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 12 volt auxiliary battery voltage is 12 V or more and fuel remains approx. half [20 - 40 L (5.3 - 10.6 US gal, 4.4 - 8.8 Imp gal)].

2) Perform the Clear Memory Mode. <Ref. to HEV(diag)-25, Clear Memory Mode.>

3) Read the DTC and check that the DTC is not displayed. <Ref. to HEV(diag)-24, Read Diagnostic Trouble Code (DTC).>

NOTE:

If the DTC is displayed on the screen, the trouble is still present. Perform the diagnosis according to DTC.
<Ref. to HEV(diag)-74, List of Diagnostic Trouble Code (DTC).> After solving the DTC, repeat from step 2).
Perform the drive cycle after warming up the engine except when any conditions such as oil temperature

at starting are specified.

2. DRIVE CYCLE A

Hybrid powertrain control system

DTC	Item	Condition
P1C10	Vacuum Pump Performance	In EV traveling, operate vacuum pump by perform- ing drive cycle A. If the vacuum pressure is suffi- cient but the vacuum pump still does not oper- ate, turn the ignition switch to ON, then run «Brake Vacuum Pump System Check» from the "System Operation Check Mode" of the hybrid powertrain con- trol system. <ref. to<br="">HEV(diag)-71, HYBRID POWERTRAIN CON- TROL SYSTEM, OPERA- TION, System Operation Check Mode.></ref.>
P2158	Vehicle Speed Sensor "B"	—

• Drive motor control system

DTC	Item	Condition
P0A2A	Drive Motor "A" Temperature Sensor Circuit	Setting the ignition switch to ON, confirm that current data of drive motor con- trol system, the values of «Drive Motor Inverter Temperature A» «Drive Motor Inverter Tempera- ture B» «Drive Motor Inverter Temperature C», and «High Voltage Bat- tery Temperature (MIN)» are at 30°C (86°F) or more, run the engine at idling speed for 1 minute, then begin drive cycle A. <ref. hev(diag)-52,<br="" to="">DRIVE MOTOR CON- TROL SYSTEM, OPERA- TION, Read Current Data.></ref.>
P0A3F	Drive Motor "A" Position Sensor Circuit	_
P0A5D	Drive Motor "A" Phase U Current	—
P0A60	Drive Motor "A" Phase V Current	—
P0A63	Drive Motor "A" Phase W Current	—
P0A78	Drive Motor "A" Inverter Performance	—
P0C05	Drive Motor "A" Phase U-V-W Circuit/Open	—
P1C24	Drive Motor "B" Temperature Sensor Circuit	Setting the ignition switch to ON, confirm that current data of drive motor con- trol system, the values of «Drive Motor Inverter Temperature A» «Drive Motor Inverter Tempera- ture B» «Drive Motor Inverter Temperature C», and «High Voltage Bat- tery Temperature (MIN)» are at 30°C (86°F) or more, run the engine at idling speed for 1 minute, then begin drive cycle A. <ref. hev(diag)-52,<br="" to="">DRIVE MOTOR CON- TROL SYSTEM, OPERA- TION, Read Current Data.></ref.>
P1C2A	Drive Motor Inverter Circuit	—

Drive Cycle

HYBRID ELECTRIC VEHICLE (DIAGNOSTICS)

Battery energy control system

DTC	Item	Condition
U1591	Invalid Data Received From Hybrid Powertrain Control Module HEV-CAN	—

Diagnostic procedure:

1) Prepare for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PROCEDURE, Drive Cycle.>

2) Drive at 10 km/h (6.2 MPH) or more.

3) Read the readiness code and check that the concerned DTC is not displayed. <Ref. to HEV(diag)-26, All Readiness Diagnostic Code(s).>

NOTE:

If the concerned DTC is displayed, the self-diagnosis of the DTC is not complete. Repeat from step 1). 4) Read the DTC and check that the DTC is not displayed. <Ref. to HEV(diag)-24, Read Diagnostic Trouble Code (DTC).>

NOTE:

If the DTC is displayed on the screen, the trouble is still present. Perform the diagnosis according to DTC. <Ref. to HEV(diag)-74, List of Diagnostic Trouble Code (DTC).> After repairing the cause of setting DTC, repeat from preparation for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PRO-CEDURE, Drive Cycle.>

