – Malfunctioning VGT actuator Workshop action: Check: – VGT actuator
P25793A	Turbocharger Speed Sensor "A" Circuit Range /Performance	Signal Has Too Many Pulses	N/A	Event: Ratio between Fault Timer (incremented when Turbo Overspeed Flag is TRUE) and Evaluation Timer above 0.9 ratio Behavior: No information available	Root Cause: – Malfunction in VGT Control Workshop action: Check: – VGT control If fault is not detected: Fault trace according to Tech Tool fault tree
P25A913	Piston Cooling Oil Control	Circuit Open	A14. EB:41	Event: Open circuit fault is detected.	Root Cause: – Open circuit in

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				<p>Behavior: No information available</p>	<p>wiring harness, actuator or connector</p> <p>Workshop action: Check: – Open circuit – Wiring harness – Actuator – Connector</p>
P25AA00	Piston Cooling Oil Control Circuit Low	No Sub-type Information	A14. EB:41	<p>Event: Short circuit to ground is detected.</p> <p>Behavior: No information available</p>	<p>Root Cause: – Wiring harness, actuator or connector is short circuited to ground voltage</p> <p>Workshop action: Check: – Wiring harness – Actuator – Connector – Short circuit to ground voltage</p>
P25AB00	Piston Cooling Oil Control Circuit High	No Sub-type Information	A14. EB:41	<p>Event: Short circuit to battery is detected.</p> <p>Behavior: No information available</p>	<p>Root Cause: – Wiring harness, actuator or connector is short circuited to battery voltage.</p> <p>Workshop action: Check: – Wiring harness – Actuator – Connector – Short circuit to battery voltage</p>
P25AC00	Piston Cooling Oil Control Circuit Performance /Stuck Off	No Sub-type Information	N/A	<p>Event: When piston cooling valve is forced open and closed the oil pressure change below 30kPa</p> <p>Behavior: No information available</p>	<p>Root Cause: – Piston cooling valve failure</p> <p>Workshop action: Check: – Piston cooling valve If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P25AE00	Piston Cooling Oil Pressure Too Low	No Sub-type Information	N/A	<p>Event: The signal Piston Cooling Oil Pressure is above a critical limit</p> <p>Behavior: Engine derate</p>	<p>Root Cause: – Low oil level</p> <p>Workshop action: Check: – Low oil level</p>
P260013	Coolant Pump "A" Control	Circuit Open	A14. EA:4	<p>Event: Open circuit fault is detected.</p>	<p>Root Cause: – Open circuit in</p>

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				<p>Behavior: No information available</p>	<p>wiring harness, actuator or connector.</p> <p>Workshop action: Check: – Open circuit – Wiring harness – Actuator – Connector</p>
P260200	Coolant Pump "A" Control Circuit Low	No Sub-type Information	A14. EA:4	<p>Event: Short circuit to ground is detected.</p> <p>Behavior: No information available</p>	<p>Root Cause: – Wiring harness, actuator or connector is short circuited to ground voltage</p> <p>Workshop action: Check: – Wiring harness – Actuator – Connector – Short circuit to ground voltage</p>
P260300	Coolant Pump "A" Control Circuit High	No Sub-type Information	A14. EA:4	<p>Event: Short circuit to battery is detected.</p> <p>Behavior: No information available</p>	<p>Root Cause: – Wiring harness, actuator or connector is short circuited to battery voltage</p> <p>Workshop action: Check: – Wiring harness – Actuator – Connector – Short circuit to battery voltage</p>
P26047F	Intake Air Heater "A" Circuit Range /Performance	Actuator Stuck Off	A14. EB:7	<p>Event: The preheat element is inactive when there is a preheat activation request</p> <p>Behavior: Engine is difficult to start - Only cold conditions</p>	<p>Root Cause: – Preheat relay problem – Wiring harness defect</p> <p>Workshop action: Check: – Preheat relay – Wiring harness</p>
P260513	Intake Air Heater "B" Control	Circuit Open	A14. EB:14	<p>Event: Voltage on B:14 above (25.14V * (Battery Voltage / 24.0V)) OR Voltage on B:14 above (2.86V * (Battery Voltage / 24.0V)) and Voltage on B:14 below (20.58V *</p>	<p>Root Cause: – Wiring harness fault – Sensor fault – ECU fault</p> <p>Workshop action: Check: – Wiring harness</p>

