05IHI–01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester II Data List allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Warm up the engine.
(b) Turn the power switch OFF.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the power switch ON (IG).
(e) Turn the intelligent tester II ON.
(f) Enter the following menus: Powertrain / Engine and ECT / Data List.
(g) According to the display on the tester, read items in Data List.

Intelligent Tester II Display (Abbreviation)	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
Injector	Injection period of the No. 1 cylinder/ Min.: 0 ms, Max.: 32.64 ms	Idling: 1 to 3 ms (Inspection mode)	—
IGN Advance (Ign Advance)	Ignition timing advance for No. 1 cylinder/ Min.: –64 deg., Max.: 63.5 deg.	Idling: BTDC 7 to 15˚ (Inspection mode)	—
Calculate Load (Cal Load)	Calculated load by ECM/ Min.: 0 %, Max.: 100 %	• Idling: 10 to 20 % (Inspection mode) • Running without load (1,500 rpm): 10 to 20 %	—
MAF	Air flow rate from MAF meter/ Min.: 0 g/s, Max.: 655 g/s	Idling: 3 to 7 g/s (1,500 rpm)	If the value is approximately 0.0 g/s: • Mass air flow meter power source circuit open • VG circuit open or short If the value is 160.0 g/s or more: • E2G circuit open
Engine Speed (Engine Spd)	Engine speed/ Min.: 0 rpm, Max.: 16383 rpm	Idling 1,000 rpm (when putting the engine in inspection mode)	—
Coolant Temp	Engine coolant temperature/ Min.: –40 °C, Max.: 140 °C	After warming up: 80 to 100˚C (176 to 212˚F)	• If the value is –40°C (–40°F): sensor circuit is open • If the value is 140°C (284°F): sensor circuit is shorted
Intake Air	Intake air temperature/ Min.: –40 °C, Max.: 140 °C	Equivalent to ambient air temperature	• If the value is –40°C (–40°F): sensor circuit is open • If the value is 140°C (284°F): sensor circuit is shorted
Throttle Position (Throttle Pos)	Absolute throttle position sensor/ Min.: 0 %, Max.: 100 %	• Throttle fully closed: 10 to 24 % • Throttle fully open: 64 to 96 %	Read the value with intrusive operation (active test)
Vehicle Speed (Vehicle Spd)	Vehicle speed/ Min.: 0 km/h, Max.: 255 km/h	Actual vehicle speed	Speed indicated on speedometer
Throttle Position No.2 (Throttle Pos #2)	Throttle position sensor No.2 output voltage/ Min.: 0 V, Max.: 5.0 V	• Throttle fully closed: 2.0 to 2.9 V • Throttle fully open: 4.6 to 5.5 V	Read the value with intrusive operation (active test)
Throttle Require Position (Throttle Req Pos)	Throttle requirement position/ Min.: 0 V, Max.: 5 V	Idling: 0.5 to 1.0 V (Inspection mode)	—

