

OBD2K2

May 22 -24, 2002

LESSONS LEARNED

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VERMONT DEC

OBDII REPAIRS

- OBDII: huge improvement in aiding proper diagnosis/repair, but not a panacea
- Can be a number of possible causes of a DTC for a specific sensor/component
- Still need to follow thorough, logical procedure for diagnosing cause of problem
- OBDII provides very good starting point

RECOMMENDED DIAGNOSTIC/REPAIR PROCEDURE FOR OBDII FAULTS

- Verify customer complaint
- Check DTCs and Freeze Frame Data
- Perform thorough visual inspection
- Check Technical Service Bulletins
- Understand and Test System or Component
- Repair as Needed
- Verify Repair

VT OBDII CASE STUDY

1996 Subaru Legacy

Repair History

Date/Odo.	MIL/DTC	Shop ID / Repair
10-96 / 48K	ON / P0325	Shop 1 / Replaced Knock Sensor (repair successful)
10-98 / 112K	ON / P0136	Shop 1 / Repaired wire to O2 Sensor (repair successful)
2-99 / 119K	ON / P0105	Shop 2 / Cleared MAP sensor code (repair unsuccessful)
3-99 / 120K	ON / P0105	Shop 2 / Replaced MAP Sensor (repair successful)

VT OBDII CASE STUDY

1996 Subaru Legacy

Repair History

Date/Odo.	MIL/DTC	Shop ID / Repair
9-99 / 131K	ON / P0115	Shop 3 / Cleared Coolant Temp. Sensor code (repair unsuccessful)
1-00 / 139K	ON / P0115	Shop 3 / Replaced Coolant Temp. Sensor (repair successful)
2-00 / 142K	ON / P0105 P0106	Shop 3 / Cleared MAP Sensor codes (repair unsuccessful)
3-00 / 145K	ON / P0105 P0106	Shop 3 / Replaced MAP Sensor w/ kit (sensor, filter) (repair unsuccessful)

