



TECHNICAL BULLETIN

A310-02v2

12/2003

Subject

Fuel System Diagnostics Information

Model: X-TYPE

Year: All

VIN All

Section: 310

Fuel System

Summary

A310-02v2: This Technical Bulletin has been issued for information only to aid with fuel system diagnostics on 2.5L and 3.0L variants.

This Technical Bulletin has been issued for the change in the Table of content and is a replacement for Technical Bulletin A310-02. Please destroy all copies of A310-02 and replace it with this Technical Bulletin A310-02v2.

Table of content

Drivability/starting issues:

- 1 Fuel starvation.
Loss of power at high engine demand, stumbling and stuttering during wide open throttle accelerations, pre-ignition (detonation) at high engine speeds/loads.
- 2 Engine starting problems.
No fuel pump commands, Engine Control Module (ECM) Diagnostic Trouble Code (DTC) P1234, P1236, P1338.
- 3 Engine stops with fuel still indicated on the fuel gauge.
Instrument cluster DTC B2879.

Customer complaints:

- 4 Malfunction Indicator Lamp (MIL) 'ON' with DTC flagged for Evaporative (EVAP) system leak. ECM DTCs P0456, P0442 and P0455. (Federal market only)
- 5 Diagnostic code for purge valve.
- 6 MIL 'ON' with ECM DTC P0460 flagged for fuel level sensor circuit.
- 7 Fuel gauge trouble accompanied by instrument cluster DTCs B1202, B1204, B2627 and B2628).
- 8 Difficulty fueling vehicle.
- 9 Fuel smells, smell of fuel around vehicle.
- 10 Fuel pump noise.

Appendix 1 Fuel Transfer Check.

Appendix 2 P0441 EVAP System Incorrect Purge Flow.

Additional Information Drive Cycle For Green ECM.

1 Fuel starvation

Determine if fuel starvation is present by monitoring the fuel pressure. This can be done either by using a suitable calibrated fuel wet gauge or by monitoring the Fuel Rail Pressure sensor using Datalogger on the Worldwide Diagnostic System (WDS). The fuel line pressure should be between 320 kPa and 380 kPa. At full throttle the pressure should be steady at nominal value (380 kPa). If pressure decays away while throttle position is steady then fuel starvation is occurring. Using WDS select DTC monitor to interrogate the ECM for DTCs, and rectify as required. If fault is still apparent carry out following checks:

- a Check electrical connections to fuel system.
- b Check function of fuel level sensor and carry out fuel transfer check as in Appendix 1.
- c Check all visible fuel lines for possible leaks and staining.
- d Check for kinks or damage to the pipes, which may cause a restriction.
- e Check the inertia switch has not tripped. (Located at the lower A-post in the footwell)
- f If blockage suspected replace the in line fuel filter and retest.

If all the above fails to identify the issue then remove the tank and replace fuel pump module and fuel transfer pump. (See Workshop Manual JTIS, CD ROM, section: 310-01)

Note: Refer to Technical Bulletin A310-03 for the fuel tank removal/installation procedure.

The pump may be worn, the filters may be heavily contaminated or there may be a leak in the internal pipe work. Clean and flush any heavy contamination in the fuel tank.

2 Engine starting problems

Ensure there is adequate fuel in the tank.

Carry out fuel transfer check as in Appendix 1.

Check fuel rail pressure with suitable calibrated fuel wet gauge during cranking or by using Datalogger on the WDS by monitoring fuel pump duty cycle, and fuel rail pressure sensor signals. The pressure should rise rapidly to nominal rail pressure within two seconds.

It is normal for the pressure to decay to zero when engine is switched ' OFF' over long periods. This does not indicate a component failure. If there is pressure during cranking then the engine should start. If there is no pressure when cranking suspect an electrical or physical failure has occurred, or the supply has been interrupted by the vehicle systems.

If fault is still apparent carry out following checks:

- a Check inertia switch is in the ' down' position.
- b Check the Passive Anti-Theft System (PATS) is proving out (see TSB A419-02) to ensure the immobilizer is not inhibiting fueling.

Note: If vehicle is cranking then the PATS is OK.

- c WDS guided diagnostics, complete function test on the fuel pump, to investigate the fuel pump and associated wiring.
- d Check the function of pump controller module via substitution of the module from a known good vehicle.
- e Check for kinks or damage to the pipes, which may cause a restriction.
- f If blockage suspected replace the in-line fuel filter and retest.

