

12. Drive Cycle

A: PROCEDURE

It is necessary to perform the drive cycle listed below if DTC is not found in the Inspection Mode. It is possible to complete diagnosis of the DTC by performing the indicated drive cycle. After the repair for the DTC, perform a necessary drive cycle and make sure the function recovers and the DTC is recorded.

1. PREPARATION FOR DRIVE CYCLE

- 1) Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 ℥ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
- 2) After performing the diagnostics and Clear Memory Mode, check that no DTC remains. <Ref. to EN(H6DO)(diag)-57, Clear Memory Mode.>
- 3) Check the delivery (test) mode connector is disconnected.

NOTE:

- Perform the drive cycle after warming up the engine except when the engine coolant temperature at engine start is specified.
- Perform the drive cycle twice if the DTC in the list is marked with *. After completing the first drive cycle, stop the engine and perform second diagnosis in same condition.

2. DRIVE CYCLE A

| DTC | Item | Condition |
|--------|--|--|
| *P0125 | Insufficient Coolant Temperature for Closed Loop Fuel Control | Engine coolant temperature at engine start is less than 20°C (68°F). |
| *P0126 | Insufficient Engine Coolant Temperature for Stable Operation | — |
| *P0128 | Coolant Thermostat (Engine Coolant Temperature Below Thermostat Regulating Temperature) | — |
| *P0133 | O2 Sensor Circuit Slow Response (Bank 1 Sensor 1) | — |
| *P0141 | O2 Sensor Heater Circuit (Bank 1 Sensor 2) | — |
| *P0153 | O2 Sensor Circuit Slow Response (Bank 2 Sensor 1) | — |
| *P0161 | O2 Sensor Heater Circuit (Bank 2 Sensor 2) | — |
| *P0171 | System Too Lean (Bank 1) | Complete diagnosis with drive cycle B or C as well. |
| *P0172 | System Too Rich (Bank 1) | Complete diagnosis with drive cycle B or C as well. |
| *P0174 | System Too Lean (Bank 2) | Complete diagnosis with drive cycle B or C as well. |
| *P0175 | System Too Rich (Bank 2) | Complete diagnosis with drive cycle B or C as well. |
| *P0196 | Engine Oil Temperature Sensor Circuit Range/Performance | — |
| *P0301 | Cylinder 1 Misfire Detected | Complete diagnosis with drive cycle B or C as well. |
| *P0302 | Cylinder 2 Misfire Detected | Complete diagnosis with drive cycle B or C as well. |
| *P0303 | Cylinder 3 Misfire Detected | Complete diagnosis with drive cycle B or C as well. |
| *P0304 | Cylinder 4 Misfire Detected | Complete diagnosis with drive cycle B or C as well. |
| *P0305 | Cylinder 5 Misfire Detected | Complete diagnosis with drive cycle B or C as well. |
| *P0306 | Cylinder 6 Misfire Detected | Complete diagnosis with drive cycle B or C as well. |
| *P0420 | Catalyst System Efficiency Below Threshold (Bank 1) | — |
| *P0442 | Evaporative Emission Control System Leak Detected (Small Leak) | Engine coolant temperature at engine start is less than 25°C (77°F). |
| *P0451 | Evaporative Emission Control System Pressure Sensor | — |

Drive Cycle

ENGINE (DIAGNOSTICS)

| DTC | Item | Condition |
|--------|--|--|
| *P0456 | Evaporative Emission Control System Leak Detected (Very Small Leak) | Engine coolant temperature at engine start is less than 25°C (77°F). |
| *P0457 | Evaporative Emission Control System Leak Detected (Fuel Cap Loose/Off) | Engine coolant temperature at engine start is less than 25°C (77°F). |
| *P0464 | Fuel Level Sensor Circuit Intermittent | — |
| P1443 | Vent Control Solenoid Valve Function Problem | — |
| *P2096 | Post Catalyst Fuel Trim System Too Lean (Bank 1) | Complete diagnosis with drive cycle B or C as well. |
| *P2097 | Post Catalyst Fuel Trim System Too Rich (Bank 1) | Complete diagnosis with drive cycle B or C as well. |
| *P2098 | Post Catalyst Fuel Trim System Too Lean (Bank 2) | Complete diagnosis with drive cycle B or C as well. |
| *P2099 | Post Catalyst Fuel Trim System Too Rich (Bank 2) | Complete diagnosis with drive cycle B or C as well. |

Diagnostic procedure:

- 1) Drive for 20 minutes at a constant speed of 80 km/h (50 MPH).
- 2) Stop the vehicle and idle for one minute.