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				(Battery Voltage / 24.0V)) Behavior: Engine is difficult to start - Only cold conditions	– Sensor – ECU
P26067F	Intake Air Heater B Circuit Range /Performance	Actuator Stuck Off	A14. EB:14	Event: The preheat element is inactive when there is a preheat activation request Only for 12 volt systems Behavior: Engine is difficult to start - Only cold conditions	Root Cause: – Preheat relay problem – Wiring harness defect Workshop action: Check: – Preheat relay – Wiring harness
P26087E	Intake Air Heater "B" Circuit High	Actuator Stuck On	A14. EB:14	Event: The preheat element is active when there is no preheat activation request. Only for 12 volt systems Behavior: No information available	Root Cause: – Preheat relay problem – Wiring harness defect Workshop action: Check: – Preheat relay – Wiring harness
P260900	Intake Air Heater System Performance	No Sub-type Information	N/A	Event: If the drop voltage involved by the consumption of the intake air heater device, measured through the battery voltage, after activation is lower than 1 volt, the IDTC is reported. Behavior: No information available	Root Cause: – Intake air heater device deficient: At least one of both devices is not heating correctly (Current consumed by the one is not enough) Workshop action: Check: – Intake air heater device
P268113	Engine Coolant Bypass Valve "A" Control	Circuit Open	A14. EB:38	Event: Open circuit fault is detected Behavior: No information available	Root Cause: – Open circuit in wiring harness, actuator or connector Workshop action: Check: – Open circuit – Wiring harness – Actuator – Connector
P268200	Engine Coolant Bypass Valve Control Circuit Low	No Sub-type Information	A14. EB:38	Event: Short circuit to ground is detected.	Root Cause: – Wiring harness, actuator or connector is short circuited to

				Behavior: No information available	ground voltage Workshop action: Check: – Wiring harness – Actuator – Connector – Short circuit to ground voltage
P268300	Engine Coolant Bypass Valve Control Circuit High	No Sub-type Information	A14. EB:38	Event: Short circuit to battery is detected Behavior: No information available	Root Cause: – Wiring harness, actuator or connector is short circuited to battery voltage Workshop action: Check: – Wiring harness – Actuator – Connector – Short circuit to battery voltage
P268C00	Cylinder 1 Injector Data Incompatible	No Sub-type Information	N/A	Event: Trim Code checksum of Injector 1 is incorrect Behavior: Uneven torque	Root Cause: – Entered wrong trim code Workshop action: Check: – Trim code
P268D00	Cylinder 2 Injector Data Incompatible	No Sub-type Information	N/A	Event: Trim Code checksum of Injector 2 is incorrect Behavior: Uneven torque	Root Cause: – Entered wrong trim code Workshop action: Check: – Trim code
P268E00	Cylinder 3 Injector Data Incompatible	No Sub-type Information	N/A	Event: Trim Code checksum of Injector 3 is incorrect Behavior: Uneven torque	Root Cause: – Entered wrong trim code Workshop action: Check: – Trim code
P268F00	Cylinder 4 Injector Data Incompatible	No Sub-type Information	N/A	Event: Trim Code checksum of Injector 4 is incorrect Behavior: Uneven torque	Root Cause: – Entered wrong trim code Workshop action: Check: – Trim code
P269000	Cylinder 5 Injector Data Incompatible	No Sub-type Information	N/A	Event: Trim Code checksum of Injector 5 is incorrect	Root Cause: – Entered wrong trim code

