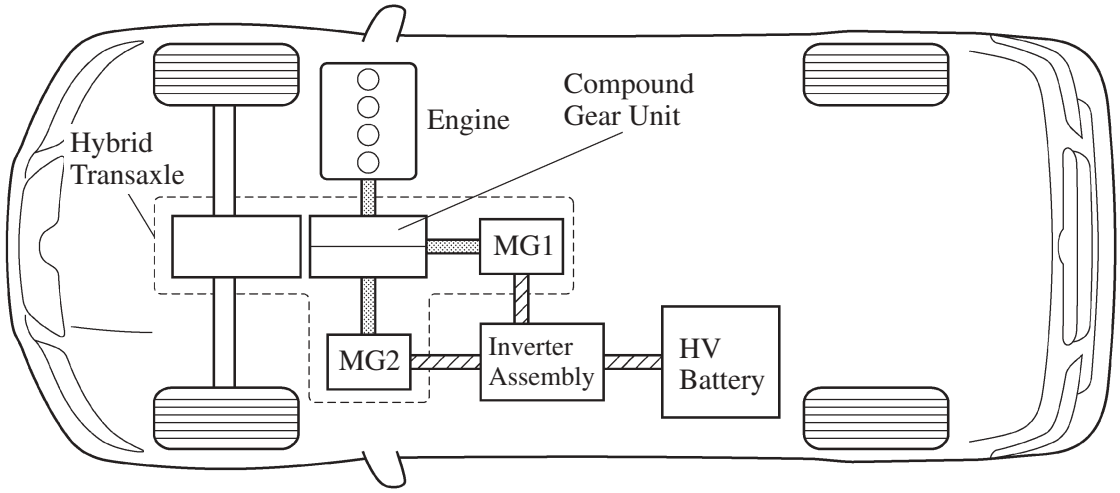
■FEATURES OF THS II

1. General

- The THS II offers the following representative features:
  - Uses a variable-voltage system in which a boost converter boosts the operating voltage of the system to a maximum voltage of DC 650 V and an inverter converts the direct current into an alternating current, which supplies the system voltage to MG1 and MG2.
  - A motor speed reduction planetary gear unit, whose purpose is to reduce motor speed, is used to enable the high-speed, high-output MG2 to adapt optimally to the power split planetary gear unit in the hybrid transaxle.
- The THS II consists primarily of the following components:

: Mechanical Power Path

: Electrical Path



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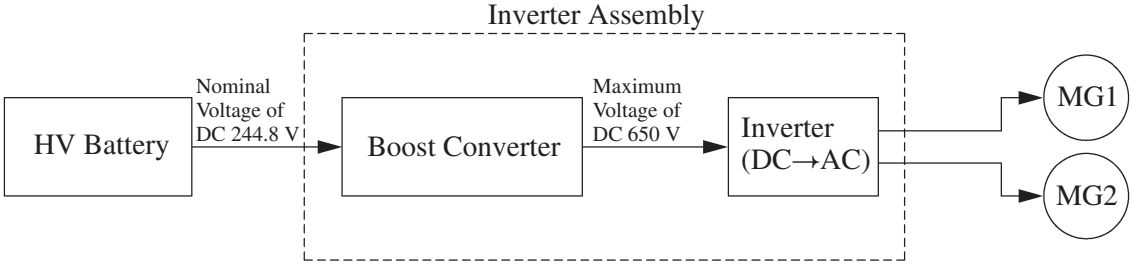
2. Variable-voltage System

In the THS II of the ’07 Camry Hybrid model, a boost converter is used inside the inverter assembly. The boost converter boosts the system operating voltage to a maximum voltage of DC 650 V and the inverter converts direct current into alternating current, in order to drive MG1 and MG2 at a high voltage as well as minimize the electrical loss associated with the electric power supply at a smaller current. Thus, MG1 and MG2 can be operated at high speeds and high output.