3. DRIVE CYCLE B

| DTC | Item | Condition |
|--------|--|---|
| *P0171 | System Too Lean (Bank 1) | Complete diagnosis with drive cycle A or C as well. |
| *P0172 | System Too Rich (Bank 1) | Complete diagnosis with drive cycle A or C as well. |
| *P0174 | System Too Lean (Bank 2) | Complete diagnosis with drive cycle A or C as well. |
| *P0175 | System Too Rich (Bank 2) | Complete diagnosis with drive cycle A or C as well. |
| *P0301 | Cylinder 1 Misfire Detected | Complete diagnosis with drive cycle A or C as well. |
| *P0302 | Cylinder 2 Misfire Detected | Complete diagnosis with drive cycle A or C as well. |
| *P0303 | Cylinder 3 Misfire Detected | Complete diagnosis with drive cycle A or C as well. |
| *P0304 | Cylinder 4 Misfire Detected | Complete diagnosis with drive cycle A or C as well. |
| *P0305 | Cylinder 5 Misfire Detected | Complete diagnosis with drive cycle A or C as well. |
| *P0306 | Cylinder 6 Misfire Detected | Complete diagnosis with drive cycle A or C as well. |
| *P0459 | Evaporative Emission System Purge Control Valve Circuit High | — |
| *P0506 | Idle Air Control System RPM Lower Than Expected | — |
| *P0507 | Idle Air Control System RPM Higher Than Expected | — |
| *P2096 | Post Catalyst Fuel Trim System Too Lean (Bank 1) | Complete diagnosis with drive cycle A or C as well. |
| *P2097 | Post Catalyst Fuel Trim System Too Rich (Bank 1) | Complete diagnosis with drive cycle A or C as well. |
| *P2098 | Post Catalyst Fuel Trim System Too Lean (Bank 2) | Complete diagnosis with drive cycle A or C as well. |
| *P2099 | Post Catalyst Fuel Trim System Too Rich (Bank 2) | Complete diagnosis with drive cycle A or C as well. |

Diagnostic procedure:

- 1) Drive at 10 km/h (6 MPH) or more.
- 2) Stop the vehicle and idle for ten minutes.