				<p>Behavior: Uneven torque</p>	<p>Workshop action: Check: – Trim code</p>
P269100	Cylinder 6 Injector Data Incompatible	No Sub-type Information	N/A	<p>Event: Trim Code checksum of Injector 6 is incorrect</p> <p>Behavior: Uneven torque</p>	<p>Root Cause: – Entered wrong trim code</p> <p>Workshop action: Check: – Trim code</p>
P269713	Exhaust aftertreatment fuel injector "A"	Circuit Open	A14. EB:62 A14. EB:45	<p>Event: Either short circuit to battery, or open circuit is detected</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause: – Open circuit in wiring harness, actuator or connector – Short circuit to battery wiring harness, actuator or connector</p> <p>Workshop action: Check: – Open circuit in wiring harness, actuator or connector – Short circuit to battery wiring harness, actuator or connector</p>
P269800	Exhaust Aftertreatment Fuel Injector "A" Performance	No Sub-type Information	A14. EB:62 A14. EB:45	<p>Event: Exhaust Aftertreatment Fuel Injector "A" loss of injection above 0.75 ratio</p> <p>Behavior: No information available</p>	<p>Root Cause: – Exhaust Aftertreatment Fuel Injector "A" clogged – Exhaust Aftertreatment Fuel Injector "A" does not deliver as expected</p> <p>Workshop action: Check: – Exhaust Aftertreatment Fuel Injector "A" If fault is not detected: Fault trace according to Tech Tool fault tree</p>
P269900	Exhaust Aftertreatment Fuel Injector "A" Circuit Low	No Sub-type Information	A14. EB:62 A14. EB:45	<p>Event: Short circuit to ground is detected</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause: – Wiring harness, actuator or connector is short circuited to ground voltage</p> <p>Workshop action:</p>

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					<p>Check:</p> <ul style="list-style-type: none"> - Wiring harness - Actuator - Connector - Short circuit to ground voltage
P269A00	Exhaust Aftertreatment Fuel Injector "A" Circuit High	No Sub-type Information	A14. EB:62 A14. EB:45	<p>Event: Short circuit to battery is detected.</p> <p>Behavior: Manual regeneration not possible</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness issue - Actuator broken - Connector - Short circuit to battery <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness - Short circuit to battery - Actuator - Connector
P2A1614	Injection Pump Fuel Metering Control "D" (Cam/Rotor /Injector)	Short Circuit to Ground or Open	A14. EB:60 A14. EB:56	<p>Event: Current driving the injector rises too slowly</p> <p>Behavior: Engine derate</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness issue - Actuator broken - Connector detached <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness - Actuator - Connector
P2A1700	Injection Pump Fuel Metering Control "D" Range /Performance (Cam/Rotor /Injector)	No Sub-type Information	N/A	<p>Event: Loss of high fuel pressure pumping capacity</p> <p>Behavior: Engine derate</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - High Fuel Pressure - Pump Rotated Cam profile <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - High fuel pressure pump - Rotated cam profile
P2A1900	Injection Pump Fuel Metering Control "D" High (Cam /Rotor/Injector)	No Sub-type Information	A14. EB:60 A14. EB:56	<p>Event: Current driving the injector rises too quickly</p> <p>Behavior: Engine derate</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> - Wiring harness issue - Actuator broken - Short circuit to battery <p>Workshop action: Check:</p> <ul style="list-style-type: none"> - Wiring harness - Short circuit to battery - Actuator
P2A1E14	Injection Pump	Short Circuit	A14.	Event:	Root Cause:

