

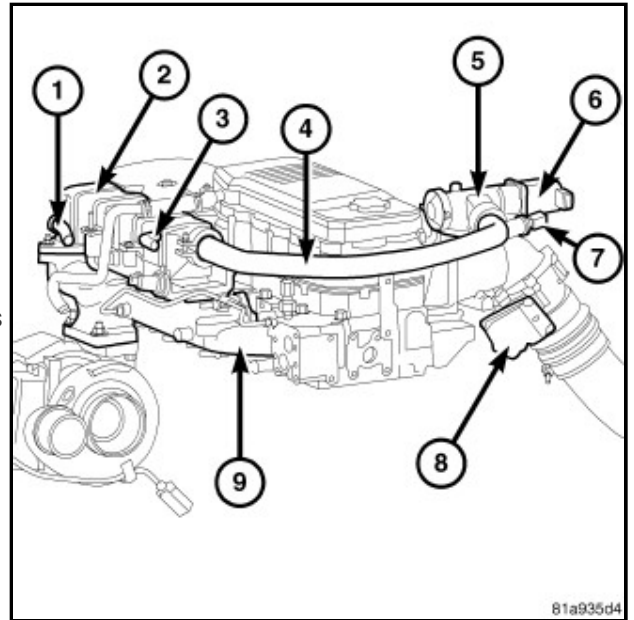
## EXHAUST GAS RECIRCULATION - OPERATION (6.7L DSL)

### OPERATION

The Exhaust Gas Recirculation (EGR) system is designed to reduce Oxides of Nitrogen (NO<sub>x</sub>) in the exhaust system by reducing combustion temperatures. This is done by introducing inert gas (exhaust) into the combustion process. The intake air charge is diluted by a precisely metered amount of exhaust gas for the operating mode. For example at idle and part throttle, more EGR is introduced than at high-speed cruise conditions. A cooler (2) reduces the temperature of the exhaust gas before it is combined with the intake air, which increases the ability of the existing volume of inert gas to reduce NO<sub>x</sub>. The EGR cooler is cooled by the engine coolant.

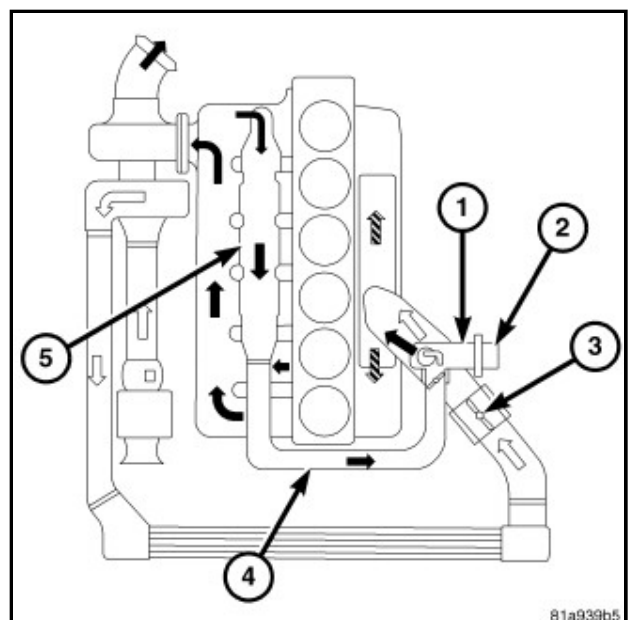
The EGR system contains the following components:

- EGR cooler (2)
- EGR valve assembly (5)
- EGR valve crossover tube (4)
- EGR temperature sensor (7)
- EGR valve (6)
- EGR air flow control valve (8)



EGR is active at low load and speed ranges. Control of EGR flow is based on engine load and engine speed. The Powertrain Control Module (PCM) gathers information from engine input sensors, and after evaluating the input signals, uses a stored performance map to operate the EGR valve motor (actuator) (2) and EGR airflow throttle control valve (3). The calculation allows for a precise EGR flow rate.

The EGR valve assembly (1) is located at the left front of the engine, in the upper corner of the intake manifold. The EGR valve has two poppet valves connected by a valve shaft. Cooled exhaust gases flow from the EGR cooler to the center of the valve. When the valves open, exhaust gasses flow into the intake air stream from both the top and the bottom of the passage.



The EGR valve motor (actuator) (2) is a three-phase, brush-less Direct Current (DC) motor controlled by the PCM. Three phase DC motors require three hall effect sensors internal to the motor to monitor the position of the motor accurately. This allows the PCM to determine whether or not the commanded verses actual position is greater than the calibrated threshold. The DC motor uses six transistors to polarize the internal magnets to rotate the output shaft. The three-phase DC motor is not serviced separately from the EGR valve.

Three-phase DC motors have the following advantages:

- Higher efficiency and reliability
- Lower acoustic noise
- Smaller and lighter
- Longer life
- Greater dynamic response