4. DRIVE CYCLE C

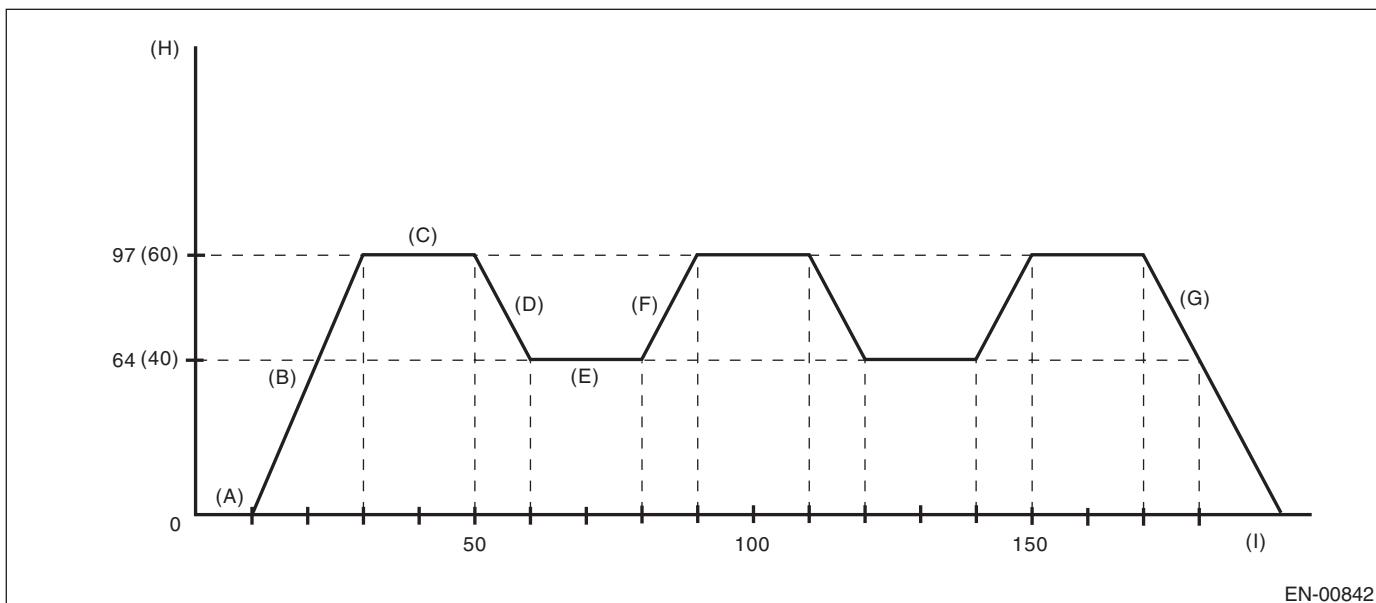
| DTC | Item | Condition |
|--------|---|---|
| *P0030 | HO2S Heater Control Circuit (Bank 1 Sensor 1) | — |
| *P0050 | HO2S Heater Control Circuit (Bank 2 Sensor 1) | — |
| *P0068 | MAP/MAF - Throttle Position Correlation | — |
| *P0101 | Mass or Volume Air Flow Circuit Range/Performance | — |
| P0134 | O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1) | — |
| *P0139 | O2 Sensor Circuit Slow Response (Bank 1 Sensor 2) | — |
| P0154 | O2 Sensor Circuit No Activity Detected (Bank 2 Sensor 1) | — |
| *P0159 | O2 Sensor Circuit Slow Response (Bank 2 Sensor 2) | — |
| *P0171 | System Too Lean (Bank 1) | Complete diagnosis with drive cycle A or B as well. |
| *P0172 | System Too Rich (Bank 1) | Complete diagnosis with drive cycle A or B as well. |
| *P0174 | System Too Lean (Bank 2) | Complete diagnosis with drive cycle A or B as well. |
| *P0175 | System Too Rich (Bank 2) | Complete diagnosis with drive cycle A or B as well. |
| *P0301 | Cylinder 1 Misfire Detected | Complete diagnosis with drive cycle A or B as well. |
| *P0302 | Cylinder 2 Misfire Detected | Complete diagnosis with drive cycle A or B as well. |
| *P0303 | Cylinder 3 Misfire Detected | Complete diagnosis with drive cycle A or B as well. |
| *P0304 | Cylinder 4 Misfire Detected | Complete diagnosis with drive cycle A or B as well. |
| *P0305 | Cylinder 5 Misfire Detected | Complete diagnosis with drive cycle A or B as well. |
| *P0306 | Cylinder 6 Misfire Detected | Complete diagnosis with drive cycle A or B as well. |
| *P0400 | Exhaust Gas Recirculation Flow | — |
| P1492 | EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input) | — |
| P1493 | EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input) | — |
| P1494 | EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input) | — |
| P1495 | EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input) | — |
| P1496 | EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input) | — |
| P1497 | EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input) | — |
| P1498 | EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input) | — |
| P1499 | EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input) | — |
| *P2096 | Post Catalyst Fuel Trim System Too Lean (Bank 1) | Complete diagnosis with drive cycle A or B as well. |
| *P2097 | Post Catalyst Fuel Trim System Too Rich (Bank 1) | Complete diagnosis with drive cycle A or B as well. |
| *P2098 | Post Catalyst Fuel Trim System Too Lean (Bank 2) | Complete diagnosis with drive cycle A or B as well. |
| *P2099 | Post Catalyst Fuel Trim System Too Rich (Bank 2) | Complete diagnosis with drive cycle A or B as well. |

