ELECTRONIC 4WD CONTROL SYSTEM ON-BOARD DIAGNOSIS

id030200802500

On-Board Diagnostic (OBD) Test Description

- The OBD test inspects the integrity and function of the 4WD control module and outputs the results when requested by the specific tests.
- On-board diagnostic test also:
  - — Provides a quick inspection of the 4WD control module usually performed at the start of each diagnostic procedure.
  - — Provides verification after repairs to ensure that no other faults occurred during service.
- The OBD test is divided into 3 tests:
  - — Read/clear diagnostic results, PID monitor and record and active command modes.

Read/clear diagnostic results

- This function allows you to read or clear DTCs in the 4WD control module memory.

PID/Data monitor and record

- This function allows you to access certain data values, input signals, calculated values, and system status information.

Active command modes

- This function allows you to control devices through the M-MDS.

Reading DTCs Procedure

CMDTC self test

1. Connect the M-MDS (IDS) to the DLC-2.
2. After the vehicle is identified, select the following items from the initialization screen of the IDS.
   (1) Select “Self Test”.
   (2) Select “All CMDTCs”.

   Note
   - Snapshot data appears at the top of the help screen when the displayed DTC is selected.

3. Verify the DTC according to the directions on the screen.
   - If any DTCs are displayed, perform troubleshooting according to the corresponding DTC inspection after recording the snapshot data.
4. After completion of repairs, clear all DTCs stored in the 4WD control module. (See Clearing DTCs Procedure.)

Clearing DTCs Procedure

CMDTC self test

1. Connect the M-MDS (IDS) to the DLC-2.
2. After the vehicle is identified, select the following items from the initialization screen of the IDS.
   (1) Select “Self Test”.
   (2) Select “All CMDTCs”.
3. Verify the DTC according to the directions on the screen.
4. Press the clear button on the DTC screen to clear the DTC.
5. Switch the ignition OFF.
6. Switch the ignition to ON (engine off) and wait for **5 s or more**.
7. Perform DTC inspection. (See Reading DTCs Procedure.)
8. Verify that no DTCs are displayed.

PID/Data Monitor and Record Procedure

1. Connect the M-MDS (IDS) to the DLC-2.
2. After the vehicle is identified, select the following items from the initialization screen of the IDS.
   (1) Select “Data Logger”.
   (2) Select “Modules”.
   (3) Select “4X4”.
3. Select the applicable PID from the PID table.
4. Verify the PID data according to the directions on the screen.

   Note
   - The PID data screen function is used for monitoring the calculated value of input/output signals in the module.Therefore, if the monitored value of the output parts is not within the specification, it is necessary to inspect the monitored value of input parts corresponding to the applicable output part control. In addition, because the system does not display an output part malfunction as an abnormality in the monitored value, it is necessary to inspect the output parts individually.

- When detecting DTCs, PIDs related to a malfunctioning system may not display even if the module is normal. Therefore, if a PID is not displayed, it is necessary to verify the DTC, perform malfunction diagnosis of the DTC that was detected, and do repairs.

Active Command Modes Procedure

1. Connect the M-MDS (IDS) to the DLC-2.
2. After the vehicle is identified, select the following items from the initialization screen of the IDS.
   (1) Select “Data Logger”.
   (2) Select “Modules”.
   (3) Select “4X4”.
3. Select the simulation items from the PID table.
4. Perform the active command modes function, inspect the operations for each parts.
   - If the operation of output parts cannot be verified after the active command mode inspection is performed, this could indicate the possibility of an open or short circuit, sticking, or operation malfunction in the output parts.