VT OBDII CASE STUDY

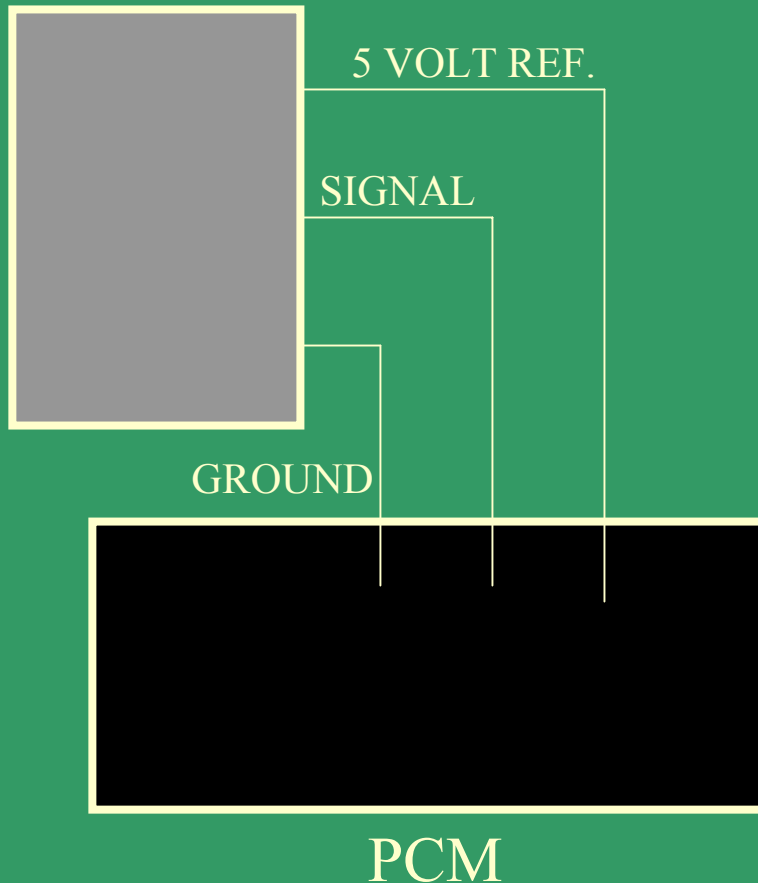
1996 Subaru Legacy

Repair History

Date/Odo.	MIL/DTC	Shop ID / Repair
3-00 / 145K	ON / P0106	Shop 3 / Gave up – “OBDII system no good”
8-01 / 181K	ON / P0106	Shop 2 / Major service interval. MIL on since 145K, still no repair done for MIL
10-01 / 187K	ON / P0106	VCERTT / see next slides for diagnosis and repair.

MAP SENSOR

MAP Sensor



- P0105 MAP CIRCUIT PROBLEM
- P0106 MAP RANGE OR PERF.
- P0107 MAP LOW INPUT
- P0108 MAP HIGH INPUT
- P0109 MAP INTERMITTENT

MAP SENSOR TESTING

- Basic sensor testing procedure involves:
 - Checking sensor reading with scan tool
 - Checking sensor voltage signal with DVOM
 - Checking circuit between PCM and sensor
 - Checking sensor signal over full range

VT OBDII CASE STUDY

Diagnosis / Repair

- Verified Customer Concern: Checked MIL status, DTCs, Checked MAP sensor reading on scan tool
 - MIL commanded ON
 - DTC P0106 (MAP Sensor Range or Performance Problem)
 - MAP sensor reading = 28 - 29” HG, no response to change in throttle or engine load
- Checked Freeze Frame Data
 - ECT 82 F, Load 9.8%, MAP 27.8” HG, RPM 1508
 - Indicates problem identified soon after engine start