Drive Cycle

ENGINE (DIAGNOSTICS)

Diagnostic procedure:

Drive according to the drive pattern described below.



| | | | | | |
|-----|---|-----|--|-----|--|
| (A) | Idle the engine for 10 seconds or more. | (D) | Decelerate with fully closed throttle to 64 km/h (40 MPH). | (G) | Stop the vehicle with throttle fully closed. |
| (B) | Accelerate to 97 km/h (60 MPH) within 20 seconds. | (E) | Drive the vehicle at 64 km/h (40 MPH) for 20 seconds. | (H) | Vehicle speed km/h (MPH) |
| (C) | Drive the vehicle at 97 km/h (60 MPH) for 20 seconds. | (F) | Accelerate to 97 km/h (60 MPH) within 10 seconds. | (I) | Sec. |

5. DRIVE CYCLE D

| DTC | Item | Condition |
|--------|---|-----------|
| *P0181 | Fuel Temperature Sensor "A" Circuit Range/Performance | — |

NOTE:

In drive cycle D, one drive cycle will be established when both the drift diagnosis and stuck diagnosis have completed.

Diagnostic procedure:

DRIFT DIAGNOSIS

- 1) Make sure of the items below before starting the engine.
 - Engine coolant temperature is less than 30°C (86°F).
 - Remaining fuel is 10 ℥ (2.6 US gal, 2.2 Imp gal) or more.
 - Battery voltage is 10.9 V or more.
- 2) Idle the engine until engine coolant temperature is at least 10°C (18°F) higher than it was when engine started.
- 3) After the engine has reached the state of procedure 2), idle the engine for another 5 minutes or more.

STUCK DIAGNOSIS

- 1) Make sure that the battery voltage is 10.9 V or more.
- 2) Perform the Clear Memory Mode. <Ref. to EN(H6DO)(diag)-57, Clear Memory Mode.>
- 3) Drive for approximately 50 ℥ (13.2 US gal, 11 Imp gal) of fuel.

NOTE:

- It is acceptable to drive the vehicle intermittently.
- Do not disconnect the battery terminals during stuck diagnosis. (Data will be cleared by disconnecting the battery terminals.)

6. DRIVE CYCLE E

| DTC | Item | Condition |
|--------|---|-----------|
| *P0461 | Fuel Level Sensor "A" Circuit Range/Performance | — |

Diagnostic procedure:

- 1) Make sure that the battery voltage is 10.9 V or more.
- 2) Perform the Clear Memory Mode. <Ref. to EN(H6DO)(diag)-57, Clear Memory Mode.>
- 3) Drive for approximately 30 ℥ (7.9 US gal, 6.6 Imp gal) of fuel.

NOTE:

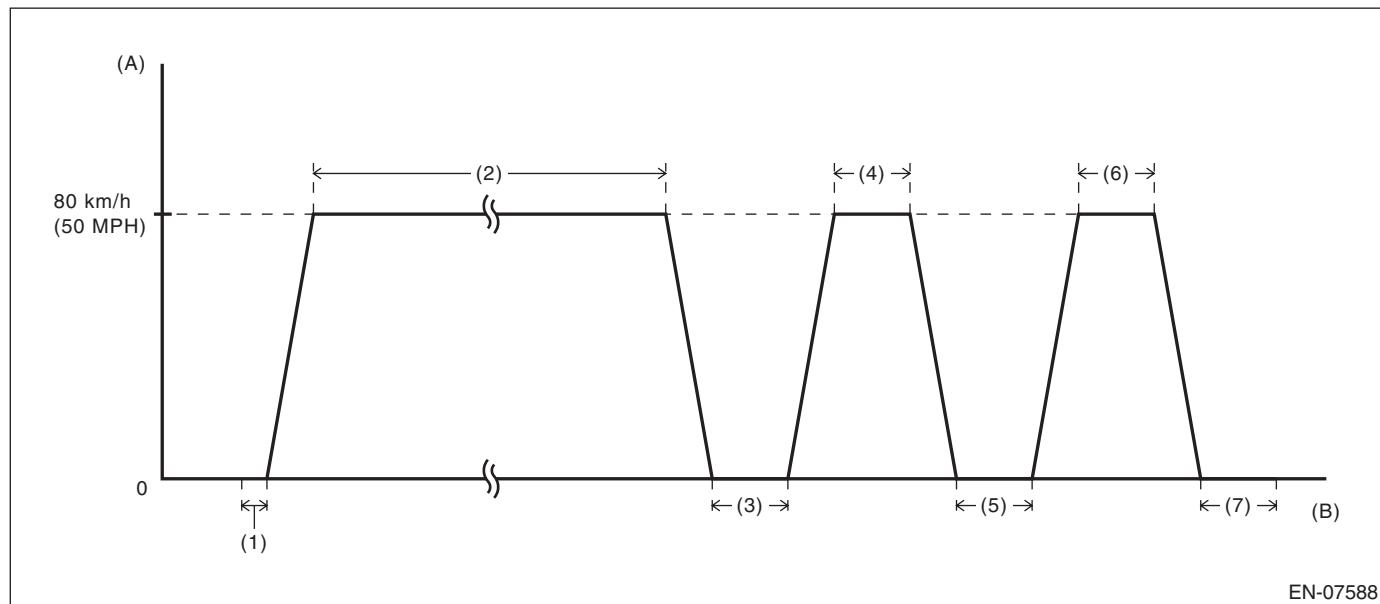
- It is acceptable to drive the vehicle intermittently.
- Do not disconnect the battery terminals while diagnosing. (Data will be cleared by disconnecting the battery terminals.)

7. DRIVE CYCLE F

| DTC | Item | Condition |
|--------|---|-----------|
| *P0111 | Intake Air Temperature Sensor 1 Circuit Range/Performance | — |

Diagnostic procedure:

- 1) Make sure that the engine coolant temperature is less than 30°C (86°F).
- 2) Drive according to the drive pattern described below.



| | | |
|--|---|---|
| (A) Vehicle speed | (B) Elapsed time | |
| (1) Idle the engine for 10 seconds after engine start. | (4) Drive for 30 seconds at a constant speed of 80 km/h (50 MPH). | (6) Drive for 30 seconds at a constant speed of 80 km/h (50 MPH). |
| (2) Drive for 8 minutes at a constant speed of 80 km/h (50 MPH). | (5) Stop the vehicle and idle for 30 seconds. | (7) Stop the vehicle and idle for 30 seconds. |
| (3) Stop the vehicle and idle for 30 seconds. | | |

NOTE:

- There is no given transition time between idling and cruising.
- Driving at constant speed only on a downhill causes smaller engine load and may result in failure to obtain a right diagnostic result.
- When the engine stops while performing drive cycle F, perform it again from the state of procedure 1).

Drive Cycle

ENGINE (DIAGNOSTICS)

8. DRIVE CYCLE H

| DTC | Item | Condition |
|--------|----------------------------------|-----------|
| *P1602 | Control Module Programming Error | — |

Diagnostic procedure:

- 1) Perform the Clear Memory Mode. <Ref. to EN(H6DO)(diag)-57, Clear Memory Mode.>
- 2) With the ignition switch ON (engine OFF), read the engine coolant temperature, intake air temperature and fuel temperature. <Ref. to EN(H6DO)(diag)-37, READ CURRENT DATA FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.>
- 3) If the values from step 2) satisfy the following two conditions, idle the engine for one minute.

Condition:

- / Engine coolant temperature — Intake air temperature | $\leq 5^{\circ}\text{C}$ (41°F)*
- / Engine coolant temperature — Fuel temperature | $\leq 2^{\circ}\text{C}$ (36°F)*

NOTE:

- If the conditions are not satisfied, turn the ignition switch to OFF and wait until the parameters are satisfied.
- Hold the select lever in “P” range or “N” range at idling.