If fault still apparent remove the tank and inspect parts for leaks to the internal pipe work and ensure that all connections are made and cross-tank lines are not twisted around each other when connected to the fuel transfer pump. If no faults are found change the fuel pump module.

If fuel pressure is present then the vehicle may have been incorrectly fuelled with diesel, or there may be a quantity of water in the fuel.

If fuel pressure is present and the vehicle is cranking but refuses to start there is most likely a problem elsewhere. Use WDS to interrogate the ECM for DTCs. Refer to TSB, A303-03 engine management diagnostic flowcharts and also check injector functionality.

3 Engine stops with fuel still indicated on the fuel gauge

If the engine stops when there is still fuel indicated on the fuel gauge then there may be a fault with the internal transfer system.

Check for instrument cluster DTC B2879 that indicates a failure to transfer fuel.

Carry out following checks:

- a Transfer pipes are connected to the fuel transfer pump (internal to tank), disconnect and check that there are no splits in the small-bore pipe, reconnect and re-test to verify.
- b Ensure the 2mm hole is in the large bore pipe connected to the jet pump, if not carry out the procedure in TSB A310-01. Re-test to verify.
- c The float arm is free to move re-test to verify.
- d The alignment arrows on the module line up (within 10 degrees of the marks on the tank molding) re-test to verify.
- e Check if the jet is blocked by blowing down the narrow bore inlet to the fuel transfer pump module (low pressure, **DO NOT** use airline). If contaminated do not attempt to clear blockage, as fault will recur. Replace the fuel transfer pump assembly.

If DTC B2879 is still logged and fault is apparent, replace the fuel transfer pump assembly.

If no DTC is logged and fault is still apparent, carry out fuel transfer check Appendix 1.

4 Malfunction Indicator Lamp (MIL) 'ON' with DTC flagged for Evaporative (EVAP) system leak. ECM DTCs P0456, P0442 and P0455. (Federal market only)

Clear fault codes, ensure WDS is loaded with software release JTP 759/26 or later then re-flash the ECM. As a fuel tank change may not be required.

Refer to ' Full Evaporative System Monitor Drive Cycle Conditions' and carry out ' Full Evaporative System Monitor Drive Cycle' (see Workshop Manual, JTIS CD ROM, section: 30313).

If this action does not resolve the issue continue with the diagnostic procedure outline below:

Refer to TSB A303-02v2 for in-depth EVAP leak diagnostics.

Locate the leak using approved EVAP emissions system test equipment.

5 Diagnostic code for purge valve

Non-Federal markets only, purge flow problems are indicated via ECM DTC P0441 (See Appendix 2) and ECM DTCs P0444 and P0445 that will be logged due to an electrical failure of the purge valve or associated circuit. (P0444 and P0445 are common to all markets with a purge valve fitted). If P0441 is present, there may also be excessive fuel smells. This should clear once rectified.

6 MIL 'ON' with ECM DTC P0460 flagged for fuel level sensor circuit.

Before installing a new fuel pump module or fuel transfer pump, clear fault codes, ensure WDS is loaded with software release JTP 759/26 or later then re-flash the ECM.

If this action does not resolve the issue continue with the diagnostic procedure outline below:

Note: If any DTCs are logged carry out the associated guided diagnostic routine.

In case of a fault with the sender units, **ONLY** the pump module(s) should be changed; there is no requirement to replace the fuel tank.

7 Sensor unit open/short circuit - Customer symptom of the fuel gauge being erratic or inaccurate.

Using WDS interrogate the Instrument Cluster for DTCs B1202, B1204 (fuel level sensor 1 circuit fault), B2627, B2628 (fuel level sensor 2 circuit fault).

If any DTCs are logged carry out the associated guided diagnostic routine.

Remove the sensor units from the tank; check the resistance through the range.

The resistance will vary between the two readings below.

Fuel level sensor resistance at empty 15 ohms.

Fuel level sensor resistance at full 160 ohms.

Note: It is possible that the sensors may become contaminated in a certain part of the mechanism, which may cause an open circuit at a certain fuel level.

8 Difficulty fueling vehicle

If the complaint is intermittent the fault could be with the delivery nozzle at the petrol station. If consistent then there may be a blockage in the vent system. **This will vary dependent on market.**

On Federal vehicles the canister close valve or filter may have some level of blockage. Suspect EVAP DTC P0446 to be logged (refer to TSB A303-02v2).

