

EPA High-Mileage OBD FTP Study

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Overview

- **Testing Protocol**
- **Sample**
- **MILs and DTCs**
- **Groups to Investigate**
- **Lack of Overlap?**
- **Study of Repair Costs**
- **Costly MIL**

Testing Protocol

- **LA-4 cycle**
- **IM240 test**
- **Drain in-use fuel; refuel with indolene**
- **LA-4 cycle**
- **FTP test**
- **IM240 test**
- **Repair**

Selection of Vehicles

- **MY '96/97/98/99**
- **Over 100,000 miles**
- **Manufacturer weighted by sales**
 - **LDV/LDT within mfr weighted by sales**
- **MIL illumination is not a criteria**
- **Selection is not entirely random due to**
 - **incentives, location of selection**

Manufacturer Distribution

- **GM 22 (9)**
- **Ford 24 (14)**
- **Daimler/Chrysler 11 (6)**
- **Toyota 10 (6)**
- **Honda 7 (1)**
- **Nissan 7 (5)**
- **Suzuki 3 (1)**
- **VW 1**
- **Kia 1**
- **Total 86 (42)**
- **LDV +LDT(LDT only)**

MILs and DTCs

- **29 vehicles with MIL illuminated**
- **47 DTCs**
 - **15 Oxygen sensor**
 - **7 Misfire; 7 EGR; 7 Evap**
 - **3 intake air temp**
 - **3 lean condition**
 - **2 catalytic converter**
 - **1 coolant temp; 1 variable valve; 1 knock sensor**

MILs vs DTCs from Operating OBD I/M data

- **Analysis of I/M lane data of 5,272 OBD failures:**
- **Over 50% of MILs for O2, Evap, or EGR [21.8%, 20.4%; 12.8%]**
- **Misfire 11.7%; fuel control 9.1%; catalyst 6.4%; engine sensors 3.7%; inlet air sensors 3.6%**

Groups to Investigated

- **1 - MIL on and IM240 pass (n=19)**
- **2 - MIL on and IM240 fail (N=9)**
- **3 - FTP fail and MIL off and IM240 pass (n=4)**
- **4 - FTP fail and MIL on and IM240 pass (n=5)**
- **5 - IM240 fail (n= 10)**
- **6 - MIL on (n=28)**
- **7 - MIL off (n=58) (only 4 with repairs)**
- **8 - MIL off LAB240 fail (n=1) [left out of statistical analysis]**

Lack of Overlap?

- **Original study on Wisconsin data has been cited as showing little overlap between OBD and LaneIM240**
- **This high-mileage testing is close to random and you would expect 26 vehicles with no MIL and failing 240 results**
- **There is one!**

Statistical Study of Repair Costs

	1	2	3	4	5	6
1	-----	Not sig.	Not sig.	Not sig.	Not sig.	Not sig.
2	-----	-----	\$ 90%	Not sig.	Not sig.	Not sig.
3	-----	-----	-----	Not sig.	\$\$ 95%	Not sig.
4	-----	-----	-----	-----	Not sig.	Not sig.
5	-----	-----	-----	-----	-----	Not sig.
6	-----	-----	-----	-----	-----	-----

Average Repair Costs Findings

- **Vehicles with MIL on and failing LAB240 (2) have:**
 - **lower repair costs (90% confidence) than vehicles which fail the FTP, MIL off, and pass the LAB240 [\$230 vs \$688]**
- **Vehicles with FTP failing emissions, MIL off, and passing LAB240 (3) have:**
 - **Higher repair cost (95% confidence) than vehicles with failing LAB240 emissions [\$688 vs \$218]**
- **Average repair cost for MIL repair for a vehicle with over 100k miles is in the range of \$210 to \$481 [95% confidence] based on 28 repairs**

Poster Child for MIL Repair

- **'96 Ford Windstar with 110k miles**
- **MIL has been on for one year prior to procurement**
- **passed LAB240; failed FTP**
 - **NMHC 0.49/ CO 4.53/NOx 1.4/MPG 18.8**
- **Vehicle had DTCs for intake manifold runner control and misfire cylinder #1**
- **Inspection revealed a disconnected IMRC and a disconnected PCV system**

Poster Child for MIL Repair

- **Disconnected PCV system had caused oil contamination of entire aircleaner and MAF**
- **Repairs cost \$217 (P&L)**
- **Misfire returned after repair**
- **Intake removed/found EGR system compromised from oil and #1 fuel injector low flow**
- **Repairs cost \$459**
- **Oxygen sensor codes then set for two dead O2 sensors (possible oil contamination)**

Poster Child for MIL Repair

- **Repairs for O2 \$263**
- **MIL finally out**
- **FTP retest results**
 - **NMHC 0.16/ CO 1.86/NOx 0.38/MPG 18.3**
- **Total cost to repair: \$1009 (addition of 1 hr diagnostic)**
 - **catalyst expected lifetime?**
- **Estimate original repair would have been under \$100**

Conclusion

- **Findings appear to follow field data on DTCs**
- **Data does not support large numbers of OBD errors of omission**
- **OBD repairs will average between \$210 and \$480 for high mileage vehicles**
- **Maintenance can be costly**
- **Statistical analysis for emissions needs to be completed**