

## **OBD SYSTEM READINESS – ENGINE MANAGEMENT**

If DTC P1000 is flagged after DTCs have been cleared, all engine management OBD diagnostic monitor drive cycles HAVE NOT BEEN COMPLETED.

If DTC P1111 is flagged after DTCs have been cleared, all engine management OBD diagnostic monitor drive cycles HAVE BEEN COMPLETED.

## **OBD SYSTEM READINESS – TRANSMISSION**

Use WDS Datalogger "TOTAL NUMBER OF DTC SET" to determine if transmission OBD monitoring has been completed. Refer to page 7.

## **OBD "TRIPS"**

The OBD system defines 1 TRIP as an ignition cycle (ignition key OFF; wait 30 seconds; ignition key ON) plus a minimum engine coolant temperature increase of 22 °C (40 °F) after which, the engine coolant temperature has to reach a minimum of 71°C (160 °F).

## **OBD DIAGNOSTIC MONITORS**

During vehicle operation, the on-board diagnostic (OBD) facilities of the Engine Control Module (ECM) and Transmission Control Module (TCM), continuously check the Engine Management and Transmission Control systems. The Powertrain OBD incorporates several diagnostic monitors; each monitor has an associated group of DTCs. The diagnostic monitors will complete the diagnostic test(s) if a specified service "drive cycle" is carried out.

The diagnostic monitors are:

- Heated Oxygen Sensors Monitor
- Adaptive Fuel Monitor
- Misfire Monitor
- Catalyst Efficiency Monitor
- Evaporative System Monitor
- Exhaust Gas Recirculation Monitor (not applicable for X400)
- Comprehensive Component Monitor (Engine Management / Transmission)

## **DIAGNOSTIC MONITORS DRIVE CYCLES**

Technicians can ensure that an OBD Monitor drive cycle is completed and that all or specific components have been checked by completing a specified drive cycle. Use the following service drive cycles to confirm that the components and subsystems covered by the Diagnostic Monitors are operating correctly.

## **HEATED OXYGEN SENSORS MONITOR DRIVE CYCLE**

### **Upstream (Universal) oxygen sensors:**

1. Engine OFF; cooling fans inoperative > 20 seconds.
2. Start engine and bring to normal operating temperature > 82 °C (180 °F).
3. Drive the vehicle between 3000 – 4000 rpm in 3rd gear at a steady speed. Lift foot completely off accelerator and coast to a stop within 30 seconds. Do not touch accelerator pedal for 4 seconds after coming to a stop.
4. Repeat step 3.
5. Idle engine for 11 minutes.

### **Downstream oxygen sensors:**

1. Start engine and bring to normal operating temperature > 82 °C (180 °F).
2. Drive the vehicle steadily between 48 – 97 km/h (30 – 60 mph) for 10 minutes.
3. Drive the vehicle above 3000 rpm in 3rd gear at a steady speed. Lift foot completely off accelerator and coast for 30 seconds.

### **Oxygen sensor heaters:**

1. Start engine and bring to normal operating temperature > 82 °C (180 °F).
2. Idle engine for 3 minutes.

### **ADAPTIVE FUEL MONITOR DRIVE CYCLE**

1. Start engine and bring to normal operating temperature > 82 °C (180 °F).
2. Idle for a minimum of 10 minutes.

### **MISFIRE MONITOR DRIVE CYCLE**

1. Record flagged DTC (s) and accompanying WDS DTC Monitor freeze frame(s) data.
2. Fuel level > 25%.
3. Start engine and bring to normal operating temperature > 82 °C (180 °F).
4. Drive vehicle to the recorded freeze frame conditions (from step 1).
5. Repeat several times.

#### **Notes regarding misfire monitor DTCs:**

- If on the first trip, the misfire is severe enough to cause excess exhaust emission, the individual cylinder DTC plus DTC P1316 will be logged. The CHECK ENGINE MIL will not be activated. If the fault reoccurs on the second trip, the individual cylinder DTC plus DTC P1316 will be flagged, and the CHECK ENGINE MIL will be activated.
- If on the first trip, the misfire is severe enough to cause catalyst damage (more severe than excess exhaust emission), the CHECK ENGINE MIL will flash while the fault is present and the individual cylinder DTC plus DTC P1313 (bank 1), DTC P1314 (bank 2) will be logged. When the fault is no longer present the MIL will be deactivated.
- If the fault reoccurs on the second trip, the CHECK ENGINE MIL will flash while the fault is present and the individual cylinder DTC plus DTC P1313 (bank 1), DTC P1314 (bank 2) will be flagged. When the fault is no longer present the CHECK ENGINE MIL will be activated.

### **CATALYST EFFICIENCY MONITOR DRIVE CYCLE**

1. Start engine and bring to normal operating temperature > 75 °C (167 °F).
2. With the gear selector in Park or Neutral, hold the engine speed at 2500 rpm for 5 minutes.
3. Drive vehicle ensuring that vehicle speed exceeds 15 km/h (10 mph) and the engine speed exceeds 1500 rpm.
4. Stop the vehicle and check for any temporary DTCs using WDS.