The canister may be full of water (wading) or there may be snow pack or ice around the canister outlet or carbon canister filter. Check for obstructions in filler neck/pipe (a foreign object etc) and for any damage. Check that the correct filler neck is fitted:

Japanese market vehicles have a BLACK plastic insert within the filler neck.

Vehicles in all other markets have a GREY plastic insert.

Replace the filler neck assembly if the incorrect color is fitted.

Check that the customer is aware of the filling guidelines in the pocket manual in order that they optimize nozzle position.

If the nozzle is not allowed to rest on the guide during filling, fill issues will occur due to the precise geometry required for the on board vapor recovery system.

9 Fuel smells, smell of fuel around vehicle

Fuel smell may be due to a physical leak from any part of the fuel system. Check all joints for leaks and seepage marks.

If available use a HC sniffer around the high-pressure system to identify leak sources.

Check the outlet and inlet pipe connections to purge valve, and interrogate the ECM for purge valve DTCs as an inoperative purge valve may lead to vapor smells.

On Federal vehicles only - Check system for leaks using the Rotunda tester or equivalent approved EVAP emissions test equipment.

Note: It is important that the green seals and metal spacer ring are correctly reinstalled on the tank should the modules be removed for inspection. The seals should be replaced and petroleum jelly used to lubricate the locking ring on reassembly.

Check that the cap has been properly installed and that the customer is aware that it should be tightened to ' **three clicks**'

10 Fuel pump noise

The fuel pump module should only be changed if the issue has been clearly identified as the pump.

Note: A certain amount of 'swishing' from the tank is normal as fuel is transferred around the fuel modules.

Note: The vehicle will idle for limited time if the fuel pump is disconnected.

To verify the issue is fuel pump, disconnect main tank harness whilst vehicle is running, if noise stops, change the fuel pump module.

Ensure WDS is used to clear any DTCs this test procedure has caused, as disconnecting the main tank harness will cause DTCs to log.

Appendix 1

Fuel Transfer Check

Test Description

By entering the test mode in the Instrument Cluster, it is possible to view the fuel transfer pump sensor value.

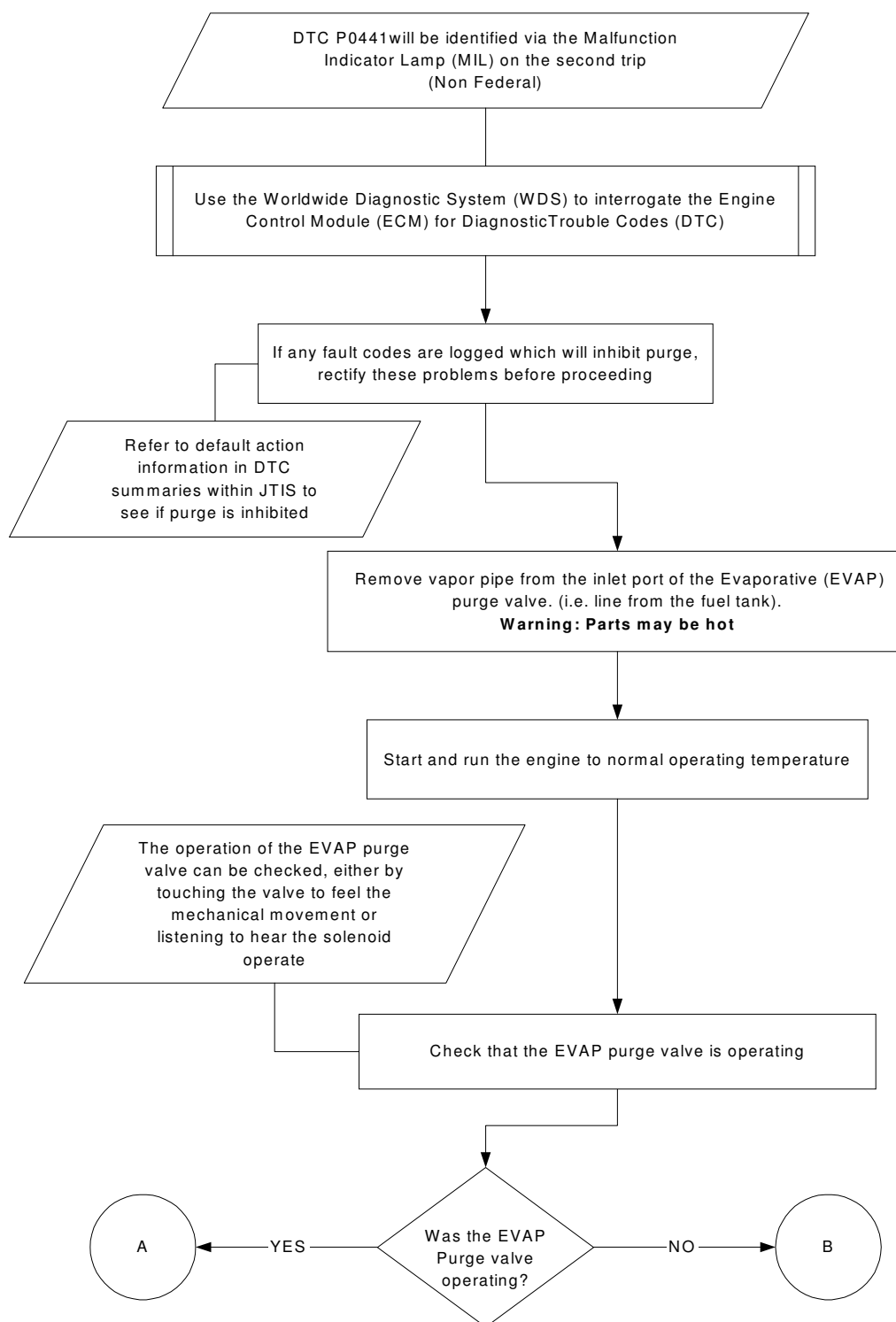
The test is to drive the vehicle in a tight, right hand bend to transfer fuel from the fuel pump module side to the fuel transfer pump side, then bringing the vehicle to rest and watch the fuel transfer pump sensor value reduce over approx 3 minutes.

