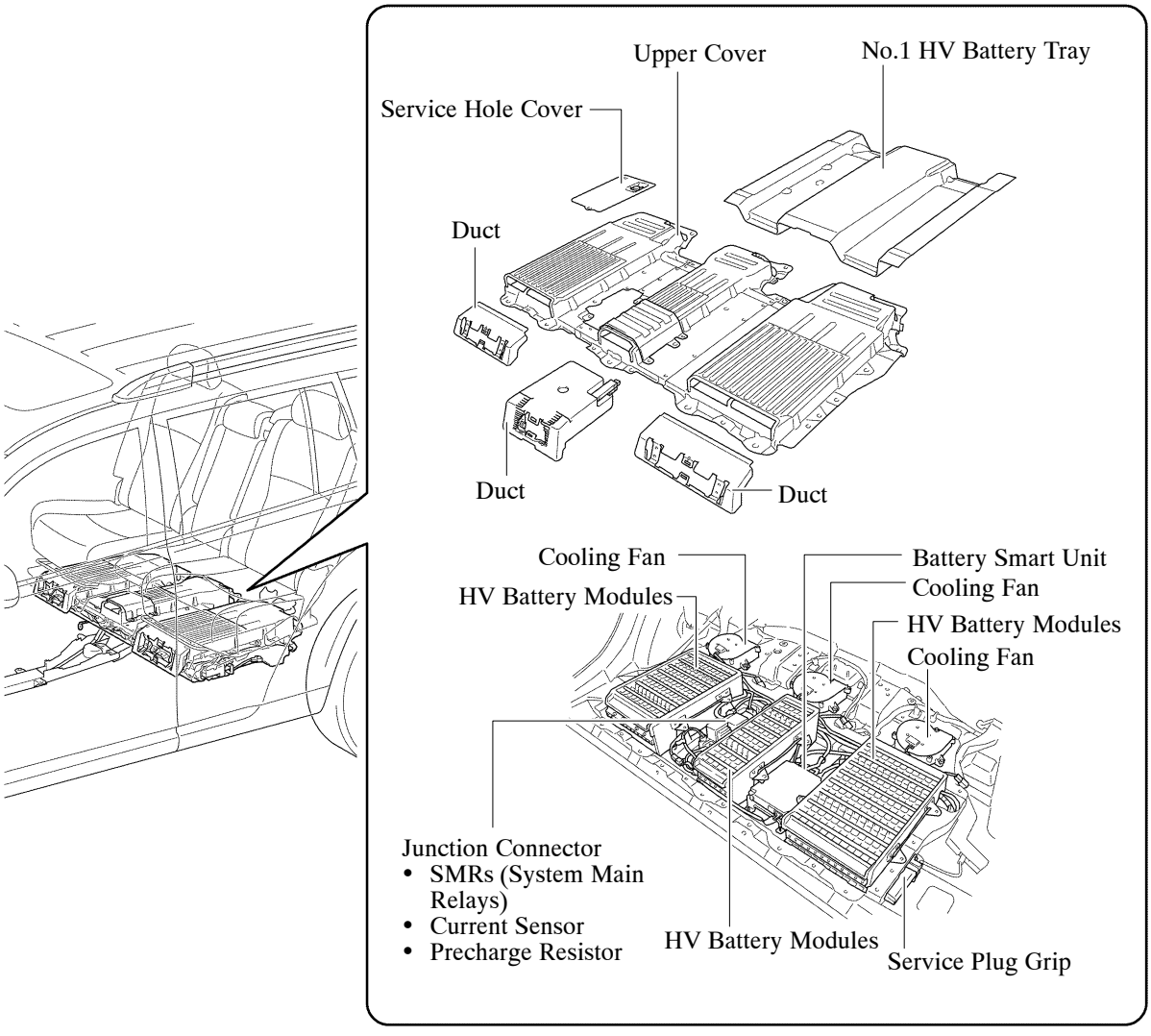
■ HV BATTERY ASSEMBLY

1. General

The HV battery assembly uses sealed nickel metal hydride (Ni-MH) battery cells. This HV battery assembly has a high power density, is lightweight, and it offers longevity to match the characteristics of the THS-II system. Because charge/discharge control is performed to maintain the HV battery assembly within a constant SOC (state of charge) range while the vehicle is operating normally, it does not require external recharging.

