

P0A7D: HYBRID BATTERY PACK STATE OF CHARGE LOW

OVERVIEW

Severity	:	High
DIY Difficulty Level	:	Advanced
Repair Cost	:	\$2000-\$8000
Can I Still Drive?	:	No

What Does The P0A7D Code Mean?

If your hybrid vehicle (HV) has stored a code P0A7D, it means that the powertrain control module (PCM) has detected an insufficient state of charge as it pertains to the high-voltage battery pack. This code should be stored only in hybrid vehicles.

Typically, the HV (nickel metal-hydride) battery is composed of eight (1.2-volt) cells which are arranged in series. Twenty-eight of these cells make up the HV battery pack. A hybrid vehicle battery management system (HVBMS) is responsible for regulation and monitoring of the high-voltage battery pack. The HVBMS interacts with the PCM and other controllers, as required.

Individual cell resistance, battery voltage, and battery temperature are all factors that are considered by the HVBMS (and other controllers) when calculating battery pack condition and the desired state of charge. Most hybrid vehicles utilize an HVBMS in which each cell is equipped with an ammeter/temperature sensor. The HVBMS monitors data from each cell and compares individual voltage levels to determine if the battery pack is functioning at the desired state of charge. Once data is calculated, the appropriate controller reacts accordingly.

If the PCM detects a level of voltage from the HVBMS that is insufficient for conditions, a code P0A7D will be stored and a malfunction indicator lamp (MIL) may be illuminated. In some cases, multiple failure cycles will be required for MIL illumination.

What Are The Symptoms Of The P0A7D Code?

Symptoms of a P0A7D trouble code may include:

- Decreased fuel efficiency
- Diminished overall performance
- Other HV battery related codes
- Electric propulsion system deactivation

What Are The Potential Causes Of The P0A7D Code?

Causes for this code may include:

- Defective HV battery, cell, or battery pack
- Bad alternator, turbine, or generator
- HVBMS sensor failure
- HV battery pack fans not working properly
- Loose, broken, or corroded busbar connectors or cables

How Can You Fix The P0A7D Code?

If battery charging system codes are also present, diagnose and repair those prior to attempting to diagnose the P0A7D.

You will need a diagnostic scanner, a digital volt/ohmmeter (DVOM), and a source of HV battery system diagnostic information to accurately diagnose a code P0A7D.

Step-by-step guide

Begin with a visual inspection of the HV battery pack and all circuitry. Look for signs of corrosion, damage, or open circuits. Remove corrosion and repair defective components as required.

Use the scanner to retrieve all stored codes and pertinent freeze frame data. After recording this information, clear the codes and test drive the vehicle. If possible, test drive the vehicle until the PCM either enters readiness mode or the code is reset.

If the P0A7D is reset, use the scanner to observe HV battery charging data and battery state of charge. Obtain battery pack testing procedures and specifications from your source of HV information.

Locating the appropriate component location diagrams, wiring diagrams, connector face views, and connector pin-out charts will be instrumental in reaching an accurate diagnosis.

If the battery pack proves to be defective: HV battery pack repair is a possibility but may prove

unreliable. The surest way to rectify a defective HV battery pack is replacement with a factory part but this may be cost prohibitive. If this is the case, consider the correct used HV battery pack.

If the battery pack proves to be within functional specifications, test appropriate HVBMS sensors (temperature and voltage) by following manufacturer testing specifications and procedures. This can be done by using the DVOM. Replace sensors which do not comply with manufacturer's specs.

If all sensors seem to be functioning as intended, use the DVOM to test individual cells for resistance. Cells which exhibit an unacceptable degree of resistance, should have the busbar connectors and cables tested using the DVOM.

Notes

- Failed battery cells and batteries may be replaced but total HV battery pack replacement is normally the most reliable solution
- A stored code P0A7D will not automatically deactivate the HV battery charging system but the conditions which caused the code to be stored may disable it
- If the HV in question has more than 100,000-miles on the odometer, suspect HV battery pack failure
- If the vehicle has less than 100K miles, a loose or corroded connection is probably the source of your malfunction

Severity Description

The stored code P0A7D and all other HVBMS related codes should be categorized as severe and addressed as such. The hybrid propulsion system may be disabled when this code is stored.

Reference Sources

[P0A7D Hybrid Battery Pack State of Charge Low](#), OBD-Codes.