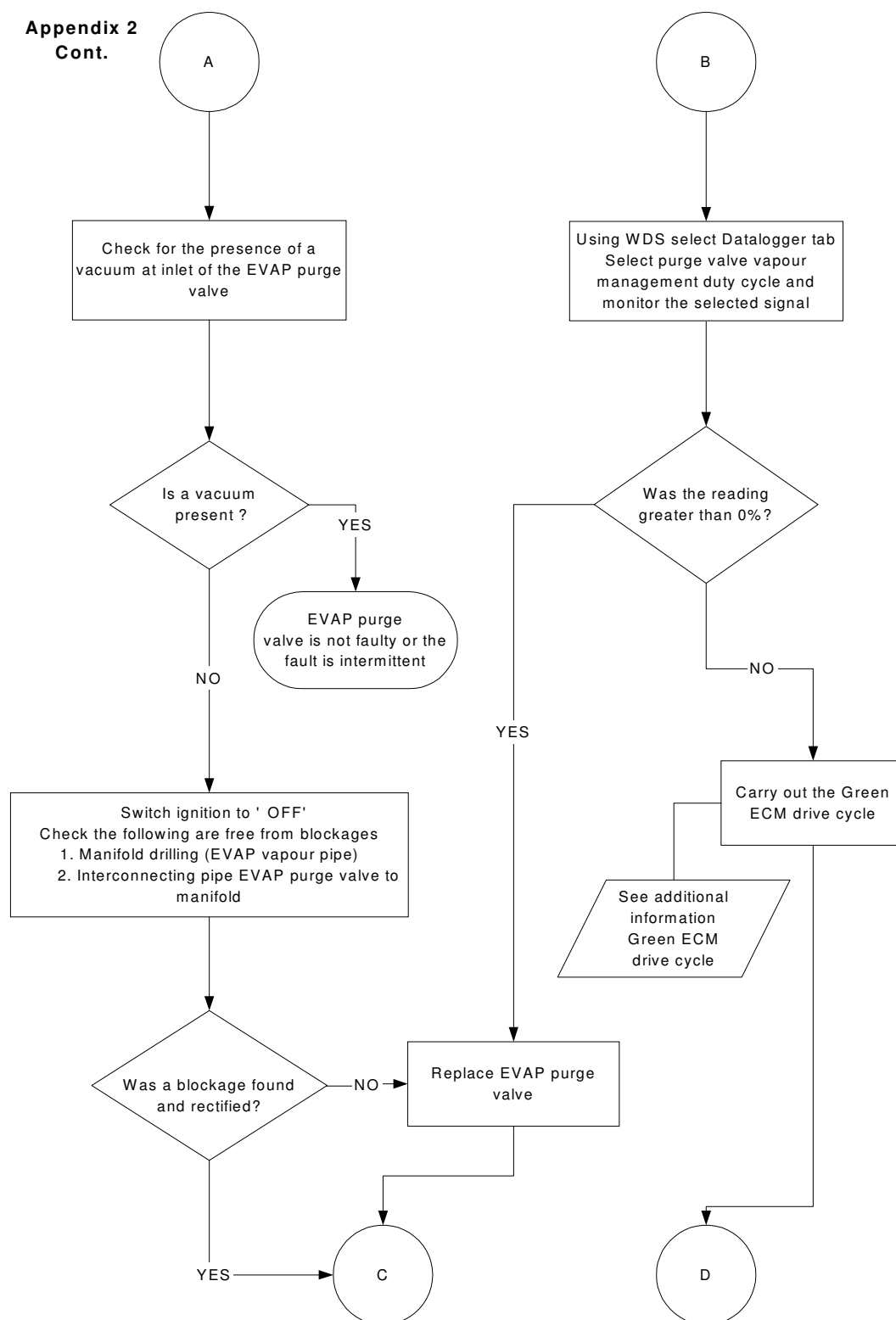
WARNING: USE EXTREME CARE WHEN CARRYING OUT THE FUEL TRANSFER NOT TO ENDANGER OTHER ROAD USERS OR INFRINGE ON ROAD TRAFFIC REGULATIONS.