- Metal is used for the material of the module case to realize enhanced cooling performance and compact construction.
- The HV battery modules are split into 3 separate groups inside the HV battery case.
- The battery consists of 30 modules that are connected in series by a bus bar module. Furthermore, the connection between cells is made at 2 locations in order to reduce internal resistance and improve efficiency.
- The cooling fan operation of the HV battery assembly is controlled to ensure the proper performance by the hybrid vehicle control ECU. The cooling fan control is required because the HV battery assembly creates heat while it is being charged and discharged. One cooling fan is provided for each of the 3 sections of the HV battery assembly. The cooling system uses air from the cabin.
- HV battery tray No. 1 has been added on the upper cover to prevent water intrusion.
- A service plug is provided to shut off the internal circuit of the battery. For details, see page HV-34.



07V0HV27Z

2. Specifications

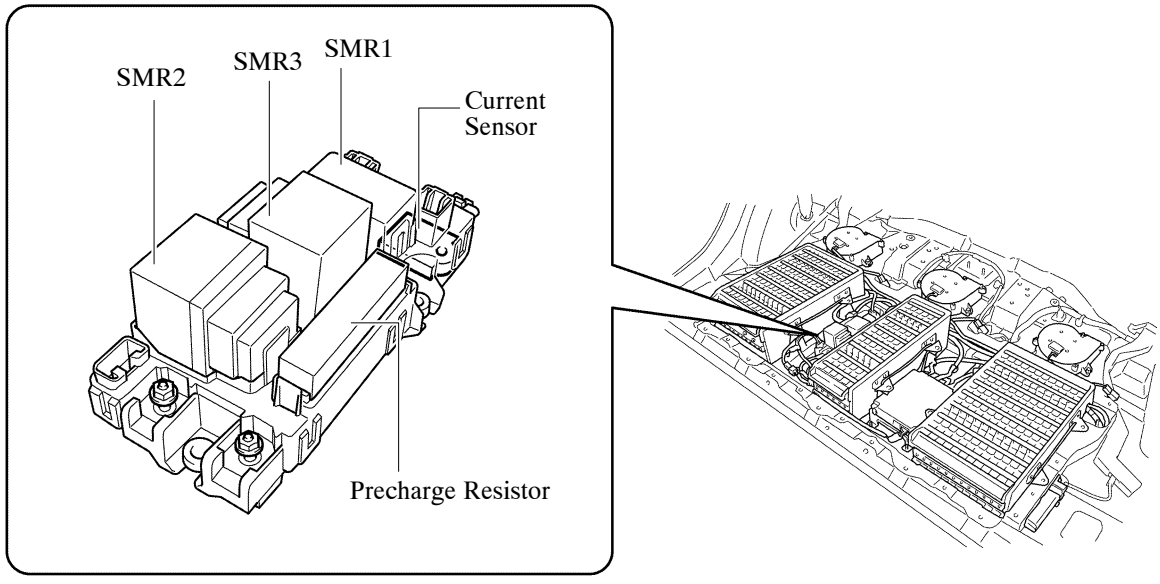
Type	Sealed Nickel Metal Hydride Battery
Cell Quantity	240 cells (8 cells × 30 Modules)
Module Type	Nickel Plated Metal Case
Nominal Voltage	288V

3. Junction Block (SMRs)

General

- A junction block, in which SMRs (System Main Relays), a precharge resistor, and a current sensor are integrated, is used.
- This junction block is mounted using rubber dampers in order to absorb the vibrations that are created by the SMRs during operation.