DTC Table

×: Applicable
—: Not applicable

DTC M-MDS	4WD warning light illumination status	Diagnosis system component	Fail-safe	Drive cycle	Self test type* 1	Memory function	Page
P164D:00	Illuminated	4WD CM configuration	X	—	C	X	(See DTC P164D:00.)
P182F:00	Flashed	4WD CM	X	—	C	X	(See DTC P182F:00.)
P187B:00	Illuminated	4WD CM	X	—	C	X	(See DTC P187B:00.)
P1886:00	Illuminated	4WD CM	X	—	C	X	(See DTC P1886:00.)
P1887:11	Illuminated	4WD solenoid circuit	X	—	C	X	(See DTC P1887:11/P1887:12/ P1887:13/P1887:14.)
P1887:12	Illuminated	4WD solenoid circuit	X	—	C	X	
P1887:13	Illuminated	4WD solenoid circuit	X	—	C	X	
P1887:14	Illuminated	4WD solenoid circuit	X	—	C	X	
P1888:11	Illuminated	Differential oil temperature sensor circuit	X	—	C	X	(See DTC P1888:11/P1888:15.)
P1888:15	Illuminated	Differential oil temperature sensor circuit	X	—	C	X	
P188A:00	Flashed	4WD CM	X	—	C	X	(See DTC P188A:00.)
U0001:88	—	CAN system communication error	X	—	C	X	(See DTC U0001:88/U0100:00/ U0101:00/U0121:00.)
U0100:00	—	Communication error to PCM	X	—	C	X	
U0101:00	—	CAN system communication error	X	—	C	X	
U0121:00	—	CAN system communication error	X	—	C	X	
U0401:68	—	Signal error from PCM	X	—	C	X	(See DTC U0401:68.)
U0402:68	—	Signal error from TCM	X	—	C	X	(See DTC U0402:68.)
U0415:68	—	Signal error from DSC HU/CM	X	—	C	X	(See DTC U0415:68.)

DTC M-MDS	4WD warning light illumination status	Diagnosis system component	Fail-safe	Drive cycle	Self test type* 1	Memory function	Page
U2100:00	Illuminated	4WD CM configuration	X	—	C	X	(See DTC U2100:00.)

*1 : C: CMDTC self test

Snapshot Data Table

Note
- Snapshot data items are not displayed, according to detected DTC.

—: Not applicable

Snapshot data item	Unit		Data contents	Data read/use method	Corresponding data monitor items
AAT	°C	°F	Ambient temperature	—	—
IC_VPWR	V		Instrument cluster power supply voltage	• The AWD CM constantly receives the power supply voltage value of the instrument cluster sent via CAN signal from the instrument cluster. • If a DTC is detected, the AWD CM records the power supply voltage of the instrument cluster when the DTC was detected, and it is displayed in the M-MDS.	VPWR*1
IG-ON_TIMER	hh:mm:ss*2		Elapsed time since ignition was switched ON (engine off or on) **Note** • The instrument cluster records the elapsed time since the ignition was switched ON (engine off or on).	• The AWD CM constantly receives the elapsed time since the ignition was switched ON (engine off or on) sent via CAN signal from the instrument cluster. • If a DTC is detected, the AWD CM records the elapsed time since the ignition was switched ON (engine off or on) when the DTC was detected, and it is displayed in the M-MDS.	—
PWR_MODE_KEY	Key Out/Key Recently Out (Position 0)/ Accessory (Position 1)/Post Ignition (Position 2)/ Ignition On (Position 2)/ Running (Position 2)/ Running - Starting		• Key Out: Ignition switched off • Key Recently Out (Position 0): Elapsed time **within 3 s** since ignition was switched off • Accessory (Position 1): Ignition is switched to ACC • Post Ignition (Position 2): Elapsed time **within 3 s** since ignition was switched ON (engine off or on) • Ignition On (Position 2): Ignition switched ON (engine off) • Running (Position 2): Ignition switched ON (engine on) • Running - Starting: Cranking condition	• The AWD CM constantly receives the ignition switch status sent via CAN signal from the instrument cluster. • If a DTC is detected, the AWD CM records the ignition switch status when the DTC was detected, and it is displayed in the M-MDS.	—

