MY06-07
Vehicle: S60, V/XC70, XC90
Engine: B5254T. B5244T

Functional Description

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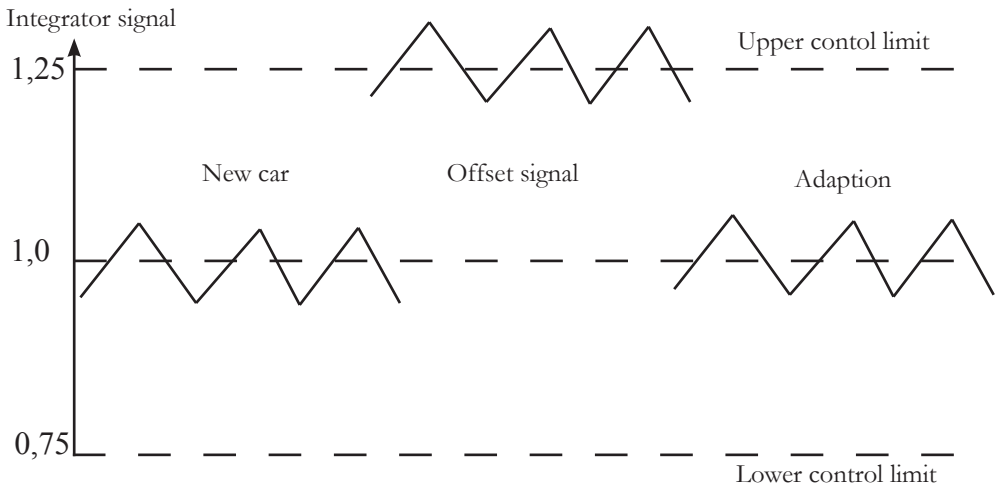
APPENDIX: CORRESPONDING MODE$06 DATA / DIAGNOSTIC FUNCTIONS

Fuel system monitoring

The fuel injection system has a function which compensates for changes in the lambda (λ) control which occur slowly over its service life. It is called λ adaptation and its purpose is to keep the integrator signal within its limits of control (see figure below).

The integrator signal controls the fuel injection time, in a new car the integrator signal oscillates about 1 (equivalent λ=1).

Integrator signal shift



The amount of λ integrator offset is calculated when the set λ is equal to 1 and the canister close valve is closed.

The fuel adaptation will compensate the fuel amount so that the λ integrator will remain in the middle (λ=1.0).

The λ control adaptation is divided into two adaptation areas: The additive adaptation at idle conditions (ora) and the multiplicative adaptation area at loaded engine (frau).

The correction of the fuel amount = calculated fuel amount * frai + ora. The speed of the fuel adaptation is depending on the λ integrator offset (big offset is equal to high adaptation speed). The amount of the λ integrator offset is also used in calculation of the physical urgency. The purge functionality is also calculating a physical urgency (dependant of charcoal canister load). This means that the fuel adaptation will get more time for adaptation if there is an offset and/or low charcoal canister load.

Fuel pressure system diagnosis

New fuel pressure system diagnosis function is implemented. It is due to new hardware design for this model year, with a variable fuel pump, a fuel pressure sensor and a fuel temperature sensor. The function target is to be able to point out the fuel pressure system as incorrect due to performance specification and fulfill legal requirements. The function will detect the fuel pressure to be stuck high (higher pressure than target), stuck low, noisy pressure signal or plausibility.

The function, fuel temperature sensor diagnosis will detect min and max error.

The function, fuel pressure sensor diagnosis will detect min and max error.

And the function fuel power stage diagnosis will detect min, max and signal error.

Fuel Monitor Operation		Corresponding Monitor ID
DTCs	ora: P2187 Lean P2188 Rich frau: P2177 Lean P2178 Rich	81 81 81 81
Monitor Strategy description	Long term fuel trim correction value is updated to maintain the short-term fuel trim at desired set value (0 % correction). The value of the long term fuel trim correction is monitored.	