Intelligent Tester II Display (Abbreviation)	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
Throttle Motor Open Duty (Throtl Opn Duty)	Throttle motor opening duty ratio/ Min.: 0 %, Max.: 100 %	During idling: 0 to 40 %	When accelerator pedal is depressed, duty ratio is increased
Throttle Motor Close Duty (Throtl Cls Duty)	Throttle motor closed duty ratio/ Min.: 0 %, Max.: 100 %	During idling: 0 to 40 %	When accelerator pedal is released quickly, duty ratio is increased
Throttle Motor (Throttle Mot)	Whether or not throttle motor control is permitted/ ON or OFF	Idling: ON (Inspection mode)	Read the value with the power switch ON (Do not start engine)
ETCS Actuator Power (+BM)	Whether or not electric throttle control system power is inputted/ ON or OFF	Idling: ON (inspection mode)	—
Accelerator Idle Position (Accel Idl Pos)	Whether or not accelerator pedal position sensor is detecting idle/ ON or OFF	Idling: ON (inspection mode)	—
Throttle Idle Position (Throttl Idl Pos)	Whether or not throttle position sensor is detecting idle/ ON or OFF	Idling: ON (inspection mode)	—
Fail Safe Drive (Fail #1)	Whether or not fail safe function is executed/ ON or OFF	ETCS has failed: ON	—
Fail Safe Drive (Main CPU) (Fail #2)	Whether or not fail safe function is executed/ ON or OFF	ETCS has failed: ON	—
Throttle Fully Close Learn (Thrtl Learn Val)	Throttle fully closed (learned value) Min.: 0 V, Max.: 5 V	0.4 to 0.8 V	—
Throttle Motor Current (Throttle Mot)	Throttle motor current Min.: 0 A, Max.: 80 A	Idling: 0 to 3.0 A (Inspection mode)	—
O2S B1 S2	Heated oxygen sensor output voltage for bank 1 sensor 2/ Min.: 0 V, Max.: 1.275 V	Driving 70 km/h (44 mph): 0.1 to 0.9 V	Performing the INJ VOL or A/F CONTROL function of the ACTIVE TEST enables the technician to check voltage output of the sensor
AFS B1 S1	A/F sensor output voltage for bank 1 sensor 1/ Min.: 0 V, Max.: 7.999 V	Idling 2.8 to 3.8 V (Inspection mode)	Performing the INJ VOL or A/F CONTROL function of the ACTIVE TEST enables the technician to check voltage output of the sensor
Short FT#1	Short–term fuel trim of bank 1/ Min.: –100 %, Max.: 99.2%	0 ± 20 %	This item is the short–term fuel compensation used to maintain the air–fuel ratio at stoichiometric air–fuel ratio
Long FT#1	Long–term fuel trim of bank 1/ Min.: –100 %, Max.: 99.2 %	0 ± 20 %	This item is the overall fuel compensation carried out in long–term to compensate a continual deviation of the short–term fuel trim from the central value
Total FT#1	Total fuel trim of bank 1: Average value for fuel trim system of bank 1/ Min.: –0.5, Max.: 0.496	Idling: –0.2 to 0.2 (Inspection mode)	—
O2FT B1 S2	Short–term fuel trim associated with the bank 1 sensor 2/ Min.: –100 %, Max.: 99.2 %	0 ± 20 %	Same as SHORT FT #1
AF FT B1 S1	Short–term fuel trim associated with the bank 1 sensor 1/ Min.: 0, Max.: 1.999	• Value less than 1 (0.000 to 0.999) = Lean • Stoichiometric air–fuel ratio=1 • Value greater than 1 (1.001 to 1.999) = RICH	—

Intelligent Tester II Display (Abbreviation)	Measurement Item/Range (Display)	Normal Condition*1	Diagnostic Note
Fuel System Status (Bank 1) (Fuel Sys #1)	Fuel system status (Bank1) / OL or CL or OL DRIVE or OL FAULT or CL FAULT	Idling after warming up: CL (Inspection mode)	• OL (Open Loop): Has not yet satisfied conditions to go closed loop • CL (Closed Loop): Using heated oxygen sensor(s) as feedback for fuel control. • OL DRIVE: Open loop due to driving conditions (fuel enrichment) • OL FAULT: Open loop due to detected system fault • CL FAULT: Closed loop but heated oxygen sensor which is used for fuel control is malfunctioning
Idle Fuel Cut (FC Idl)	Fuel cut idle/ ON or OFF	Fuel cut operation: ON	FC IDL = "ON" when throttle valve fully closed and engine speed is over 2,800 rpm
MIL*2	CHK ENG status/ ON or OFF	CHK ENG ON: ON	—
ST1	Starter signal/ ON or OFF	Cranking: ON	—
Fuel Pump/Speed Status (Fuel Pump/Speed)	Fuel pump/speed status/ ON or OFF	Idling: ON (Inspection mode)	—
EVAP Purge VSV (Evap (Purge) VSV)	VSV status for EVAP control/ ON or OFF	VSV operating: ON	VSV for EVAP is controlled by the ECM (ground side duty control)
Ignition	Ignition counter/ Min.: 0, Max.: 800	0 to 800	—
Cylinder #1,#2,#3,#4 Misfire Rate (Cyl #1, #2, #3, #4)	Misfire ratio of the cylinder 1 to 4/ Min.: 0, Max.: 255	0 %	This item is displayed in only idling
Misfire Load	Engine load for first misfire range/ Min.: 0 g/rev, Max.: 3.98 g/rev	Misfire 0: 0 g/rev	—
Misfire RPM	Engine RPM for first misfire range/ Min.: 0 rpm, Max.: 6,375 rpm	Misfire 0: 0 rpm	—
FC TAU	Fuel cut TAU: Fuel cut during very light load/ ON or OFF	Fuel cut operating: ON	The fuel cut is being performed under very light load to prevent the engine combustion from becoming incomplete
Check Mode	Check mode/ ON or OFF	Check mode ON: ON	See page 05–29
Engine Run Time (Eng Run Time)	Engine run time/ Min.: 0 second, Max.: 65535 seconds	Time after engine start	Service data
MIL ON Run Distance*2 (MIL On Run Dist)	CHK ENG ON run distance/ Min.: 0 second, Max.: 65535 seconds	Distance after DTC is detected	—
Warm–up Cycle Cleared DTC (Wu Cyc DTC Dist)	Warm–up cycle after DTC cleared/ Min.: 0, Max.: 255	—	Number of warm–up cycles after DTC is cleared
Distance from DTC Cleared (Dist DTC Clear)	Distance from DTC cleared/ Min.: 0 km/h, Max.: 65535 km/h	Equivalent to drive distance after DTCs were erased	—
Battery Voltage (BATT)	Battery voltage/ Min.: 0 V, Max.: 65.535 V	Idling: 9 to 14 V (Inspection mode)	—
Air–Fuel Ratio	Air fuel ratio: Min.: 0, Max.: 1.999	During idling: 1,500 rpm 0.8 to 1.2	—
Throttle Sensor Position (Throttle Pos)	Throttle sensor positioning/ Min.: 0 %, Max.: 100 %	Idling 10 to 18 % (Inspection mode)	Calculated value based on VTA1