Junction Block



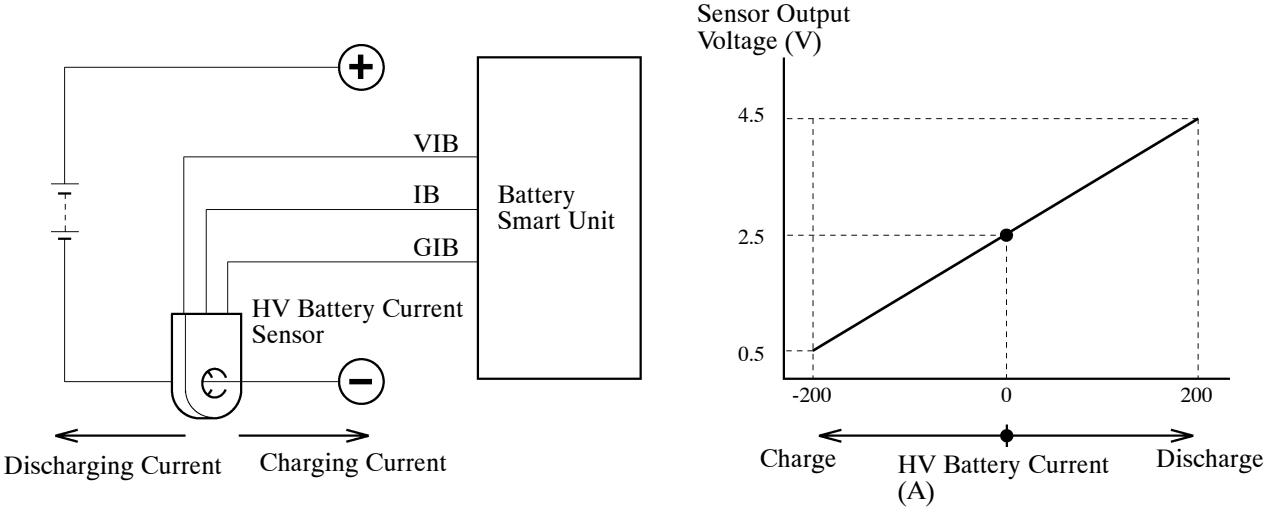
07V0HV29Z

SMRs

The SMRs (System Main Relays) are the relays that connect or disconnect the high voltage power system in accordance with commands from the hybrid vehicle control ECU.

Current Sensor

The current sensor is installed on the high-voltage cable inside the HV battery assembly, to detect current flow. It sends a voltage signal to the battery smart unit. This signal changes between 0 and 5V in proportion to changes in the current flowing to or from the HV battery assembly. Less than 2.5V means the HV battery assembly is being charged, and more than 2.5V means the HV battery assembly is being discharged.



