THS-II (TOYOTA HYBRID SYSTEM-II)

■DESCRIPTION

- The new Prius operates under THS-II (Toyota Hybrid System-II), which has carried over the basic components of the THS (Toyota Hybrid System) from the previous Prius. To further enhance efficient performance, the controls for the engine, MG1 (Motor Generator No. 1), MG2 (Motor Generator No.2), and the battery have been optimized.
- On this model, the capacity of the HV battery has been set to the nominal voltage of DC 201.6 V, the number of the cells has been reduced, and furthermore, boosting the voltage up to the maximum of DC 500 V inside the inverter has been achieved. The boosted direct current is converted into an alternating current inside the inverter in order to drive MG1 and MG2. As a result, a downsized, lightweight and high-power system has been realized.
- A function, which enables the vehicle to run with only MG2 by manually pushing on the EV mode switch located on the instrument panel, has been newly adopted.
- The table below describes the newly adopted items.

▶ Major Differences ◀

Item	Outline
HV Battery	• The HV battery of the previous Prius consists of 228 cells ({1.2 V x 6 cells} x 38 modules) with a nominal voltage of DC 273.6 V. In contrast, the HV battery of the new Prius consists of 168 cells ({1.2 V x 6 cells} x 28 modules) with a nominal voltage of DC 201.6 V. A compact and lightweight battery configuration has been achieved through these internal improvements. • On the previous Prius, the connection between the cells of the HV battery consists of one spot. In contrast, the cells on the new Prius are connected with two spots. The internal resistance of the battery has been reduced by this improvement.
Inverter Assembly	• A boost converter has been included in the inverter. This boosts the nominal voltage of DC 201.6 V that is output by the HV battery to maximum voltage of DC 500 V. • The bridge circuits for MG1, MG2, and the signal processor/protective function processor have been integrated and made compact into an IPM (Integrated Power Module) for driving purposes. • An A/C inverter, which supplies power for driving the electric inverter compressor of the A/C system, has been included in the inverter assembly. • A radiator that integrates an inverter radiator and engine radiator has been adopted to optimize the space it occupies.
MG1	Accompanied by enhancing the rotor robustness of MG1, its rpm range for the maximum possible output has been increased from 6,500 to 10,000 rpm, therefore the charging capability has been enhanced.
MG2	• Structure of each built-in permanent magnet inside the rotor of MG2 has been optimized by redesigning it to V shaped structure, and improvement of its power output and torque has been realized. • For MG2 control, a newly developed over-modulation control system has been adopted to the medium-speed range.
HV ECU	• The HV ECU has been made to efficiently control the systems and functions that have been newly adopted on the new Prius. • The HV ECU has been changed from 16-bit CPU to 32-bit CPU to increase the speed for processing the signals.
Engine ECU	The engine ECU has been changed from 16-bit CPU to 32-bit CPU to increase the speed for processing the signals.
Battery ECU	• The battery ECU has been made more compact through optimized construction. • The battery ECU has been changed from 16-bit CPU to 32-bit CPU to increase the speed for processing the signals.
Skid Control ECU	The skid control ECU has been changed from 16-bit CPU to 32-bit CPU to increase the speed for processing the signals.
Communication	CAN (Controller Area Network) communication has been adopted to establish communication among the principal ECUs (HV ECU, battery ECU, engine ECU, and skid control ECU) that are associated with THS-II control.