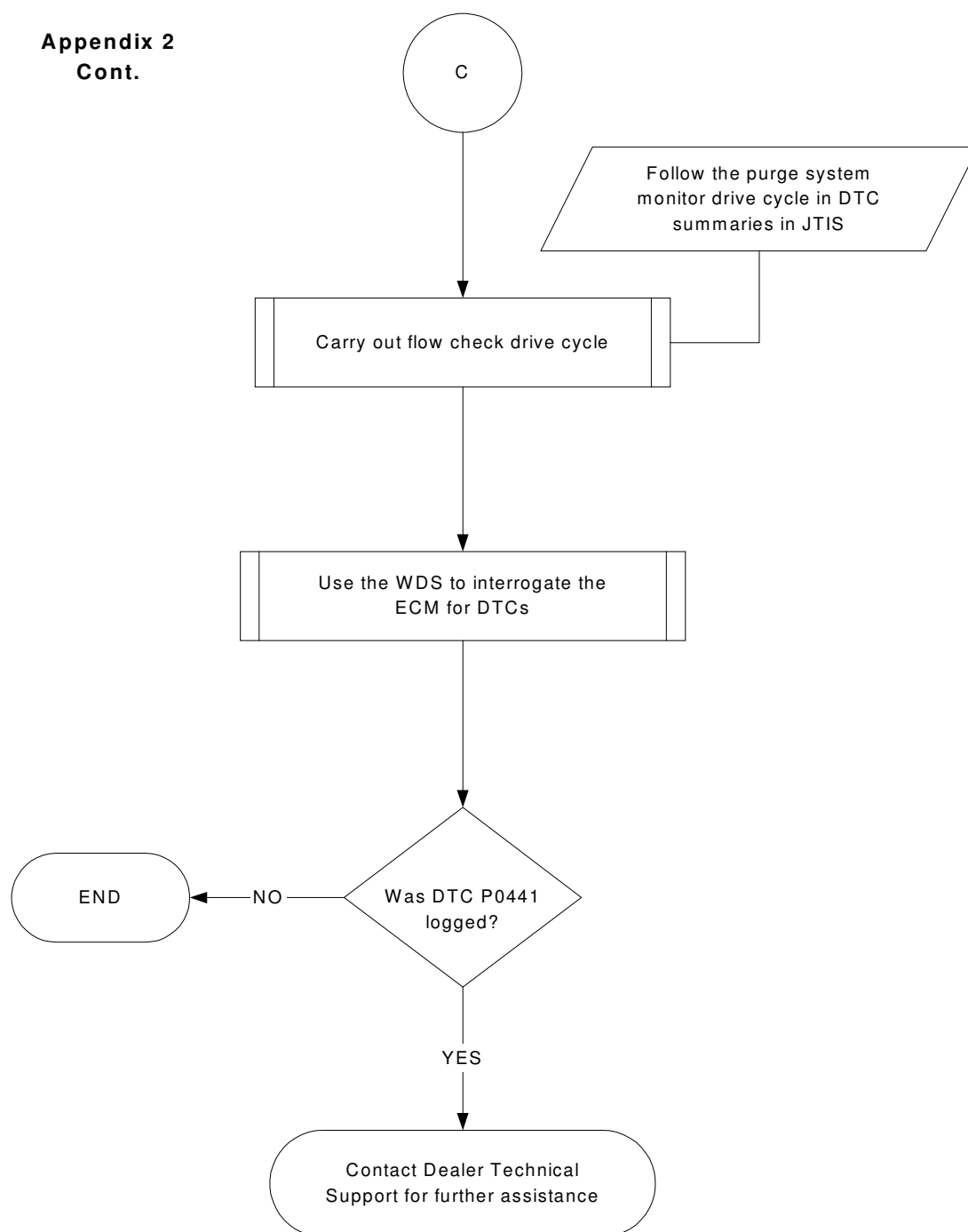
Process

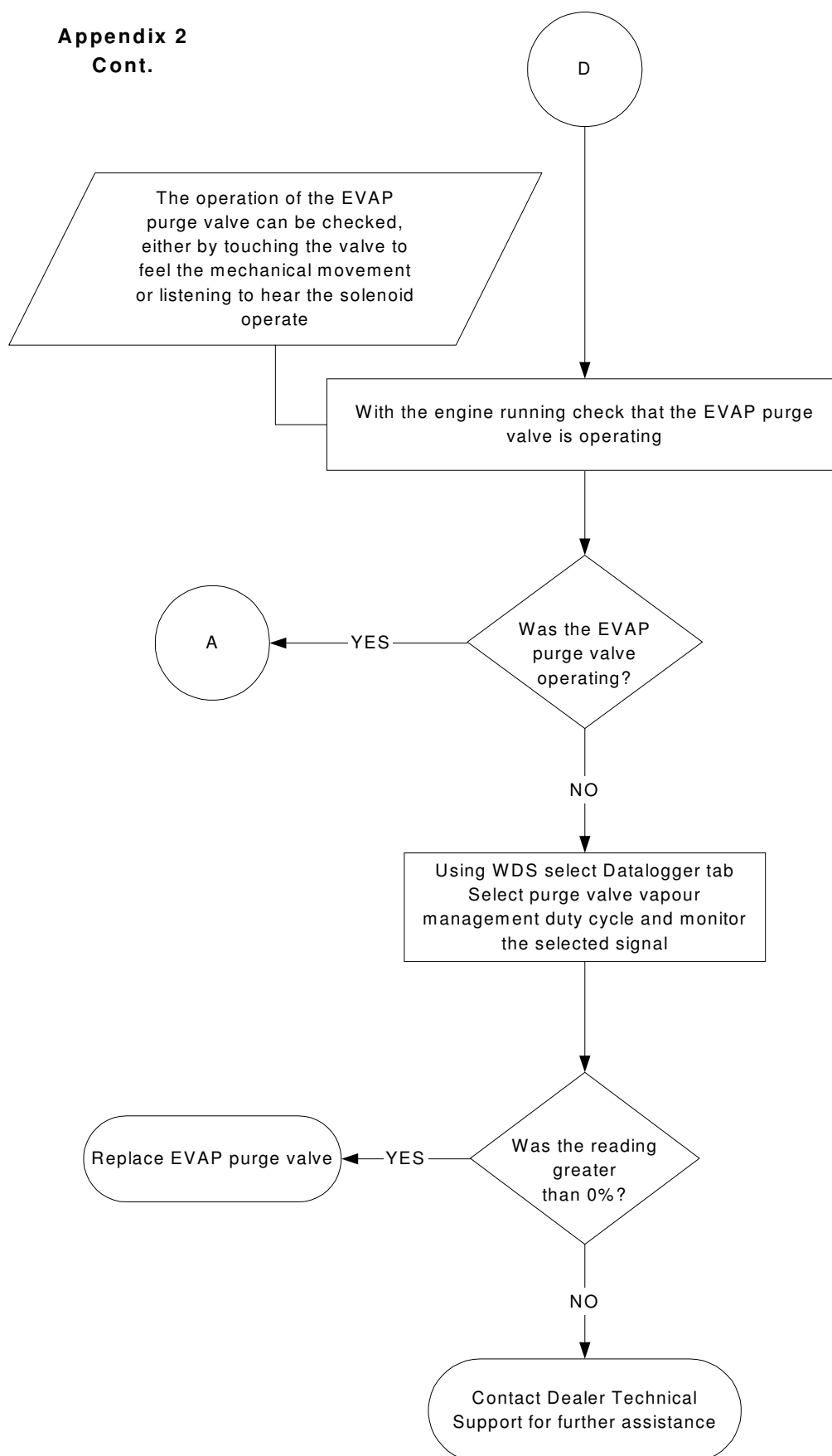
1. Ensure vehicle has between 1/4 and a 1/2 tank of fuel as indicated by the fuel gauge.
2. Enter Instrument Cluster Test Mode as follows:
 - With ignition ' OFF' hold in the trip button on the indicator stalk and then turn ignition to ' ON' position II.
 - Continue to hold the trip button in until ' TEST' appears on the cluster display.
 - Release the trip button.
 - Press the trip button to scroll through the available tests until you reach F2 XXX – this is the sensor value of the fuel transfer pump.
 - Start the engine by turning the ignition to crank.
3. Note the value of F2 at idle. Value must read over 60, if not follow steps as in (4-6).
4. Drive the vehicle in a tight, right hand bend to transfer fuel from the fuel pump module side to the fuel transfer pump side of the fuel tank, and then bring the vehicle to rest and watch the fuel transfer pump sensor value reduce over approx 3 minutes.
5. If the value of F2 decreases to a value of approximately 28 to 29 this indicates that fuel is transferring.
6. If the value does not decrease, carry out checks listed on section 3. Replace the fuel transfer pump if required.
7. If the F2 value displayed is 255 suspect an open/short circuit through the sensor, carry out checks listed in section 7.