Snapshot data item	Unit		Data contents	Data read/use method	Corresponding data monitor items
TOTAL_DIST	km	Miles	Accumulated total traveled distance from completion of vehicle until AWD CM detects DTC (Odometer value in instrument cluster)	The total traveled distance from which the AWD CM detects DTCs to the present can be calculated by performing the following procedure. 1. Verify the odometer value in the instrument cluster. 2. Verify the snapshot data item TOTAL_DIST. 3. Subtract 2 from 1.	—
TOTAL_TIME	hh:mm:ss*2		Accumulated total elapsed time since vehicle completion until AWD CM detects a DTC **Note** • When the ROOM fuse is removed, and the ignition is switched off, the time is not included in the elapsed time.	The elapsed time from which the AWD CM detects DTCs to the present can be calculated by performing the following procedure. 1. Verify the instrument cluster PID item TOTAL_TIME. 2. Verify the snapshot data item TOTAL_TIME. 3. Subtract 2 from 1.	TOTAL_TIME*1

*1 : Instrument cluster PID (See PID/DATA MONITOR TABLE [INSTRUMENT CLUSTER].)
*2 : The seconds may be indicated after the decimal point.

PID/DATA Monitor Table

PID name (definition)	Unit/Condition	Operation condition (reference)	Action
WARN_LAMP	—	• Displays the warning light state	Inspect the 4WD CM. (See 4WD CONTROL MODULE INSPECTION.)
AAT	°C, °F	• Displays the ambient air temperature	Inspect the ambient air temperature sensor. (See AMBIENT TEMPERATURE SENSOR INSPECTION [FULL-AUTO AIR CONDITIONER].)
APP	%	• Displays the accelerator pedal position	Inspect the accelerator pedal position sensor. (See ACCELERATOR PEDAL POSITION (APP) SENSOR INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) (See ACCELERATOR PEDAL POSITION (APP) SENSOR INSPECTION [SKYACTIV-D 2.2].)
CAL_TABLE	—	• Displays the selected calibration table	—
CUP_SOL	%	• Displays the coupling solenoid duty cycle	Inspect the 4WD CM. (See 4WD CONTROL MODULE INSPECTION.)
GEAR	1st/2nd/3rd/4th/ 5th/6th/7th/ Park/Neutral/ Drive/Reverse	• Displays the gear position	Inspect the PCM. (See PCM INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) (See PCM INSPECTION [SKYACTIV-D 2.2].)
OIL_TEMP	°C, °F	• Displays the differential oil temperature	Inspect the differential oil temperature sensor. (See DIFFERENTIAL OIL TEMPERATURE SENSOR INSPECTION.)

PID name (definition)	Unit/Condition	Operation condition (reference)	Action
RPM	RPM	• Displays the engine speed	Inspect the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) (See CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [SKYACTIV-D 2.2].)
SHIFT	P/R/N/D/S/L	• Displays the select lever position	Perform the DTC inspection for the TCM. (See ON-BOARD DIAGNOSTIC SYSTEM DTC TABLE [FW6A-EL, FW6AX-EL].) (See ON-BOARD DIAGNOSTIC SYSTEM DTC TABLE [GW6A-EL, GW6AX-EL].)
VPWR	V	• Engine stopped: **Approx. 12 V** • Idling: **Approx. 14 V**	Inspect the voltage of the 4WD control module terminal I. (See 4WD CONTROL MODULE INSPECTION.)
WSPD_LF	KPH, MPH	• Vehicle stopped: **0 KPH, 0 MPH** • Vehicle running: Vehicle speed	Inspect the front ABS wheel-speed sensor. (See FRONT ABS WHEEL-SPEED SENSOR INSPECTION.)
WSPD_LR			Inspect the rear ABS wheel-speed sensor. (See REAR ABS WHEEL-SPEED SENSOR INSPECTION [4WD].)
WSPD_RF			Inspect the front ABS wheel-speed sensor. (See FRONT ABS WHEEL-SPEED SENSOR INSPECTION.)
WSPD_RR			Inspect the rear ABS wheel-speed sensor. (See REAR ABS WHEEL-SPEED SENSOR INSPECTION [4WD].)
TORQUE	Nm	• Displays the total wheel torque	—

Active Command Modes Table

Command name	Output part	Operation	Operating condition
CUP_SOL	4WD solenoid	on/off	Switch the ignition to ON (engine off or on)