VT OBDII CASE STUDY

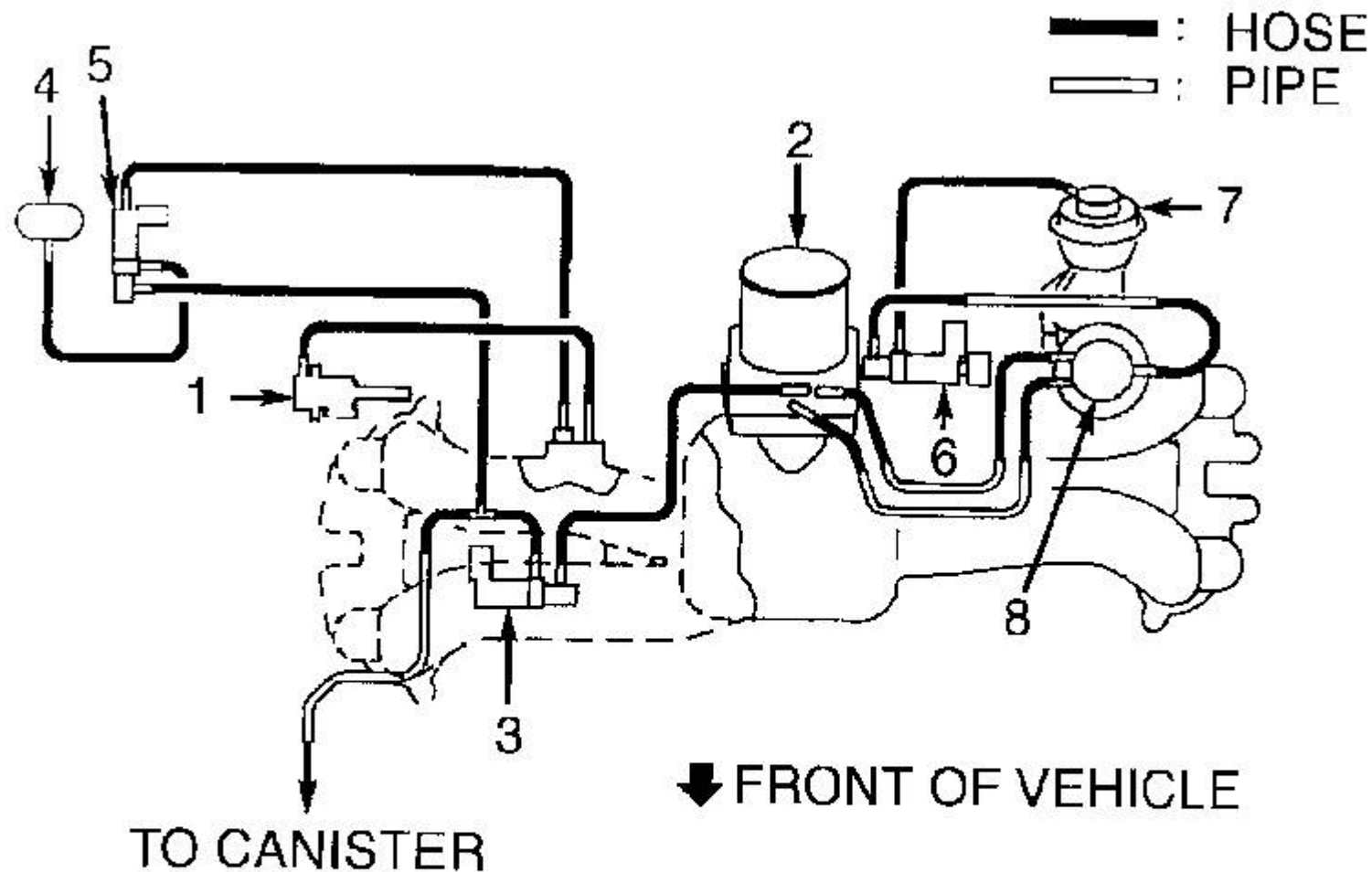
Diagnosis / Repair

- Performed Visual Inspection
 - Checked wiring, vacuum hoses and routing
- Reviewed Repair History
 - See previous slides
- Checked Technical Service Bulletins
 - TSB 11-47-95 (In extreme cold / high humidity, ice can form in MAP sensor or vacuum line, causing P0105 or P0106)
 - If P0105 replace sensor and install filter
 - If P0106 install filter only

VT OBDII CASE STUDY

Diagnosis / Repair

- Tested MAP sensor with scan tool
 - MAP pressure signal: ~ 28” HG pressure w/ KOEO and KOER, indicating problem
- Tested vacuum supply to MAP sensor
 - No vacuum found at supply line at idle
 - Found vacuum supply line connected to unknown component (not a vacuum source)
- Referenced vacuum routing diagram
 - Corrected vacuum line routing



1. Pressure Regulator
2. Throttle Body
3. Purge Control Solenoid Valve
4. Pressure Sensor

5. Pressure Sources Switching Solenoid Valve
6. EGR Solenoid Valve
7. EGR Valve
8. BPT

VT OBDII CASE STUDY

Diagnosis / Repair

- Re-tested MAP Sensor
 - Checked 5 volt reference and ground: OK
 - Checked signal voltage vs. vacuum: OK
 - Checked MAP sensor reading on scan tool: OK
- Cleared codes, test drove several trips
 - MIL OFF

VT OBDII CASE STUDY

Diagnosis / Repair

Conclusions

- Don't just clear codes to turn off MIL
 - Doesn't correct problem, and usually results in frustrated customer
- Check Technical Service Bulletins
 - Proper repair of first MAP sensor would have prevented second MAP sensor failure

VT OBDII CASE STUDY

Diagnosis / Repair

Conclusions

- Thorough visual check is necessary
 - ~75% of problems can be identified visually
 - Checking vacuum routing diagram would have identified problem immediately
- Need to confirm repair
 - Previous repair was incomplete
 - MAP sensor replacement was appropriate, but vacuum hoses not correctly reconnected

CONCLUSIONS

- Improper vehicle repairs have always existed
- OBDII increases accountability
- Safe to assume OBDII will force better repairs on it's own?
- IM programs need to increase efforts to provide OBDII information/training