### **EVAPORATIVE SYSTEM MONITOR DRIVE CYCLE**

1. Ensure that fuel filler cap is fully closed (minimum three clicks).
2. Fuel level > 30% and < 85%.
3. Using WDS, perform ECM DTC Clear (even if no DTCs are flagged).
4. Drive vehicle for a minimum of 2 minutes, and until engine is at normal operating temperature.
5. Using WDS, ensure that the EVAP Canister Purge Valve is operating by observing "PURGE VAPOR MANAGEMENT VALVE – DUTY CYCLE". If the valve is not active, ECM adaptations have not been learned. Conduct a "green ECM" Drive Cycle as described in Technical Service Bulletin.
6. Drive vehicle to the road where the EVAP System Drive Cycle will be conducted. Stop vehicle and switch OFF the ignition. Leave ignition OFF for 30 seconds, and then restart the engine.
7. Accelerate briskly to 80 km/h (50 mph) ensuring that the engine speed reaches a minimum of 3500 rpm for a minimum of 5 seconds.
8. (0.040-inch EVAP Test) View WDS "PURGE VAPOR MANAGEMENT VALVE – DUTY CYCLE", "CANISTER CLOSE VALVE – VAPOR RECOVERY SYSTEM", and FUEL TANK PRESSURE – VAPOR RECOVERY SYSTEM". Avoiding high engine loads, drive the vehicle steadily between 65 km/h (40 mph) and 100 km/h (60 mph). Avoid driving conditions that will produce excessive fuel movement. WDS should give an indication that the test is active (it may take up to 30 minutes before the test will initialize). When the test has initialized (EVAP Canister Close Valve CLOSED), it will take approximately 90 seconds for the test to complete.
9. (0.020-inch EVAP Test) Continue driving vehicle as explained in Step 8 for an additional 10 minutes.

10. Gently coast the vehicle to a stop. Allow the engine to idle for 2 minutes and view WDS "PURGE VAPOR MANAGEMENT VALVE – DUTY CYCLE", "CANISTER CLOSE VALVE – VAPOR RECOVERY SYSTEM", and FUEL TANK PRESSURE – VAPOR RECOVERY SYSTEM". WDS should give an indication that the test is active. When the test has initialized (EVAP Canister Close Valve CLOSED), it will take approximately 90 seconds for the test to complete.
11. If the 0.020-inch EVAP Test is not activated, the purge system vapor concentration may be too great. To reduce the vapor concentration proceed as follows:
12. Drive the vehicle for an additional 30 minutes avoiding driving conditions that will produce excessive fuel movement. Repeat Step 10. If the 0.020-inch EVAP Test is still not activated, repeat the Drive Cycle from Step 6.
13. Using WDS, check for and clear flagged DTCs.

#### **EXHAUST GAS RECIRCULATION MONITOR DRIVE CYCLE (not applicable to X400)**

1. Start engine and bring to normal operating temperature > 82 °C (180 °F).
2. Drive the vehicle in 3rd gear at 2500 rpm. Maintain a steady speed for 1 minute; lift foot completely off accelerator and coast for a minimum of 10 seconds.

#### **COMPREHENSIVE COMPONENT MONITOR ENGINE MANAGEMENT DRIVE CYCLE**

To avoid unnecessary complexity, a single comprehensive engine management drive cycle has not developed for X-TYPE. Refer to the individual DTC for specific drive cycle / monitoring conditions.

#### **COMPREHENSIVE COMPONENT MONITOR TRANSMISSION DRIVE CYCLE**

The Comprehensive Component Monitor transmission drive cycle will "check" all transmission system components:

1. Engine and transmission at normal operating temperature. Ignition OFF; ensure that SPORT mode is NOT selected.
2. With gear selector in P and the ignition ON. Check gearshift interlock by attempting to move selector without pressing the brake pedal. Verify P state illumination.
3. Press and hold the brake pedal. Move the gear selector to R. Verify R state illumination.
4. Set the parking brake. Press and hold the brake pedal. Attempt to start the engine. The engine should not start.
5. Move the gear selector to N. Verify N state illumination. Start the engine.
6. With the hand brake set and the brake pedal pressed, move the gear selector to the remaining positions in the J-Gate (D, 4, 3, 2) for five (5) seconds each. Verify the state illumination in each position.
7. Move the gear selector back to 4. Verify 4 state illumination.
8. Move the gear selector to D. Verify D state illumination.
9. Move the gear selector to N. Verify N state illumination.
10. Select R, release the brakes and drive the vehicle in Reverse for a short distance.
11. Stop the vehicle.
12. Select 2 and drive the vehicle up to 65 km/h (40 mph). Hold 65 km/h (40 mph) for a minimum of five (5) seconds.
13. Select 3 and hold 65 km/h (40 mph) for a minimum of five (5) seconds.
14. Select 4 and hold 65 km/h (40 mph) for a minimum of five (5) seconds.
15. Select D and accelerate to a minimum speed of 80 km/h (50 mph). Hold 80 – 129 km/h (50 – 80 mph) for a minimum of 1.7 kilometers (1 mile).
16. Stop the vehicle; do not switch OFF the engine.
17. Use WDS Datalogger "TOTAL NUMBER OF DTC SET" to ensure that transmission DTC monitoring is complete.