Intelligent Tester II Display (Abbreviation)	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
Ambient Temperature (Ambient Temp)	Ambient air temperature/ Min.: –40°C, Max.: 215°C	Equivalent to ambient air temperature	• If the value is –40°C: sensor circuit is open • If the value is 215°C: sensor circuit is shorted
Throttle Sensor Position #2 (Throttle Pos #2)	Throttle sensor positioning #2/ Min.: 0 %, Max.: 100 %	—	Calculated value based on VTA2
Throttle Motor (Throttle Mot)	Throttle motor Min.: 0 %, Max.: 100 %	Idling: 0.5 to 40 % (Inspection mode)	—
Running Time from MIL ON (MIL ON Run Time)	Running time from CHK ENG ON/ Min.: 0 minute, Max.: 65535 minutes	Equivalent to running time after CHK ENG was ON	—
Time after DTC Cleared (Time DTC Clear)	Time after DTC cleared/ Min.: 0 minute, Max.: 65535 minutes	Equivalent to time after DTC was erased	—
Knock Correct Learn Value (Knock Crrt Val)	Correction learning value of knocking/ Min.: –64 CA, Max.: 1984 CA	0 to 22 °CA Driving: 70 km/h (44 mph)	Service data
Knock Feedback Value (Knock FB Val)	Feedback value of knocking/ Min.: –64 CA, Max.: 1984 CA	–22 to 0 °CA Driving: 70 km/h (44 mph)	Service data
Purge Flow	Purge flow/ Min.: 0 %, Max.: 102.4 %	Idling: 0 to 100 %	—
Cylinder Number (Cylinder)	Cylinder number/ Min.: 0, Max.: 255	—	Identifying the cylinder number
Model Year	Model year/ Min.: 0, Max.: 255	—	Identifying the model year
Throttle Position No.1 (Throttle Pos #1)	Throttle position sensor No. 1 output voltage/ Min.: 0 V, Max.: 4.9 V	• Throttle fully closed: 0.5 to 1.2 V • Throttle fully opened : 3.2 to 4.8 V	—
Throttle Motor Current (Throttle Mot)	Throttle motor current/ Min.: 0 A, Max.: 19.92 A	Idling: 0 to 3.0 A	—
Throttle Sens Open Pos #1 (Throttle Ssr #1)	Throttle sensor opener position No. 1/ Min.: 0 V, Max.: 4.98 V	0.6 to 0.9 V	ETCS service data
Throttle Sens Open Pos #2 (Throttle Ssr #2)	Throttle sensor opener position No. 2/ Min.: 0 V, Max.: 4.98 V	2.2 to 2.6 V	ETCS service data
Throttle Position Command (Thrtl Comnd Val)	Throttle position command value/ Min.: 0 V, Max.: 4.98 V	0.5 to 4.8 V	ETCS service data
Throttle Sens Open #1 (AD) (Thrtl Ssr #1 AD)	Throttle sensor opener position No.1 (AD)/ Min.: 0 V, Max.: 4.98 V	0.6 to 0.9 V	ETCS service data
Actuator Power Supply (Actuator Power)	Actuator power supply/ ON or OFF	Idling ON (Inspection mode)	ETCS service data
Open Side Malfunction (Opn Malfunction)	Open side malfunction/ ON or OFF	—	ETCS service data
System Guard (Sys Guard Judge)	System guard/ ON or OFF	—	ETCS service data
Throttle Position No.1 (Throttle Pos #1)	Throttle position No. 1/ Min.: 0 V, Max.: 5 V	—	ETCS service data
Throttle Position No.2 (Throttle Pos #2)	Throttle position No. 2/ Min.: 0 V, Max.: 5 V	—	ETCS service data