3. DRIVE CYCLE B

Drive motor control system

DTC	Item	Condition
P0A90	Drive Motor "A" Performance	—
POAEE	Drive Motor Inverter Temperature Sensor "A" Circuit Range/Performance	Setting the ignition switch to ON, confirm that current data of drive motor control system, the values of «Drive Motor Inverter Temperature A» «Drive Motor Inverter Temperature B» «Drive Motor Inverter Temperature C» are within 30 — 50°C (86 — 122°F) range, run the engine at idling speed for 5 minutes, then begin drive cycle B. <ref. control="" drive="" hev(diag)-52,="" motor="" sys-<br="" to="">TEM, OPERATION, Read Current Data.></ref.>
P0AF3	Drive Motor Inverter Temperature Sensor "B" Circuit Range/Performance	Setting the ignition switch to ON, confirm that current data of drive motor control system, the values of «Drive Motor Inverter Temperature A» «Drive Motor Inverter Temperature B» «Drive Motor Inverter Temperature C» are within 30 — 50°C (86 — 122°F) range, run the engine at idling speed for 5 minutes, then begin drive cycle B. <ref. control="" drive="" hev(diag)-52,="" motor="" sys-<br="" to="">TEM, OPERATION, Read Current Data.></ref.>
P0BD2	Drive Motor Inverter Temperature Sensor "C" Circuit Range/Performance	Setting the ignition switch to ON, confirm that current data of drive motor control system, the values of «Drive Motor Inverter Temperature A» «Drive Motor Inverter Temperature B» «Drive Motor Inverter Temperature C» are within 30 — 50°C (86 — 122°F) range, run the engine at idling speed for 5 minutes, then begin drive cycle B. <ref. control="" drive="" hev(diag)-52,="" motor="" sys-<br="" to="">TEM, OPERATION, Read Current Data.></ref.>
P1C27	Drive Motor "A" and "B" Temperature Sensor Correla- tion	Setting the ignition switch to ON, confirm that current data of drive motor control system, the values of «Drive Motor Temperature A» «Drive Motor Temperature B» are within 30 — 50°C (86 — 122°F) range, run the engine at idling speed for 5 minutes, then begin drive cycle B. <ref. control="" current="" data.="" drive="" hev(diag)-52,="" motor="" operation,="" read="" system,="" to=""></ref.>

Battery energy control system

DTC	Item	Condition
P0A7F	Hybrid Battery Pack Deterioration	Confirm that current data of the battery energy control system, the value of «High Voltage Battery Temperature 1» «High Voltage Battery Temperature 2» «High Voltage Battery Temperature 3» are at 25°C (77°F) or more before running the drive cycle. <ref. hev(diag)-58,<br="" to="">BATTERY ENERGY CONTROL SYSTEM, OPERATION, Read Current Data.></ref.>
P0AA6	Hybrid Battery Voltage System Isolation Fault	—
POABF	Hybrid Battery Pack Current Sensor "A" Circuit	Confirm that current data of the battery energy control system, the value of «High Voltage Battery Temperature 1» «High Voltage Battery Temperature 2» «High Voltage Battery Temperature 3» are at 25°C (77°F) or more before running the drive cycle. <ref. hev(diag)-58,<br="" to="">BATTERY ENERGY CONTROL SYSTEM, OPERATION, Read Current Data.></ref.>

Diagnostic procedure:

1) Prepare for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PROCEDURE, Drive Cycle.>

2) Drive for 10 minutes or more at a speed of 30 km/h (18.6 MPH) or more.

3) Read the readiness code and check that the concerned DTC is not displayed. <Ref. to HEV(diag)-26, All Readiness Diagnostic Code(s).>

NOTE:

If the concerned DTC is displayed, the self-diagnosis of the DTC is not complete. Repeat from step 1). 4) Read the DTC and check that the DTC is not displayed. <Ref. to HEV(diag)-24, Read Diagnostic Trouble Code (DTC).>

NOTE:

If the DTC is displayed on the screen, the trouble is still present. Perform the diagnosis according to DTC. <Ref. to HEV(diag)-74, List of Diagnostic Trouble Code (DTC).> After repairing the cause of setting DTC, repeat from preparation for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PRO-CEDURE, Drive Cycle.>

4. DRIVE CYCLE C

• Hybrid powertrain control system

DTC	Item	Condition
P065A	Generator System Performance	—
P1C18	Generator System "B" Performance	—

Diagnostic procedure:

1) Prepare for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PROCEDURE, Drive Cycle.>

2) Set the shift lever to "P" range.

3) Check that «Open» is displayed for the current data «12V Battery Relay Mode Target» of the hybrid powertrain control system. <Ref. to HEV(diag)-40, HYBRID POWERTRAIN CONTROL SYSTEM, OPERATION, Read Current Data.>

4) Race the engine at 2000 rpm for 3 minutes.

