HYBRID SYSTEM

HYBRID VEHICLE

■ DESCRIPTION

1. General

Hybrid vehicles uses a combination of two kinds of power sources, such as an engine and electric motor, so as to take advantage of the benefits provided by each power source while compensating for each other's shortcomings. As a result, efficient operation is achieved.

- Hybrid vehicles do not need their batteries to be charged externally unlike existing electric-only vehicles. Therefore, special infrastructure is not required to use hybrid vehicles.
- Technical development of power units (such as an engine or fuel cell) is advancing in various fields. The hybrid system is a flexible system that uses a high-efficiency power unit and electric motors.

2. Features of Hybrid Vehicles

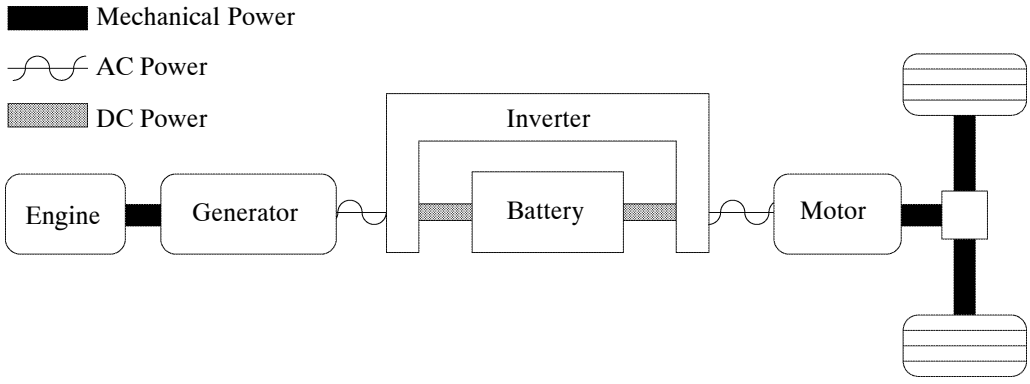
Hybrid vehicles have the following 4 features.

Features	Outline
Idle Stop (Reduction of Energy Loss)	Idling of the engine is automatically stopped (idle stop) to reduce energy loss.
Regenerative Braking (Energy Regeneration)	During deceleration and while depressing the brake pedal, part of the energy that was lost as heat is collected as electrical energy to be reused, such as for motor power.
Motor Assist	A motor supplements the engine power when accelerating.
EV Drive (Efficient Drive Control)	This allows the vehicle to be driven using only the electric motor when engine efficiency is low. In addition, electricity is generated when engine efficiency is high. Control is performed to maximize the total efficiency of the vehicle.

3. Types of Hybrid Systems

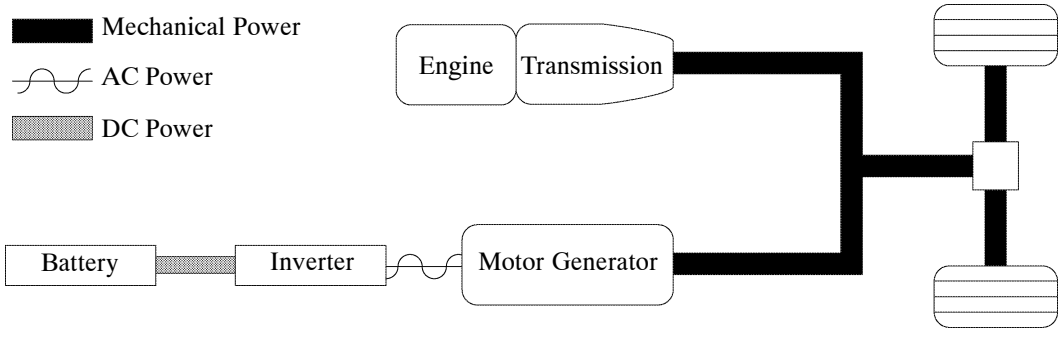
Generally, there are 3 types of hybrid systems: A series-type hybrid system, a parallel-type hybrid system and a series/parallel-type hybrid system.

- In a series-type hybrid system, the motor rotates the wheels, and the engine, using a generator, acts as an electric power source for the motor.



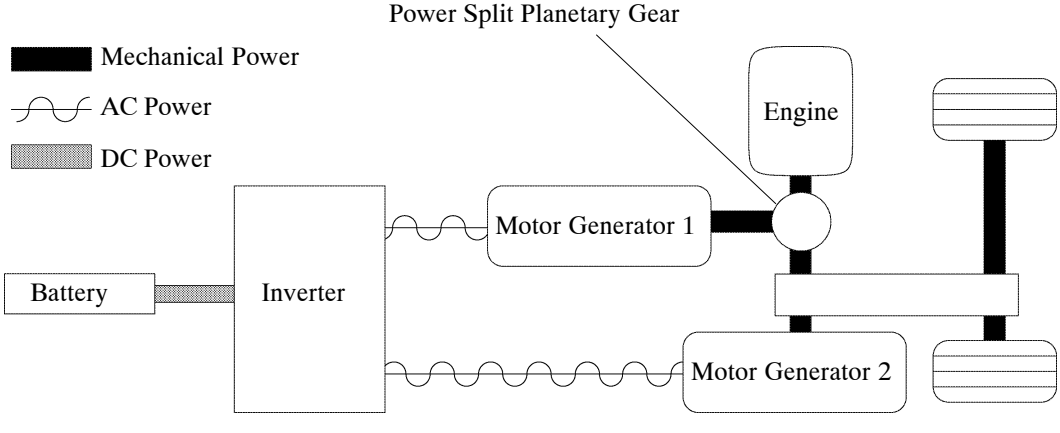
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- In a parallel-type hybrid system, both the engine and the motor directly rotate the wheels. In addition to supplementing the power of the gasoline engine, the electric motor can also serve as a generator to charge the high-voltage battery pack while the vehicle is in motion. Driving the vehicle only with the motor is also possible.



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- In a series/parallel hybrid system, aspects of both a series hybrid system and a parallel hybrid system are combined. The system has two motor generators. Electricity can be generated by motor generator 1 using engine power. The generated electricity is used to charge the HV battery and/or also to power motor generator 2.



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