Appendix 2

**P0441 EVAP System Incorrect Purge Flow
(Non Federal)**

Appendix 2
Cont.

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Appendix 2
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Additional Information

DRIVE CYCLE FOR ' GREEN' ECM

This procedure should be performed to enable ECM to re-learn fueling adaptations.

Due to component tolerance and wear during the normal running of a vehicle, fueling and air requirements for an engine will vary over time. The ECM has the ability to adjust for this variation by learning the level of compensation that is required. These compensation values are referred to as adaptations.

If the vehicle battery is disconnected, all adaptations held within the ECM will be lost (i.e. set to zero); the ECM is then referred to as ' Green' . To enable the engine to run correctly and for the evaporative purge system to function, the ECM must ' relearn' these adaptations. There are four areas or sites that need to be re-learned.

This guide is intended to assist with the process of re-adapting the ECM without the need for any additional equipment, e.g. WDS unit.

Green ECM drive cycle.

- 1 Idle vehicle until fully warm. Coolant temperature gauge just below mid point (48/50%).
- 2 Leave idling for a further three minutes minimum. (Site 1)
- 3 Drive the vehicle, with the air conditioning off, on level road using a constant throttle (use speed control if fitted) for at least 60 seconds, in the following gears, at the stated engine speeds for sites 2,3 and 4 in table 1.
- 4 Return to rest and leave the vehicle idling for 60 seconds.

Table 1

Site	Engine	Transmission	Gear	Engine speed (RPM)
1	3.0L	Manual	N	Idle
	3.0L	Auto	P/N	Idle
	2.5L	Manual	N	Idle
	2.5L	Auto	P/N	Idle
2	3.0L	Manual	3rd	2000
	3.0L	Auto	3rd	1750
	2.5L	Manual	3rd	2000
	2.5L	Auto	3rd	1750
3	3.0L	Manual	4th	2250
	3.0L	Auto	4th	2000
	2.5L	Manual	4th	2250
	2.5L	Auto	4th	2250
4	3.0L	Manual	4th	2750
	3.0L	Auto	4th	2500
	2.5L	Manual	4th	2750
	2.5L	Auto	4th	2750

If sufficient adaptations have occurred, the evaporative purge valve should now be operating. This can be verified manually by either touching or listening to the valve. Touching the evaporative purge valve; it is possible to feel the valve switching.

WARNING: THE EVAPORATIVE PURGE VALVE IS LIKELY TO BE HOT.

To listen to the valve, for possible switching, use a stethoscope or other suitable instrument (switching frequency is 10 Hz).