Last Modified: 5-3-2010	6.4 C	From: 200904
Model Year: 2010	Model: Prius	Doc ID: RM00000259Q00QX
Title: HYBRID / BATTERY CONTROL: HYBRID BATTERY SYSTEM: P0A7F-123: Hybrid Battery Pack Deterioration (2010 Prius)		

DTC	P0A7F-123	Hybrid Battery Pack Deterioration

DESCRIPTION

• The battery smart unit and the power management control ECU calculate the SOC (state of charge) of the HV battery through the accumulated amperage in the HV battery. The battery smart unit sends the condition of the HV battery to the power management control ECU. Then the power management control ECU calculates the SOC based on the information and controls HV battery charge and discharge according to the driving condition.
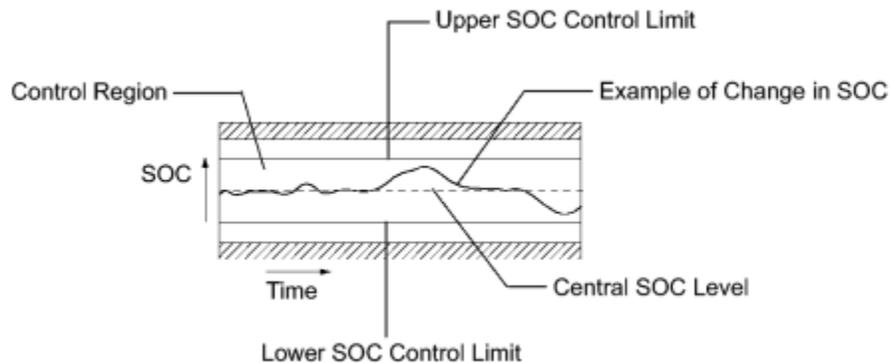
DTC NO.	DTC DETECTION CONDITION	TROUBLE AREA
P0A7F-123	• Internal resistance of the HV battery is higher than the standard (1 trip detection) • Difference in the capacity between battery blocks is larger than the standard (2 trip detection)	• HV battery assembly • Battery smart unit

MONITOR DESCRIPTION

• The battery smart unit calculates the resistance of the HV battery through amperage and voltage, and uses this resistance to determine the extent of deterioration of the HV battery. If the battery smart unit detects that the resistance of the HV battery has exceeded the standard, it determines that

a malfunction has occurred. In addition, the battery smart unit monitors the SOC, and if the difference between the maximum and minimum SOC values exceeds the standard, it determines that a malfunction has occurred. When either of the malfunction detection conditions is met, the power management control ECU (HV CPU) illuminates the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A7F (INF 123): Battery cell malfunction
Required sensors / components	Main: Battery voltage sensor inside battery smart unit, battery current sensor Sub: Battery temperature sensor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

|	
The monitor will run whenever the following DTCs are not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0A7F (INF 123) is not detected

CONFIRMATION DRIVING PATTERN

10 minutes or more [A]

25 mph (40 km/h)

Power Switch on (Ready)

30 seconds or more
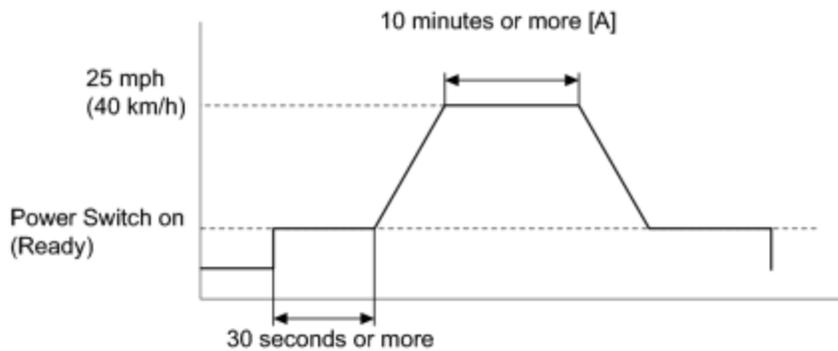
c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.
6. Turn the power switch on (READY) and wait for 30 seconds or more.
7. Drive the vehicle on urban roads at a speed of 25 mph (40 km/h) or more for a total of at least 10 minutes. [A]

NOTICE:

Avoid abrupt acceleration or braking.

8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

o If a permanent DTC is output, the system is malfunctioning.
o If no permanent DTC is output, the system is normal.

INSPECTION PROCEDURE

PROCEDURE

1.	CHECK DTC OUTPUT (DTC P0AFC-123 IS OUTPUT)

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read output DTCs INFO.

Result:

RESULT	PROCEED TO
P0AFC-123 is not output.	A
P0AFC-123 is also output.	B

(e) Disconnect the Techstream from the DLC3.

B ► GO TO DTC CHART

A ▼

2.	CHECK BATTERY SMART UNIT

(a) Ensure the safety of the areas in front and at the back of the vehicle.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (READY).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / VB0 to 14 Batt block.

(e) Fully warm up the engine and turn the air conditioning off.

(f) Firmly depress the brake pedal with your left foot.

(g) Move the select lever to D.

(h) Record each battery block voltage from the data list (V1 to 14 Batt block) while fully depressing the accelerator pedal.

(i) Compare the battery block voltages (VB0 to 13 Batt block) between the even and odd number groups in each combination shown in the table below.

EVEN NUMBER GROUP	ODD NUMBER GROUP	BATTERY BLOCK VOLTAGES TO BE COMPARED
V0 BATT BLOCK	V1 BATT BLOCK	VB0 - VB1
V2 BATT BLOCK	V3 BATT BLOCK	VB2 - VB3
V4 BATT BLOCK	V5 BATT BLOCK	VB4 - VB5

V6 BATT BLOCK	V7 BATT BLOCK	VB6 - VB7
V8 BATT BLOCK	V9 BATT BLOCK	VB8 - VB9
V10 BATT BLOCK	V11 BATT BLOCK	VB10 - VB11
V12 BATT BLOCK	V13 BATT BLOCK	VB12 - VB13

(j) Check the difference in voltage of each combination.

Result

RESULT	PROCEED TO
Difference in voltage of each combination is less than 0.3 V.	A
Difference in voltage of each combination is 0.3 V or more.	B

HINT:

If the difference in voltage of each combination is 0.3 V or more, it is due to a battery smart unit internal error.

(k) Turn the power switch off.

(l) Disconnect the Techstream from the DLC3.

B ▶ **REPLACE BATTERY SMART UNIT**

A ▶ **REPLACE HV BATTERY ASSEMBLY**