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3. Clutch-Less System

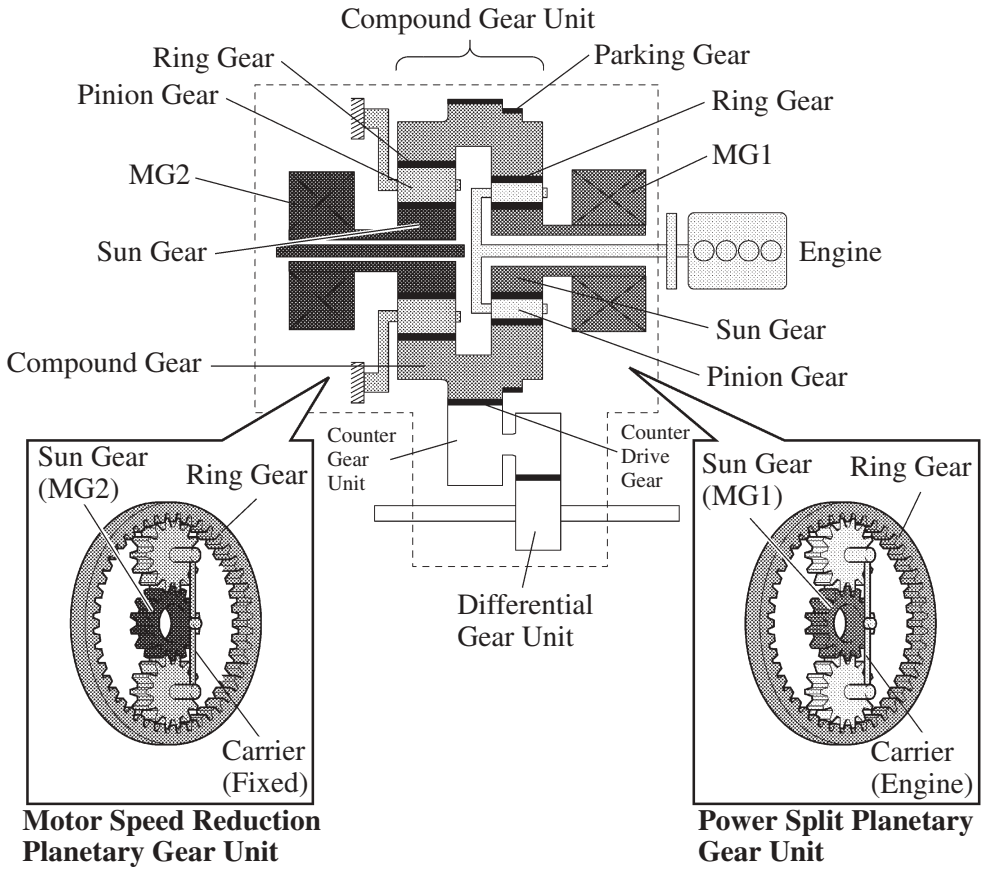
A clutch-less system is used to mechanically link the front wheels and MG2 via gears. To disengage the motive force in the neutral position, the shift position sensor outputs an N position signal to turn OFF all the power transistors in the inverter (which controls MG1 and MG2). As a result, the operation of MG1 and MG2 shuts down, thus rendering the motive force at the wheels to zero.

4. Hybrid Transaxle

- This system drives the vehicle by combining the motive forces of the engine and the MG2 in an optimal manner in accordance with the driving conditions of the vehicle. In this system, the engine power forms the basis. The power split planetary gear unit in the hybrid transaxle splits the engine power two ways: one to drive the wheels, and the other to drive MG1, so that it can function as a generator.
- This hybrid transaxle consists primarily of MG1, MG2, a compound gear unit (which consists of a motor speed reduction planetary gear unit and a power split planetary gear unit), a counter gear unit, and a differential gear unit.
- The engine, MG1 and MG2 are mechanically joined via the compound gear unit.
- The compound gear unit contains a motor speed reduction planetary gear unit and a power split planetary gear unit. The motor speed reduction planetary gear unit reduces the rotational speed of MG2, and the power split planetary gear unit splits the motive force of the engine two ways: one to drive the wheels, and the other to drive MG1, so that it can function as a generator.
- In the motor speed reduction planetary gear unit, the sun gear is coupled to the output shaft of MG2, and the carrier is fixed. Furthermore, the compound gear unit uses a compound gear, in which two planetary ring gears, a counter drive gear, and a parking gear are integrated.

For details, refer to P311 Hybrid Transaxle on page CH-2.

▶ Image Diagram ◀



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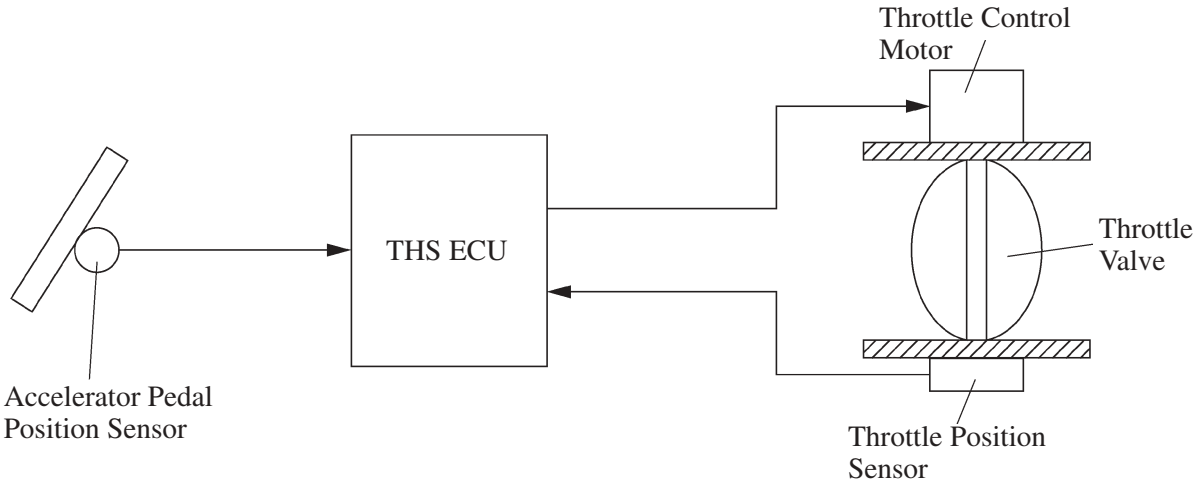
5. Link-Less

