

# Technical Service Bulletin

**Date:** 8/20/2003

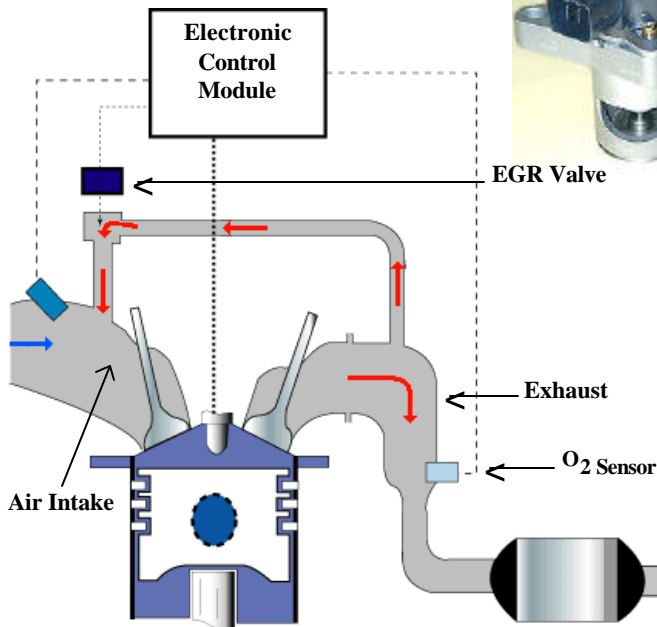
**Product Description:** All Motor Oils/Oil Analysis

**Subject:** EGR Valves

## DESCRIPTION

Exhaust gas recirculation (EGR) valves are vital emission control components in modern internal combustion engines. Their task is to minimize the formation of oxides of nitrogen (NOx), a byproduct of the combustion process.

EGR valves function by recycling a small amount of spent exhaust gas back into the combustion chamber, diluting the air/fuel mixture and resulting in a lowering of the combustion chamber temperature to below 2,500°F. This is important as NOx production is greatest at temperatures above 2,500°F.



## EGR Malfunction

If the EGR valve malfunctions, engine performance is dramatically reduced. An EGR valve remaining in the open position will result in the engine stumbling or stalling at idle speeds. When the EGR fails to open, combustion temperatures cannot be limited, causing higher cylinder temperatures and an increase in NOx emissions. Engine ping or knock may occur, especially when the engine is under load.

In either case, drivability problems arise and NOx control is lost. The loss of NOx control results in rapid degradation of the engine's motor oil. NOx shortens oil life by increasing oil nitration and decreasing the oil's ability to neutralize acids (TBN) and maintain internal cleanliness, resulting in oil thickening and/or the formation of sludge within the engine.

## Problem Detection

A malfunctioning EGR valve can be detected through engine diagnostics. The primary means of diagnosing a problem with the EGR valve are by checking vacuum lines, wire connections, engine computer diagnostics, emissions testing and checking for leaking gaskets.

Oil analysis can also be helpful in determining if the EGR valve is malfunctioning. Normally, the oxidation and nitration levels will be about equal. However, if the nitration level approaches double the oxidation level, a faulty EGR valve may be to blame. Note: A faulty MAF (mass air flow) sensor may also result in elevated levels of nitration.

Operated by either electronic (computer/servo) or mechanical (vacuum) means, EGR valves are designed to be closed at lower engine speeds. At low speeds, combustion temperatures are relatively low and NOx production is at a minimum. As speed and loads increase, so does the combustion chamber temperature. The EGR valve then opens to minimize the temperature and resulting increase in NOx production.

To insure optimum engine performance and the integrity and longevity of the motor oil, it is important to insure the EGR valve is working properly.

**Submitted By:** DA/DW

**Approved By:** DRA

**Approval Date:** 9/15/03

**Distribution:**  Internal  All