5) Read the readiness code and check that the concerned DTC is not displayed. <Ref. to HEV(diag)-26, All Readiness Diagnostic Code(s).>

NOTE:

If the concerned DTC is displayed, the self-diagnosis of the DTC is not complete. Repeat from step 1). 6) Read the DTC and check that the DTC is not displayed. <Ref. to HEV(diag)-24, Read Diagnostic Trouble Code (DTC).>

NOTE:

If the DTC is displayed on the screen, the trouble is still present. Perform the diagnosis according to DTC. <Ref. to HEV(diag)-74, List of Diagnostic Trouble Code (DTC).> After repairing the cause of setting DTC, repeat from preparation for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PRO-CEDURE, Drive Cycle.>

5. DRIVE CYCLE D

• Hybrid powertrain control system

DTC	Item	Condition
P0620	Generator Control Circuit	—
P06EF	Engine Restart Performance	—

Diagnostic procedure:

1) Prepare for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PROCEDURE, Drive Cycle.>

2) Set the shift lever to "D" range.

3) At standing still (vehicle speed is at 0 km/h (0 MPH)), depress the brake pedal several times ON $\leftarrow \rightarrow$ OFF from Auto Start Stop, then start the engine.

4) Read the readiness code and check that the concerned DTC is not displayed. <Ref. to HEV(diag)-26, All Readiness Diagnostic Code(s).>

NOTE:

If the concerned DTC is displayed, the self-diagnosis of the DTC is not complete. Repeat from step 1). 5) Read the DTC and check that the DTC is not displayed. <Ref. to HEV(diag)-24, Read Diagnostic Trouble Code (DTC).>

NOTE:

If the DTC is displayed on the screen, the trouble is still present. Perform the diagnosis according to DTC. <Ref. to HEV(diag)-74, List of Diagnostic Trouble Code (DTC).> After repairing the cause of setting DTC, repeat from preparation for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PRO-CEDURE, Drive Cycle.>

HEV(diag)-36

6. DRIVE CYCLE E

• Hybrid powertrain control system

DTC	Item	Condition
P1C06	12V Battery Relay Close Circuit Performance	—
P1C07	12V Battery Relay Open Circuit Performance	—
P1C08	12V Battery Relay Performance or Stuck Off	—
P1C09	12V Battery Relay Performance or Stuck On	—

Diagnostic procedure:

1) Prepare for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PROCEDURE, Drive Cycle.>

2) Set the shift lever to "P" range.

3) Increase electrical load of auxiliary devices, wait until the value of current data «High Voltage Battery SOC» of the hybrid powertrain control system drops below 37% and the display for «12V Battery Relay Mode Target» turns to «Close». <Ref. to HEV(diag)-40, HYBRID POWERTRAIN CONTROL SYSTEM, OPERA-TION, Read Current Data.>

4) Drive for 10 minutes or more at a speed of 30 km/h (18.6 MPH) or more.

5) Check that the value of current data «High Voltage Battery SOC» of the hybrid powertrain control system increases to 42% or more and the display for «12V Battery Relay Mode Target» turns to «Open». <Ref. to HEV(diag)-40, HYBRID POWERTRAIN CONTROL SYSTEM, OPERATION, Read Current Data.>

6) Read the readiness code and check that the concerned DTC is not displayed. <Ref. to HEV(diag)-26, All Readiness Diagnostic Code(s).>

NOTE:

If the concerned DTC is displayed, the self-diagnosis of the DTC is not complete. Repeat from step 1). 7) Read the DTC and check that the DTC is not displayed. <Ref. to HEV(diag)-24, Read Diagnostic Trouble Code (DTC).>

NOTE:

If the DTC is displayed on the screen, the trouble is still present. Perform the diagnosis according to DTC. <Ref. to HEV(diag)-74, List of Diagnostic Trouble Code (DTC).> After repairing the cause of setting DTC, repeat from preparation for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PRO-CEDURE, Drive Cycle.>

7. DRIVE CYCLE F

• Battery energy control system

DTC	Item	Condition
P0C30	Hybrid Battery Pack State of Charge High	—

Diagnostic procedure:

1) Prepare for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PROCEDURE, Drive Cycle.>

2) Start the engine, and run the engine at idle for 60 seconds or more.

