ENGINE 156.984 in MODEL 216, 221

Location on model 164, 216, 221, 251

157 Firewall catalytic converter
157/1 Catalytic converter insert

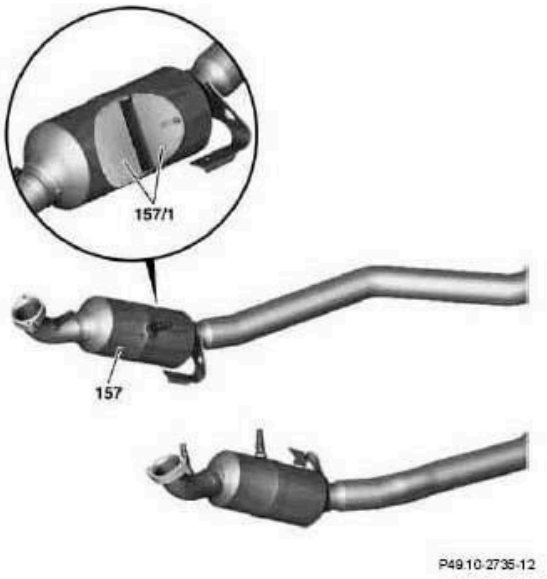

Fig. 3: Identifying Three-Way Catalytic Converter Components Location On Model 164, 216, 221, 251
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Two types of catalytic converter inserts are used respectively in near-engine mounted firewall catalytic converters.

Location on model 209, 211, 219

Two separate catalytic converters each are used per exhaust chain.

157 Firewall catalytic converter
158 Underfloor catalytic converter

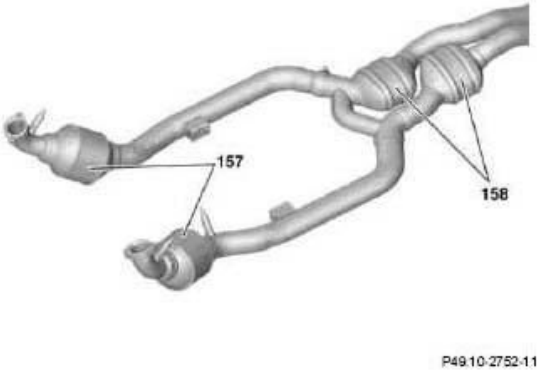

Fig. 4: Identifying Three-Way Catalytic Converter Components Location On Model 209, 211, 219
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Task

Reducing the exhaust gas emissions:

- Nitrogen oxides (NO_X)
- Hydrocarbon (HC)
- Carbon monoxide (CO)

Body (schematic)

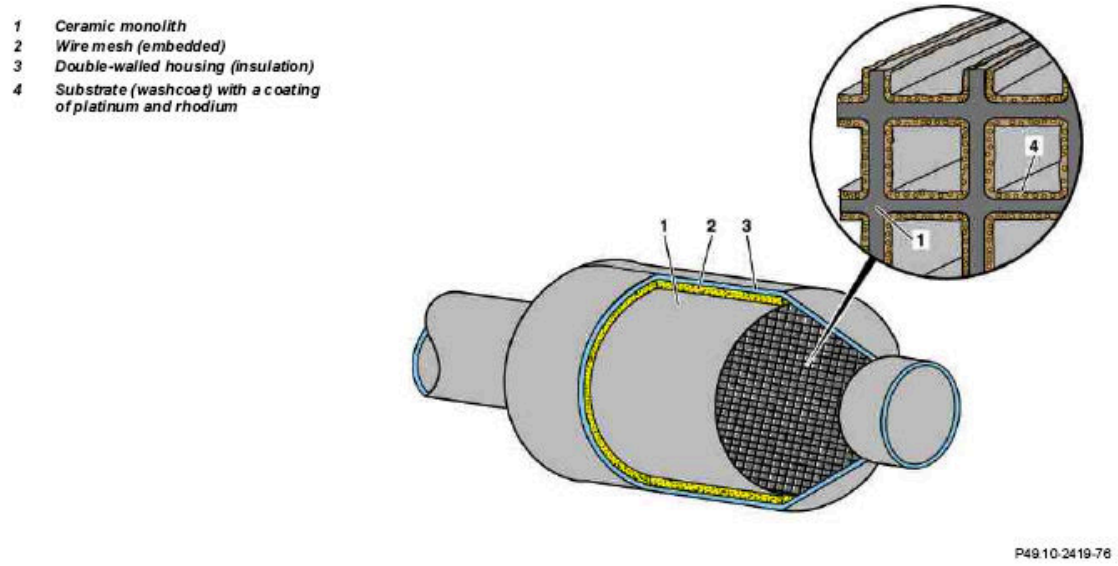

Fig. 5: Identifying Three-Way Catalytic Converter Body (Schematic) Diagram
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

There are two ceramic monoliths (ceramic body) in each firewall catalytic converter which are penetrated by 600 channels each. The exhaust gas flows through these passages. The ceramic consists of high temperature-resistant magnesium aluminum silicate. The monolith, which is extremely sensitive to voltages, is embedded in an elastic wire mesh made of high-alloy steel wires and fitted in a double-walled stainless steel housing.