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	Fuel Metering Control "F" (Cam/Rotor/Injector)	to Ground or Open	EB:60 A14. EB:40	Current driving the injector rises too slowly Behavior: Engine derate	– Wiring harness issue – Actuator broken – Connector detached Workshop action: Check: – Wiring harness – Actuator – Connector
P2A1F00	Injection Pump Fuel Metering Control "F" Range /Performance (Cam/Rotor/Injector)	No Sub-type Information	N/A	Event: Loss of high fuel pressure pumping capacity Behavior: Engine derate	Root Cause: – High fuel pressure pump – Rotated cam profile Workshop action: Check: – High fuel pressure pump – Rotated cam profile
P2A2100	Injection Pump Fuel Metering Control "F" High (Cam/Rotor/Injector)	No Sub-type Information	A14. EB:60 A14. EB:40	Event: Current driving the injector rises too quickly Behavior: Engine derate	Root Cause: – Wiring harness issue – Short circuit to battery – Actuator broken Workshop action: Check: – Wiring harness – Short circuit to battery – Actuator
P2AB047	Particulate Matter Sensor Processor	Watchdog / Safety μ C Failure	N/A	Event: Particulate Matter Sensor Processor Performance Behavior: No information available	Root Cause: – Particulate Matter Sensor CPU Internal Fault Workshop action: Check: – Particulate Matter Sensor
P2CE113	Intake Air Heater "C" Circuit/Open	Circuit Open	A14. EB:25	Event: Open circuit fault is detected Behavior: Engine is difficult to start - Only cold conditions	Root Cause: – Open circuit in wiring harness, actuator or connector Workshop action: Check: – Open circuit in wiring harness – Actuator – Connector
P2CE311	Intake Air Heater "C"	Short Circuit to Ground	A14. EB:25	Event: Short circuit to ground is detected.	Root Cause: – Wiring harness,

	Circuit Low			<p>Behavior: No information available</p>	<p>actuator or connector is short circuited to battery voltage</p> <p>Workshop action: Check: – Wiring harness – Actuator – Connector – Short circuit to ground voltage</p>
P2CE412	Intake Air Heater "C" Circuit High	Short Circuit to Battery	A14. EB:25	<p>Event: Short circuit to battery is detected</p> <p>Behavior: Engine is difficult to start - Only cold conditions</p>	<p>Root Cause: – Wiring harness, actuator or connector is short circuited to battery voltage</p> <p>Workshop action: Check: – Wiring harness – Actuator – Connector – Short circuit to battery voltage</p>
U000188	CAN Communication Backbone 2 Net	Bus off	A14. EB:22 A14. EB:21	<p>Event: It has not been possible to send frames on high speed CAN communication bus, and it has not been possible to receive frames on high speed CAN communication bus</p> <p>Behavior: Starter motor does not run</p>	<p>Root Cause: – Lost communication on high speed CAN communication bus</p> <p>Workshop action: Check: – High speed CAN communication bus If fault is not detected: Fault trace according to Tech Tool fault tree</p>
U001088	CAN Communication Backbone 1 Net	Bus off	A14. EB:51 A14. EB:55	<p>Event: It has not been possible to send frames on medium speed CAN communication bus, and it has not been possible to receive frames on medium speed CAN communication bus</p> <p>Behavior: Starter motor does not run</p>	<p>Root Cause: – Lost communication on medium speed CAN communication bus</p> <p>Workshop action: Check: – Medium speed CAN communication bus If fault is not detected: Fault trace according to Tech Tool fault tree</p>
U008088	Vehicle Communication Engine Subnet	Bus off	N/A	<p>Event: It has not been possible to send frames on vehicle communication engine subnet, and it has not been possible to</p>	<p>Root Cause: – Lost communication on vehicle communication</p>

				receive frames on vehicle communication engine subnet Behavior: Engine derate	engine subnet Workshop action: Check: – Vehicle communication engine subnet If fault is not detected: Fault trace according to Tech Tool fault tree
U010100	Lost Communication with TECU	No Sub-type Information	N/A	Event: Lost communication with TCM on medium speed CAN communication bus Behavior: No information available	Root Cause: – TCM not powered – Software incompatibility with TCM Workshop action: Check: – TCM – Software incompatibility with TCM
U010C00	Lost Communication with Turbocharger /Supercharger Control Module "A"	No Sub-type Information	N/A	Event: Lost communication with VGTM on vehicle communication engine subnet Behavior: Engine derate	Root Cause: – VGTM not powered – Software incompatibility with VGTM Workshop action: Check: – VGTM – Software incompatibility with VGTM
U010E00	Lost Communication With Reductant Control Module	No Sub-type Information	N/A	Event: Lost communication with EACM on Medium Speed CAN Communication Bus Behavior: Engine derate	Root Cause: – EACM not powered – Software incompatibility with EACM Workshop action: Check: – EACM – Software If fault is not detected: Fault trace according to Tech Tool fault tree
U012100	Lost Communication With Anti-Lock Brake System (ABS) Control Module	No Sub-type Information	N/A	Event: Lost communication with ABS on medium speed CAN communication bus Behavior: No information available	Root Cause: – ABS not powered – Software incompatibility with ABS