3) Read the readiness code and check that the concerned DTC is not displayed. <Ref. to HEV(diag)-26, All Readiness Diagnostic Code(s).>

NOTE:

If the concerned DTC is displayed, the self-diagnosis of the DTC is not complete. Repeat from step 1). 4) Read the DTC and check that the DTC is not displayed. <Ref. to HEV(diag)-24, Read Diagnostic Trouble Code (DTC).>

NOTE:

If the DTC is displayed on the screen, the trouble is still present. Perform the diagnosis according to DTC. <Ref. to HEV(diag)-74, List of Diagnostic Trouble Code (DTC).> After repairing the cause of setting DTC, repeat from preparation for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PRO-CEDURE, Drive Cycle.>

HEV(diag)-37

8. DRIVE CYCLE G

Battery energy control system

DTC	Item	Condition
POAAD	Hybrid Battery Pack Air Temperature Sensor "A" Circuit Range/Perfor- mance	_

Diagnostic procedure:

1) Prepare for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PROCEDURE, Drive Cycle.>

2) After leaving the vehicle unattended for 6 hours or longer, start the engine and run at idling speed for 20 seconds.

3) Read the readiness code and check that the concerned DTC is not displayed. <Ref. to HEV(diag)-26, All Readiness Diagnostic Code(s).>

NOTE:

If the concerned DTC is displayed, the self-diagnosis of the DTC is not complete. Repeat from step 1). 4) Read the DTC and check that the DTC is not displayed. <Ref. to HEV(diag)-24, Read Diagnostic Trouble Code (DTC).>

NOTE:

If the DTC is displayed on the screen, the trouble is still present. Perform the diagnosis according to DTC. <Ref. to HEV(diag)-74, List of Diagnostic Trouble Code (DTC).> After repairing the cause of setting DTC, repeat from preparation for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PRO-CEDURE, Drive Cycle.>

9. DRIVE CYCLE H

• Drive motor control system

DTC	Item	Condition
P0A82	Hybrid/Ev Battery Pack Cooling Fan 1 Performance/Stuck Off	—
P0A83	Hybrid/Ev Battery Pack Cooling Fan 1 Stuck On	—

Diagnostic procedure:

1) Prepare for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PROCEDURE, Drive Cycle.>

2) Select the System Operation Check Mode «High Voltage Battery Cooling Fan» of the drive motor control system. <Ref. to HEV(diag)-73, DRIVE MOTOR CONTROL SYSTEM, OPERATION, System Operation Check Mode.>

3) On «High Voltage Battery Cooling Fan» display, select {Step1}.

4) On «High Voltage Battery Cooling Fan» display, select {Stop}.

5) Read the readiness code and check that the concerned DTC is not displayed. <Ref. to HEV(diag)-26, All Readiness Diagnostic Code(s).>

NOTE:

If the concerned DTC is displayed, the self-diagnosis of the DTC is not complete. Repeat from step 1). 6) Read the DTC and check that the DTC is not displayed. <Ref. to HEV(diag)-24, Read Diagnostic Trouble Code (DTC).>

NOTE:

If the DTC is displayed on the screen, the trouble is still present. Perform the diagnosis according to DTC. <Ref. to HEV(diag)-74, List of Diagnostic Trouble Code (DTC).> After repairing the cause of setting DTC, repeat from preparation for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PRO-CEDURE, Drive Cycle.>

HEV(diag)-38

10.DRIVE CYCLE I

• Hybrid powertrain control system

DTC	Item	Condition
P0506	Idle Air Control System RPM Lower Than Expected	—
P0507	Idle Air Control System RPM Higher Than Expected	—
P1C16	Idle Control System RPM Lower Than Expected (HPCM)	—
P1C17	Idle Control System RPM Higher Than Expected (HPCM)	—

Diagnostic procedure:

1) Prepare for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PROCEDURE, Drive Cycle.>

2) Drive at 10 km/h (6.2 MPH) or more.

3) Increase electrical load of auxiliary devices, wait until the value of current data «High Voltage Battery SOC» of the hybrid powertrain control system falls between 37% and below 40%.

4) Depress the brake pedal, set the shift lever to "D" range, and wait for 30 seconds. (Perform the power generation at stand still.)

5) Read the readiness code and check that the concerned DTC is not displayed. <Ref. to HEV(diag)-26, All Readiness Diagnostic Code(s).>

NOTE:

If the concerned DTC is displayed, the self-diagnosis of the DTC is not complete. Repeat from step 1). 6) Read the DTC and check that the DTC is not displayed. <Ref. to HEV(diag)-24, Read Diagnostic Trouble Code (DTC).>

NOTE:

If the DTC is displayed on the screen, the trouble is still present. Perform the diagnosis according to DTC. <Ref. to HEV(diag)-74, List of Diagnostic Trouble Code (DTC).> After repairing the cause of setting DTC, repeat from preparation for drive cycle. <Ref. to HEV(diag)-32, PREPARATION FOR DRIVE CYCLE, PRO-CEDURE, Drive Cycle.>