Ceramic monoliths require a substrate (washcoat) of aluminum oxide ($Al_2 O_3$) that increases the active surface of the catalytic converter by an approximate factor of 7000.

The active catalytic layer coated on the substrate is available in three-way catalysts primarily out of platinum and rhodium. Platinum accelerates oxidation of hydrocarbons (HC) and carbon monoxide (CO), whereas rhodium accelerates the reduction of nitrogen oxide (NO_x).

The O_2 sensors on the left or right downstream of TWC (G3/5, G3/6) are located on the side on the firewall catalytic converters and jut into the space between both monoliths.

Function (schematic)

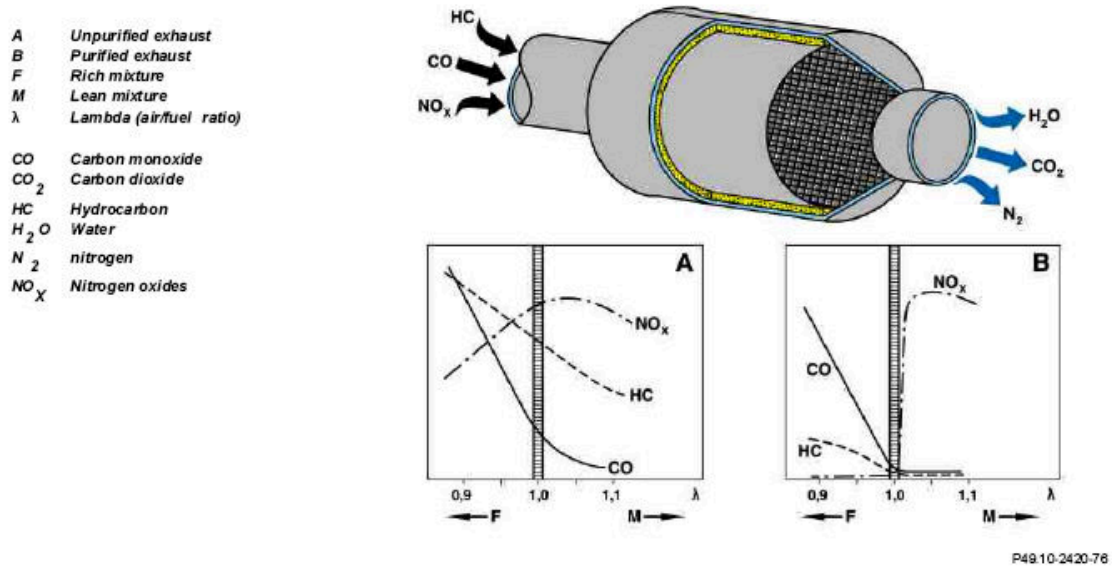

Fig. 6: Identifying Three-Way Catalytic Converter Function (Schematic) Diagram
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Exhaust gases flow through the three way catalytic converter and hence come into contact with the rare metals, platinum and rhodium.

- Through oxidation, carbon monoxide (CO) is converted into carbon dioxide (CO_2) and hydrocarbons (HC) into water (H_2 O) + carbon dioxide (CO_2).
- Through reduction, nitrogen oxides (NO_x) are converted into nitrogen (N_2) + carbon dioxide (CO_2).

The remaining oxygen content in the exhaust is a crucial factor in the conversion of pollutants. The best pollutant conversion is obtained at lambda=1.

Operating conditions

As is the case for the O_2 sensor, the operating temperature also plays a very important role in the case of the catalytic converter. Appreciable conversion of the pollutants does not commence until an operating temperature of approx. 250°C.

Ideal operating conditions for high conversion rates and a long life prevail at temperatures between around 450 to 800°C.

The temperature of the three way catalytic converter can increase beyond 1400°C due to malfunctioning of the engine such as misfiring etc. These high temperatures can lead to destruction of the catalytic converter, by melting the ceramic monoliths.

Another requirement for reliable long-term operation is that only unleaded fuel be used. Lead compounds form