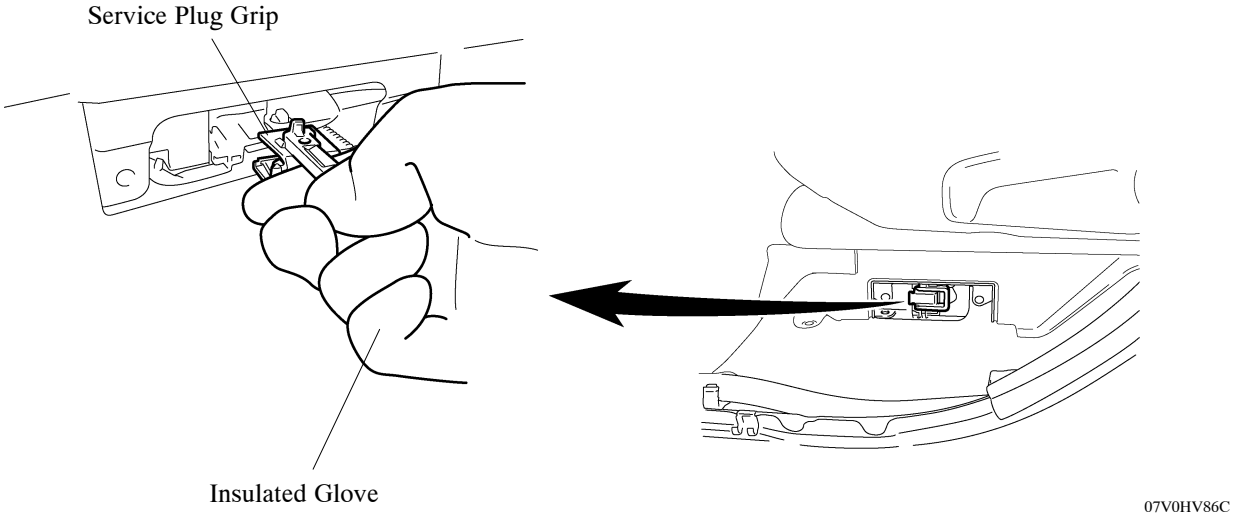
07V0HV44C

4. Service Plug

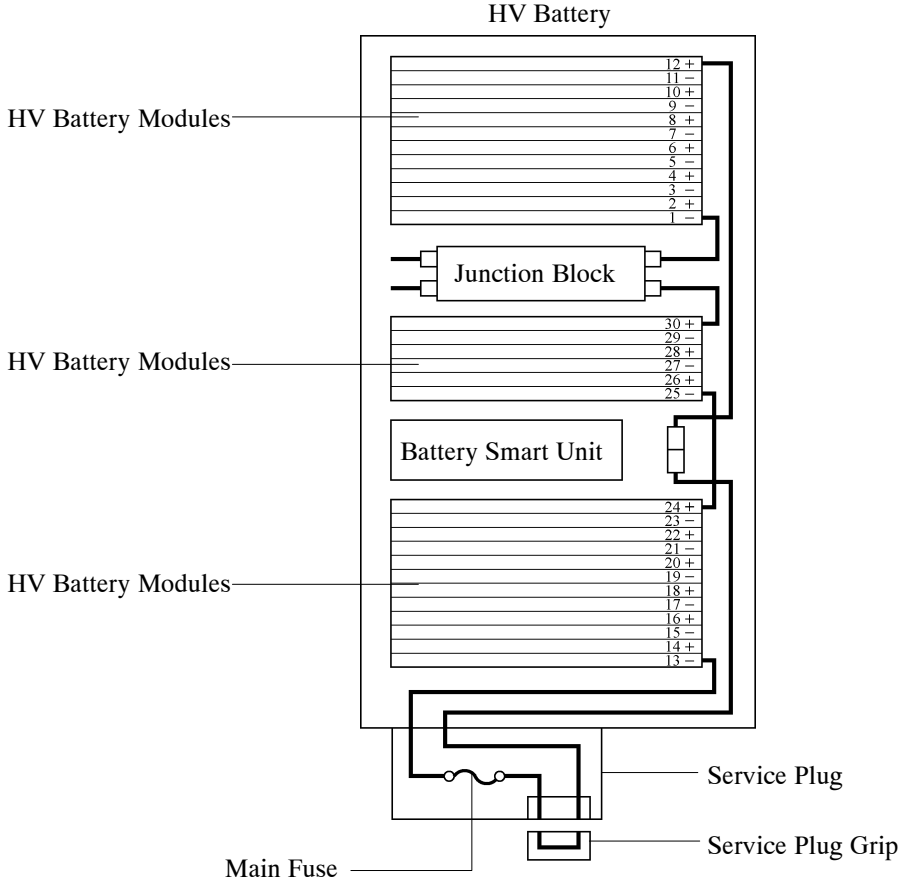
By removing the service plug before performing any inspection or service, the high-voltage circuit is opened in the middle of the HV battery assembly, for safety during service.

