

**Chapter 10**

NAME \_\_\_\_\_

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

1. What advantages do lithium-ion batteries have compared to NiMH batteries?

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2. Why do high-voltage batteries need to be heated if cold or cooled if hot?

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3. What occurs if the state-of-charge exceeds 80%?

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4. What is the primary function of the Electrical Distribution System (EDS)?

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5. What are the steps involved to address failed high-voltage battery modules?

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## Answer Key

Testname: EV1SHORT10

1. Lithium-ion batteries have the following advantages:
  - High specific energy
  - Good high temperature performance
  - Low self-discharge
  - Minimal memory effect
  - High nominal cell voltage. The nominal voltage of a lithium-ion cell is 3.6 volts, which is three times that of nickel-based alkaline batteries. This allows for fewer battery cells being required to produce high voltage from an HV battery.

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2. High operating temperatures can lower performance and cause damage to a NiMH or lithium battery pack. Cold temperatures reduce battery efficiency.

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3. The battery can overheat if the battery state of charge rises above 80%.

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4. The primary function of the Electrical Distribution System (EDS) is to provide the electrical conduction path through the battery pack and includes the following features:
  - Isolates the conduction path
  - Measures current and voltage in the high-voltage (HV) line
  - Provides pre-charge function when energizing the HV line
  - Fuses the HV line in case of over-current
  - Provides manual disconnect of the HV line for vehicle servicing
  - Monitors effectiveness of the electrical insulation

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5. STEP 1 Following the service procedures and observing all high-voltage cautions, the battery should be removed from the vehicle and made ready for repair.  
STEP 2 Using the service information, identify the location of the defective module within the pack.  
STEP 3 Remove the battery covers, the controller, and other components needed to access the battery modules as described in the service procedures.  
STEP 4 Prior to completing the final disassembly of the battery, all module voltages must be measured using a digital multimeter to determine the module charge balance of the battery. This data will be used to determine the adjustment voltage for the replacement module.  
STEP 5 The new replacement battery module must be installed in the module charge balancer, and the adjustment voltage must be entered into the charger. This will allow the charge to be adjusted to match the rest of the battery.  
STEP 6 The defective module can now be removed and the new module installed.  
STEP 7 Reinstall all parts that have been removed during the disassembly process and make the battery ready for reinstallation.

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