

Engine Management System

Regeneration

The particulate filter must be regenerated regularly so that it does not become clogged with soot particles and its function impaired. During regeneration, the soot particles collected in the particulate filter are burned off (oxidized).

The regeneration of the particulate filter is performed in the following stages:

- Warm-up phase
- Passive regeneration
- Active regeneration
- Customer-initiated regeneration drive
- Service regeneration

Warm-Up Phase

To heat up a cold oxidation catalyst and particulate filter as quickly as possible and thus bring them to operating temperature, the engine management system introduces a post-injection after the main injection.

This fuel combusts in the cylinder and increases the combustion temperature. Through the air flow in the exhaust gas tract, the resulting heat reaches the oxidation catalyst and the particulate filter and heats them.

The warm-up phase is complete when the operating temperature of the oxidation catalyst and the particulate filter has been reached for a specific period of time.

Passive Regeneration

During passive regeneration the soot particles are continuously burned without the intervention of Engine Control Module (ECM) J623.

This occurs primarily at higher engine load, such as in highway driving, when exhaust gas temperatures range from 662°F to 932°F (350°C to 500°C).

At these temperatures the soot particles are converted into carbon dioxide through a combustion reaction with nitrogen dioxide.

Active Regeneration

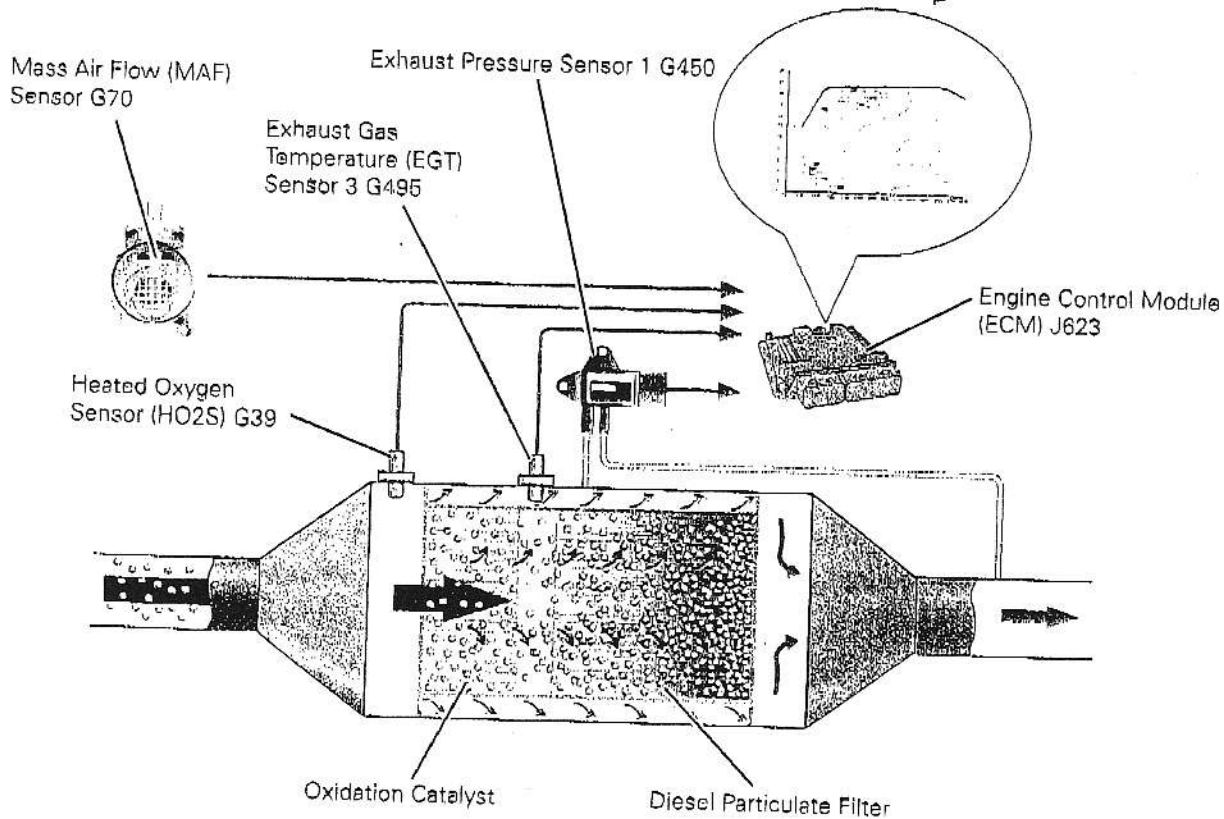
In a large portion of the operating range the exhaust gas temperatures are too low for a passive regeneration. Because soot particles can no longer be eliminated passively, soot accumulates in the filter. As soon as a specific soot load has been reached in the filter, the Engine Control Module (ECM) J623 initiates an active regeneration. The soot particles are burned off at an exhaust gas temperature of 1022°F to 1202°F (550°C to 650°C).

Active Regeneration Function

The soot load of the particulate filter is calculated by two pre-programmed load models in the Engine Control Module (ECM) J623.

One of the load models is determined from the driving profile of the user and the signals from the exhaust gas temperature sensors and Heated Oxygen Sensor (HO2S) G39.