					<p>Workshop action: Check: – ABS – Software incompatibility with ABS</p>
U012900	Lost Communication With Brake System Control Module	No Sub-type Information	N/A	<p>Event: Lost communication with BSCM on medium speed CAN communication bus</p> <p>Behavior: Auxiliary brakes, low performance (reduced retarder braking)</p>	<p>Root Cause: – BSCM not powered – Software incompatibility with BSCM</p> <p>Workshop action: Check: – BSCM – Software incompatibility with BSCM</p>
U014100	Lost Communication with VMCU	No Sub-type Information	N/A	<p>Event: Lost communication with BCM on medium speed CAN communication bus OR Lost communication with BCM on medium speed CAN communication bus</p> <p>Behavior: Starter motor does not run</p>	<p>Root Cause: – BCM not powered – Software incompatibility with BCM</p> <p>Workshop action: Check: – BCM – Software incompatibility with BCM If fault is not detected: Fault trace according to Tech Tool fault tree</p>
U014200	Lost Communication With Body Control Module "B"	No Sub-type Information	N/A	<p>Event: Lost communication with body control module "B" on medium speed CAN communication bus</p> <p>Behavior: Activation failure, engine mounted power take off</p>	<p>Root Cause: – Body control module "B" not powered – Software incompatibility with body control module "B"</p> <p>Workshop action: Check: – Body control module "B" – Software</p>
U015500	Lost Communication with Instrument Panel Cluster (IPC) Control Module	No Sub-type Information	N/A	<p>Event: Lost communication with IPC on medium speed CAN communication bus</p> <p>Behavior: No information available</p>	<p>Root Cause: – IPC not powered – Software incompatibility with IPC</p> <p>Workshop action:</p>

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					<p>Check:</p> <ul style="list-style-type: none"> – IPC – Software incompatibility with IPC <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
U016700	Lost Communication With Vehicle Immobilizer Control Module	No Sub-type Information	N/A	<p>Event: Signal response time out</p> <p>Behavior: Starter motor does not run Engine cranks but does not start</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> – Response time out <p>Workshop action: Check: – Response time out</p>
U029D00	Lost Communication With NOx Sensor "A"	No Sub-type Information	N/A	<p>Event: Lost communication with NOX1 on vehicle communication engine subnet</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> – NOX1 not powered – Software incompatibility with NOX1 <p>Workshop action: Check: – NOX1 – Software incompatibility with NOX1</p> <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
U029E00	Lost Communication With NOx Sensor "B"	No Sub-type Information	N/A	<p>Event: Lost communication with NOX2 on vehicle communication engine subnet</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> – NOX2 not powered – Software incompatibility with NOX2 <p>Workshop action: Check: – NOX2 – Software incompatibility with NOX2</p> <p>If fault is not detected: Fault trace according to Tech Tool fault tree</p>
U02A300	Lost Communication With Particulate Matter (PM) Sensor	No Sub-type Information	N/A	<p>Event: Lost communication with Particulate Matter (PM) Sensor 11 on Vehicle Communication Engine Subnet</p> <p>Behavior: No information available</p>	<p>Root Cause:</p> <ul style="list-style-type: none"> – Particulate Matter (PM) Sensor 11 not powered – Software incompatibility with Particulate Matter (PM) Sensor 11