Typical fuel monitor enable conditions

Enable condition	*Minimum*	*Maximum*
Filtered air mass flow	20-27 kg/h	270-280 kg/h
Engine temperature	69.8°C	
Intake air temperature		80.3°C

Typical fuel monitor malfunction thresholds

Malfunction criteria	*Threshold value*
Multiplicative correction factor: frau, Lean frau, Rich	 ≥ 1.20001-1.21002 ≤ 0.78-0.83
Additive correction: rkat, Lean rkat, Rich	 ≥ 7.500-8.484 % ≤ -7.312 %

Fuel pressure regulating – DECOS

The fuel pressure regulating for demand controlled fuel pump (DECOS – DEmand COntrolled fuel Supply), means that the fuel pressure is infinitely variable by vary the power of the fuel pump. The systems construction implies among other things that a larger maximum pressure (approx. 5.5 bar) is allowed in the fuel pump. This pressure is used in extreme situations, for instance at high engine load. Following components are used for fuel pressure regulating:

- Engine Control Module (ECM)
- Fuel pump control module
- Fuel pressure sensor with Fuel temperature sensor
- Fuel pump

The time for start process of the engine can be decreased by quickly raising the pressure in the fuel distribution pipe, when ECM receive a signal from Central Electronic Module (CEM) about position of the ignition switch. ECM can easier calculate the injection time for the injection valves, because the signal from the fuel pressure sensor provides information about current fuel pressure. Especially cold start properties of the engine are improved. Advantages which receives when not all power of the fuel pump is used continuously are:

- The total current consumption of the fuel pump is decreased which bring about the power-supply system being discharged.
- The fuel pump durability will increase.
- Noise from the fuel pump is decreased.

The Engine Control Module (ECM) calculates which fuel pressure that shall be reached. After that a signal will be sent to the Fuel pump control module with a request for desired fuel pressure. This is performed via serial communication between ECM and the Fuel pump control module. By changing the PWM-signal the fuel pump can be infinitely variable. Only the needed pressure will be delivered to the Fuel distribution pipe/Injection valves. The value of the PWM-signal is a measure on workload of the Fuel pump (% duty, 100% = maximum pressure).

The ECM is continually monitoring the fuel pressure by means of a signal from the Fuel pressure sensor. Thereby, desired fuel pressure can be reached and on condition a signal will be sent to the Fuel pump control module with a request to adjusting the fuel pressure.

If the control module in Supplemental Restraint System (SRS) detects a collision the Engine Control Module, by reasons of security, will cut off the fuel pump.

Fuel pressure regulating – DECOS operation	
DECOS – Fuel Pressure error	P0087 Min error P0088 Max error P0089 Plausibility error P0090 Signal error
Monitor Strategy description	Performance

Fuel pressure regulating – DECOS operation		
DTCs	*DECOS – Fuel Temperature Sensor*	*Monitor Strategy description*
	P0181 Min error P0180 Max error	Circuit low Circuit high

Fuel pressure regulating – DECOS operation		
DTCs	*DECOS – Fuel Pressure Sensor low*	*Monitor Strategy description*
	P0192 Min error P0193 Max error	Circuit low Circuit high

Fuel pressure regulating – DECOS operation		
DTCs	*DECOS – Pump Power stage (No MIL)*	*Monitor Strategy description*
	P0627 Signal Error P0628 Min error P0629 Max error	Turn on delay

Typical fuel pressure regulating - DECOS conditions		
Enable condition	*Minimum*	*Maximum*
Waiting time after end of start		60 s
Duty Cycle PCM	10 %	85 %

Typical fuel pressure regulating - DECOS malfunction thresholds	
Malfunction criteria	*Threshold value*
Fuel pressure deviation lower limit	≤ 150.00 kPa
Control Signal to DSM too high	20 %
Delay time after condition above	> 5 s