The ETCS-i (Electronic Throttle Control System-intelligent) is used. This is a link-less system that does not use an accelerator cable. Instead, it uses an accelerator pedal position sensor and a throttle position sensor to detect the accelerator pedal position and the throttle position.
The THS ECU calculates the target engine speed and the required engine motive force in accordance with the signals provided by the accelerator pedal position sensor, vehicle driving conditions, and the SOC (state of charge) of the battery. Based on the results of this calculation, the THS ECU optimally controls the throttle valve. For details, refer to 2AZ-FXE engine on page EG-43.



6. Regenerative Brake

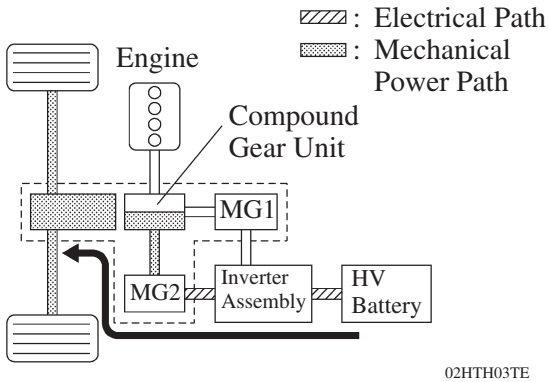
The regenerative brake function operates MG2 as a generator while the vehicle is decelerating or braking and stores this electrical energy in the HV battery.
For details, refer to Outline of Regenerative Brake Cooperative Control Function in the Brake Control System, on page CH-28.

7. Basic Operation

This system generates a motive force in combination with the engine, MG1 and MG2 in accordance with the driving conditions. Representative examples of the various combinations are described below.

Starting (Drive by MG2)

Supply of electrical power from the HV battery to MG2 provides force to drive the front wheels.



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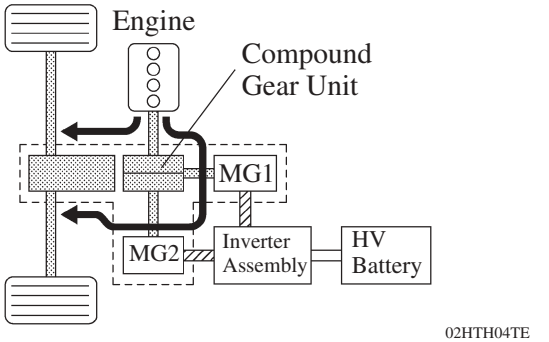
During Acceleration with Engine

While the front wheels are being driven by the engine via the planetary gears, MG1 is driven by the engine via the planetary gears, in order to supply the generated electricity to MG2.



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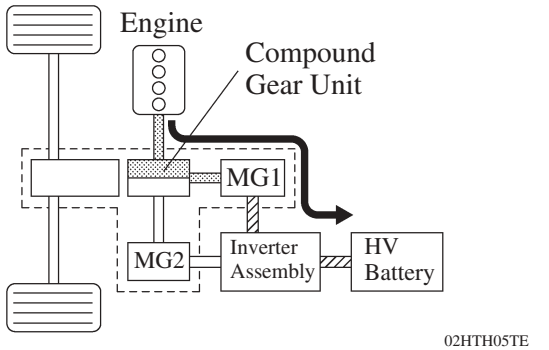
Charge The HV Battery

MG1 is rotated by the engine via the planetary gears, in order to charge the HV battery.



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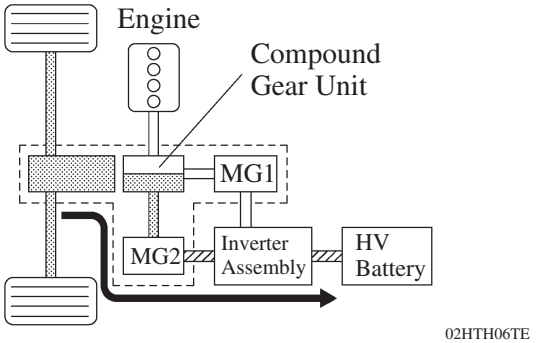
During Deceleration Driving

When the vehicle is decelerating, kinetic energy from the front wheels is recovered and converted into electrical energy and used to recharge the HV battery by means of MG2.



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