Intelligent Tester II Display (Abbreviation)	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
Throttle Motor Duty (Open) (Thrtl Mot (Opn))	Throttle motor duty ratio (open)/ Min.: 0 %, Max.: 100 %	—	ETCS service data
Throttle Motor Duty (Close) (Thrtl Mot (Cls))	Throttle motor duty ratio (close)/ Min.: 0 %, Max.: 100 %	—	ETCS service data
+BM Voltage	+BM voltage/ Min.: 0, Max.: 19.92	Idling: 10 to 15 V	ETCS service data
#Codes ()	#Codes/ Min.: 0, Max.: 255	—	Number of detected DTC
VVTL Aim Angle (Bank 1) (VVTL Aim Angle #1)	VVT aim angle (bank 1)/ Min.: 0 %, Max.: 100 %	Idling: 0 %	VVT duty signal value during intrusive operation
VVT Change Angle (Bank 1) (VVT Chng Angl #1)	VVT change angle/ Min.: 0°FR, Max.: 60°FR	Idling: 0 to 5 °FR	Displacement angle during intrusive operation
VVT OCV Duty (Bank 1) (VVT OCV Duty B1)	VVT OCV operation duty/ Min.: 0 %, Max.: 100 %	Idling: 0 %	Requested duty value for intrusive operation
VVT Control Status (VVT Ctrl B1)	VVT control status/ ON or OFF	—	Support for VVT active test
Electric Fan Motor (Fan Motor)	Electric fan motor/ ON or OFF	—	Support for fan motor active test
Initial Engine Coolant Temp (Ini Cool Temp)	Initial engine coolant temperature/ Min.: −40°C, Max.: 140°C	Close to ambient temperature	Service data
Initial Intake Air Temp (Ini Intake Temp)	Initial intake air temperature/ Min.: −40°C, Max.: 140°C	Close to ambient temperature	Service data
Injection Volume (Cylinder 1) (Inj Vol)	Injection volume (cylinder 1)/ Min.: 0 ml, Max.: 2.048 ml	0 to 0.5 ml	Quantity of fuel injection volume for 10 times
All Cylinders Misfire Rate (Cyl All)	All cylinders misfire rate/ Min.: 0, Max.: 255	0 to 35	—
Misfire Margin	Misfire monitoring/ MIn.: −100 %, Max.: 99.22 %	−100 to 99.2 %	Misfire detecting margin
Requested Engine Torque (Req Eng Trq)	Requested engine torque/ Min.: 0 kW, Max.: 16383.75 kW	0 to 57 kw	Flag information for hybrid vehicle
HV Target Engine Speed (HV Trgt Eng Spd)	HV target engine speed/ Min.: 0 rpm, Max.: 6375 rpm	0 to 5000 rpm	Flag information for hybrid vehicle
Actual Engine Torque (Act Engine Spd)	Actual engine torque/ Min.: −128 Nm, Max.: 127 Nm	−128 to 127 Nm	Flag information for hybrid vehicle
Estimated Engine Torque (Est Engine Trq)	Estimated engine torque/ Min.: 0 Nm, Max.: 510 Nm	0 to 120 Nm	Flag information for hybrid vehicle
Engine Run Time	Engine run time/ Min.: 0 second, Max.: 255 seconds	0 to 255 seconds	Flag information for hybrid vehicle
Request Engine Run Time (Engine Run Time)	Request engine run time/ Min.: 0 second, Max.: 25.5 seconds	0 to 25.5 seconds	Flag information for hybrid vehicle
Judge Time Engine Ignition (Ignition Time)	Judgment time for ignition of engine/ Min.: 0 second, Max.: 25.5 seconds	0 to 25.5 seconds	Flag information for hybrid vehicle
Judge Time Engine Output (Output Time)	Judgment time for engine output/ Min.: 0 second, Max.: 25.5 seconds	0 to 25.5 seconds	Flag information for hybrid vehicle

Intelligent Tester II Display (Abbreviation)	Measurement Item/Range (Display)	Normal Condition *1	Diagnostic Note
Fuel Level	Fuel level/ 0: EMPTY/1: NOT EMP	—	Flag information for hybrid vehicle
F/C for Engine Stop Req (Fuel Cut)	Fuel cut for engine stop request/ 0: OFF/1: ON	—	Flag information for hybrid vehicle
Engine Independent (Indpendnt Opr)	Engine independently operation/ 0: NOT OPR/1: OPERATE	—	Flag information for hybrid vehicle
Racing Operation (Racing)	Rev–up operation/ 0: NOT OPR/1: OPERATE	—	Flag information for hybrid vehicle
Request Warm–up (Warm Up)	Request warm–up/ 0: NOT REQ/1: REQUEST	—	Flag information for hybrid vehicle
Engine Independent Control (Indpndnt Cntrl)	Engine independently control operation/ 0: NOT OPR/1: OPERATE	—	Flag information for hybrid vehicle
Engine Oil Pressure SW (Eng Oil Pres SW)	Engine oil pressure switch signal/ 0: OFF / 1: ON	Indicating ON while engine is running	—