					Workshop action: Check: – Particulate Matter (PM) Sensor – Software
U032300	Software Incompatibility with Instrument Panel Control Module	No Sub-type Information	N/A	Event: Lost communication with IPC on medium speed CAN communication bus Behavior: No information available	Root Cause: – IPC not powered – Software incompatibility with IPC Workshop action: Check: – IPC – Software incompatibility with IPC If fault is not detected: Fault trace according to Tech Tool fault tree
U033100	Software Incompatibility with Body Control Module "A"	No Sub-type Information	N/A	Event: Lost communication with BCM on medium speed CAN communication bus Behavior: Starter motor does not run	Root Cause: – BCM not powered – Software incompatibility with BCM Workshop action: Check: – BCM – Software incompatibility with BCM If fault is not detected: Fault trace according to Tech Tool fault tree
U041500	Invalid Data Received from Anti-Lock Brake System (ABS) Control Module	No Sub-type Information	N/A	Event: Invalid Data Received from Anti-Lock Brake System (ABS) Control Module Behavior: No information available	Root Cause: – Invalid Data Received from Anti-Lock Brake System Workshop action: Check: – Invalid Data Received from Anti-Lock Brake System
U042600	Invalid Data Received From Vehicle Immobilizer Control Module	No Sub-type Information	N/A	Event: ECM and immobilizer unit security codes do not match Behavior: Starter motor does not run Engine cranks but does not start	Root Cause: – Faulty immobilizer code Workshop action: Check: – Immobilizer code
U116C00	Lost	No Sub-type Information	N/A	Event:	Root Cause:

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	Communication with TCM on Powertrain CAN	Information		Lost communication with TCM on vehicle communication powertrain CAN Behavior: No information available	– TCM – Software incompatibility with TCM Workshop action: Check: – TCM – Software
U116F00	Lost Communication with Reductant Control Module on Engine Subnet	No Sub-type Information	N/A	Event: Lost communication with EACM on vehicle communication engine subnet Behavior: Engine derate	Root Cause: – EACM not powered – Software incompatibility with EACM Workshop action: Check: – EACM – Software If fault is not detected: Fault trace according to Tech Tool fault tree
U117888	Vehicle Communication Powertrain CAN	Bus off	A14. EB:52 A14. EB:56	Event: It has not been possible to send frames on vehicle communication powertrain CAN, and it has not been possible to receive frames on vehicle communication powertrain CAN Behavior: No information available	Root Cause: – Lost communication on Vehicle communication powertrain CAN Workshop action: Check: – Vehicle communication powertrain CAN
U1FFF68	Factory Mode Active	Event Information	N/A	Event: The factory mode is active through P1HCF Behavior: No information available	Root Cause: – Factory Mode was not turned off by P1HCF Workshop action: Check: – Factory mode
U300001	Electronic control unit	General Electrical Failure	N/A ECU internal	Event: Voltage on ECU internal below 0.15V Behavior: Starter motor does not run	Root Cause: – Wiring harness fault – Sensor fault – ECU fault Workshop action: Check: – Wiring harness – Sensor – ECU
U300041	Electronic control unit	General Checksum	N/A	Event: Program memory corruption	Root Cause: – Download issue

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		Failure		Behavior: Starter motor does not run	Workshop action: Check: – Download
U300044	Electronic control unit	Data Memory Failure	N/A	Event: RAM corruption Behavior: Starter motor does not run	Root Cause: – Download issue Workshop action: Check: – Download
U300045	Electronic control unit	Program Memory Failure	N/A	Event: Program memory corruption Software memory checksum error Behavior: Starter motor does not run	Root Cause: – Download issue Workshop action: Check: – Download
U300049	Electronic control unit	Internal Electronic Failure	N/A	Event: ECU internal error Behavior: Starter motor does not run	Root Cause: – ECU hardware issue Workshop action: Check: – ECU hardware
U301700	Control Module Timer/Clock Performance	No Sub-type Information	N/A	Event: Engine running monitor Failure Behavior: No information available	Root Cause: – Real time clock failure Workshop action: Check: – Real time clock If fault is not detected: Fault trace according to Tech Tool fault tree

For more information, please see:

[Engine Control Module \(ECM\), Signal Description](#)