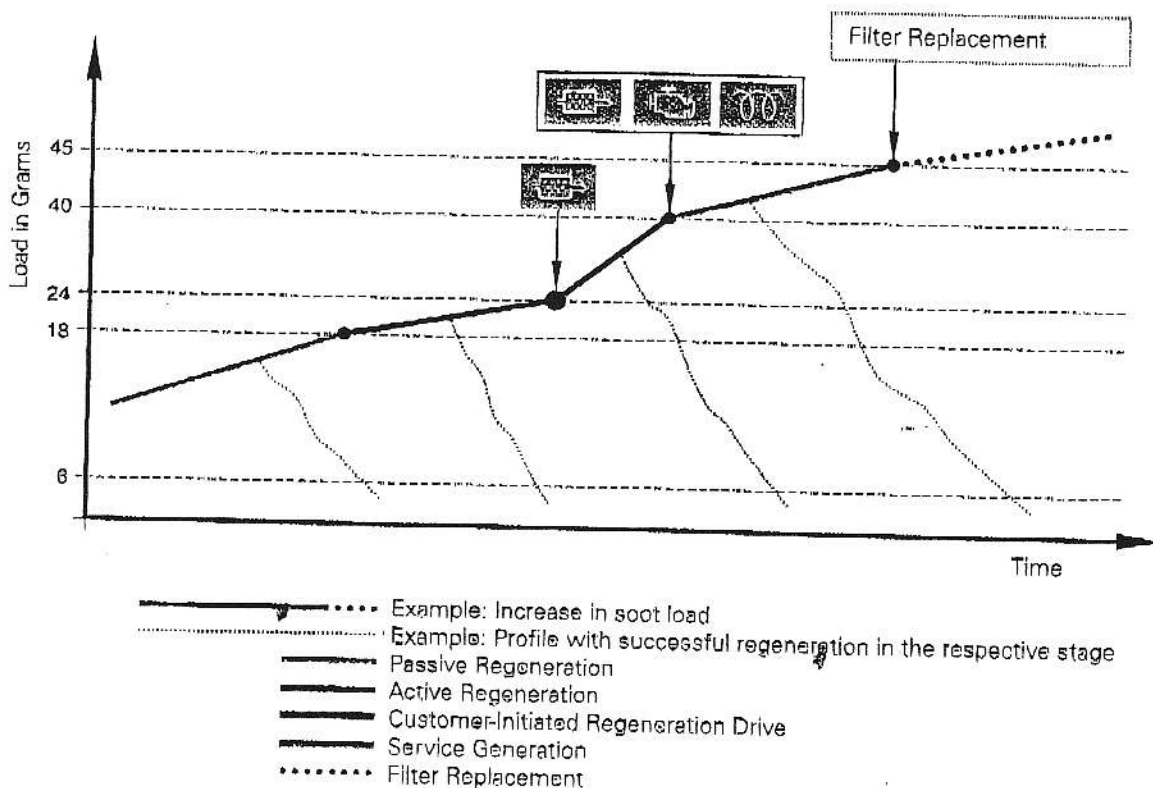
Another soot load model is the flow resistance of the particulate filter. It is calculated from the signals of Exhaust Pressure Sensor 1 G450, Exhaust Gas Temperature (EGT) Sensor 3 G495, and Mass Air Flow (MAF) Sensor G70.



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Engine Management System

Regeneration of the 2.0 Liter TDI Particulate Filter



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Distance Regeneration

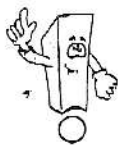
"Distance regeneration" is a distance-dependent regeneration of the particulate filter. The Engine Control Module (ECM) J623 initiates an active regeneration automatically if during the last 466 to 621 miles (750 to 1000 km) of travel no successful regeneration has taken place, regardless of the load condition in the diesel particulate filter.

Distance regeneration serves as additional safeguard to minimize the load condition of the diesel particulate filter.

Customer-Initiated Regeneration Drive

An exhaust gas temperature high enough for particulate filter regeneration is not reached when the vehicle is only driven for short-distances. If the load condition of the diesel particulate filter reaches a threshold value, Diesel Particle Filter Indicator Lamp K231 in the instrument panel will light up.

This signal prompts the driver to perform a regeneration drive. The vehicle must be driven for a short period of time at increased speed to ensure that an adequately high exhaust gas temperature is reached. The operating conditions must remain constant over the period for a successful regeneration.



Details of the driving behavior required when the Diesel Particle Filter Indicator Lamp K231 comes on can be found in the Owner's Manual.

Service Regeneration

If the regeneration drive is not successfully completed and the load condition of the diesel particulate filter has reached 1.41 ounces (40 grams), Diesel Particle Filter Indicator Lamp K231 and Glow Plug Indicator Lamp K29 will light up simultaneously.

The text "Check Engine - Service Shop" will appear in the instrument panel display.

This prompts the driver to visit the nearest service shop. In this case, the Engine Control Module (ECM) J623 blocks active regeneration of the diesel particulate filter to prevent damage to the filter and the particulate filter can only be regenerated by service regeneration with the VAS 5051.



When the load condition reaches 1.59 ounces (45 grams), service regeneration is no longer possible. Because the danger of destroying the filter is too great with this load, the filter must be replaced.