*1: If no condition is specifically stated for ”Idling”, it means the shift position is in the N or P position, the A/C switch is OFF and all accessory switches are OFF.

*2: MIL stands for Malfunction Indicator Lamp. It is referring to CHK ENG.

2. ACTIVE TEST

HINT:

Performing Active Test using the intelligent tester II allows the relay, VSV, actuator and so on to operate without parts removal. Performing Active Test as a first step of troubleshooting is one method to shorten diagnostic time.

It is possible to display DATA LIST during Active Test.

(a) Warm up the engine.
(b) Turn the power switch OFF.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the power switch ON (IG).
(e) Turn the intelligent tester II ON.
(f) Enter the following menus: Powertrain / Engine and ECT / Active Test.
(g) According to the display on tester, perform items in Active Test.

Intelligent Tester II Display (Abbreviation)	Test Details	Diagnostic Note
Control the Injection Volume (Inj Vol)	[Test Details] Control the injection volume Min.: –12.5 %, Max.: 25 % [Vehicle Condition] Engine speed: 3,000 rpm or less	• All injectors are tested at once • Injection volume is gradually changed between –12.5 and 25 %
Control the Injection Volume for A/F Sensor (A/F Control)	[Test Details] Control the injection volume –12.5 or 25 % (Change the injection volume –12.5 % or 25 %.) [Vehicle Condition] Engine speed: 3,000 rpm or less	The following A/F CONTROL procedure enables the technician to check and graph the voltage outputs of both the A/F sensor and heated oxygen sensor To display the graph indication, enter ”Active Test / A/F CONTROL / USER DATA”, then select ”AFS B1S1 and O2S B1S2” or ”AFS B2S1 and O2S B2S2” by pressing ”YES” button and followed by ”ENTER” button and then ”F4” button
Activate the VSV for Evap (Evap VSV (Alone))	[Test Details] Activate the VSV for EVAP control ON or OFF	—
Control the Fuel Pump / Speed (Fuel Pump/Spd)	[Test Details] Control the fuel pump ON or OFF	—
Activate the VVT System (VVT Ctrl B1)	[Test Details] Activate the VVT system (Bank 1) ON or OFF	• ON: Rough idle or engine stall • OFF: Normal engine speed
Connect the TC and TE1 (TC/TE1)	[Test Details] Connect the TC and TE1 ON or OFF	—
Control the Idle Fuel Cut Prohibit (FC Idl Prohbt)	[Test Details] Control the idle fuel cut prohibit ON or OFF	During idling
Control the Electric Cooling Fan (Cooling Fan)	[Test Details] Control the electric cooling fan ON or OFF	—
Control the ETCS Open/Close Slow Speed (ETCS Slow (Open/Close))	[Test Details] Control the ETCS opening/closing slow speed ON or OFF	Throttle valve intrusive operation
Control the ETCS Open/Close Fast Speed ETCS Fast (Open/Close))	[Test Details] Control the ETCS opening/closing fast speed ON or OFF	Throttle valve intrusive operation
Control the Cylinder #4 Fuel Cut (Fuel Cut#4)	[Test Details] Control the cylinder #4 fuel cut ON or OFF	Cylinder No. 4 fuel cut for power balance

Intelligent Tester II Display (Abbreviation)	Test Details	Diagnostic Note
Control the Cylinder #3 Fuel Cut (Fuel Cut#3)	[Test Details] Control the cylinder #3 fuel cut ON or OFF	Cylinder No. 3 fuel cut for power balance
Control the Cylinder #2 Fuel Cut (Fuel Cut#2)	[Test Details] Control the cylinder #2 fuel cut ON or OFF	Cylinder No. 2 fuel cut for power balance
Control the Cylinder #1 Fuel Cut (Fuel Cut#1)	[Test Details] Control the cylinder #1 fuel cut ON or OFF	Cylinder No. 1 fuel cut for power balance
Control the VVT (Bank 1) (VVT B1)	[Test Details] Control the VVT (bank 1) Min.: –128 %, Max.: 127 %	—