- The service plug contains a reed switch for the interlock circuit. Lifting the clip lock up turns off the reed switch, which shuts off the SMRs. However, to ensure safety, make sure to turn the ignition switch off before removing the service plug.
- The main fuse for the high-voltage circuit is provided inside of the service plug.
- The service plug is connected in the middle of the 30 modules (Between module No.12 and module No.13). Before servicing any portion of the high-voltage circuit, make sure to remove the service plug.

For further details on how to handle the service plug grip and for other safety cautions, refer to the 2008 HIGHLANDER HYBRID VEHICLE Repair Manual (Pub. No. RM07V0U).



07V0HV86C

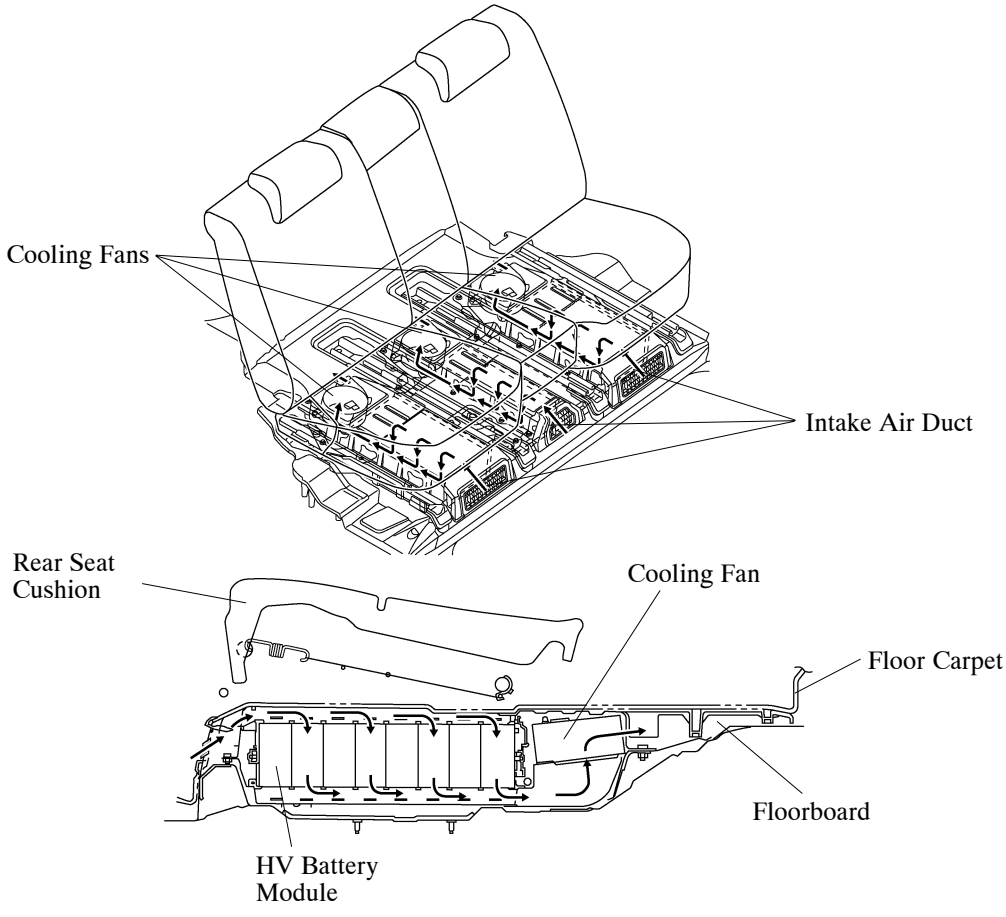


07V0HV28C

5. Cooling Fan System

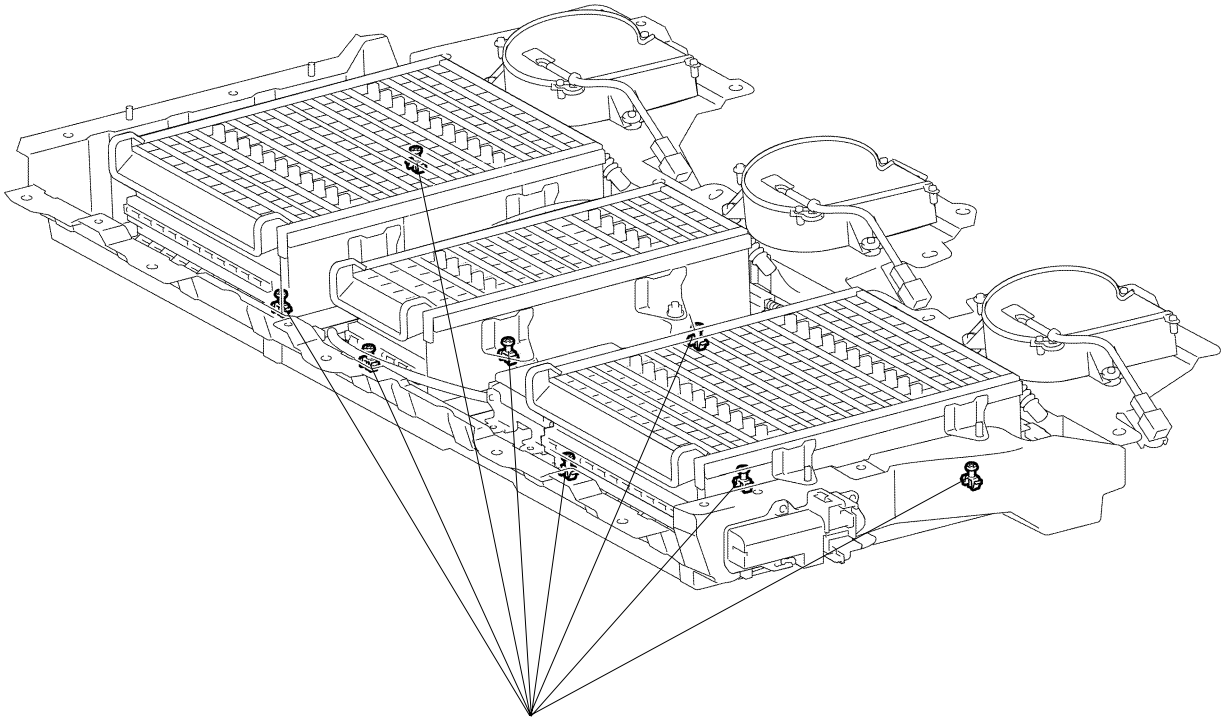
General

- To ensure the proper performance of the HV battery assembly while it generates heat during the repetitive charge and discharge cycles, a dedicated cooling system is used for the HV battery assembly.
- One cooling fan is provided for each of the 3 sections of the HV battery assembly. Because each of the three cooling fans has been made compact, the overall operating sound has been reduced. Furthermore, because the cooling fans are mounted using rubber dampers, this construction also contributes to noise reduction.
- The cabin air that is drawn in from the intake air ducts underneath the rear seat flows across the battery modules from top to bottom, thus lowering the temperature of the battery modules. Then, it passes out from the back and through the space below the deck board, and flows inside the cabin or is discharged outside of the vehicle.
- A low noise sirocco type fan is used for the HV battery cooling fans.
- The hybrid vehicle control ECU controls the operation of the cooling fans. The hybrid vehicle control ECU receives signals from the battery smart unit about the battery temperature sensors, which are built into the HV battery assembly. Then, the hybrid vehicle control ECU controls the cooling fans in order to control the battery temperature to an appropriate level. For details, refer to cooling fan control section on page HV-66.



Battery Temperature Sensors

- Battery temperature sensors are arranged in eight places in the HV battery assembly. The sensor resistance changes along with the temperature change of the HV battery assembly.
- The battery smart unit transmits the detection results of the battery temperature sensors to the hybrid vehicle control ECU, and the hybrid vehicle control ECU controls the battery cooling fans.



Battery Temperature Sensors 07V0HV32Z