Section 5

Chassis

Overview

Toyota hybrid vehicles use a number of specialized chassis systems including:

- A shift-by-wire system with electronic transmission control.
- A regenerative braking system that recovers much of the energy normally lost to heat and friction during braking.
- An Electric Power Steering (EPS) system that improves fuel economy because it only consumes energy when it is in use.

Shift Control ('01-'03 Prius)

The '01-'03 Prius uses a shift-by-wire system. The shift position sensor is connected to a column-mounted shift lever and outputs two voltage signals: a main signal and a sub signal. Both contain information about shift position. The HV ECU determines shift position when both signals match.

Shift Control ('04 & later Prius)

The '04 & later Prius uses a different shift-by-wire system. It uses two sensors to monitor shift lever movement: a Select Sensor that detects the lateral movement and a Shift Sensor that detects the longitudinal movement. The combination of these signals is used to determine shift position. When shift selection is complete, the reactive force of a spring returns the lever to its home position.

Shift Control

('01-'03 Prius)

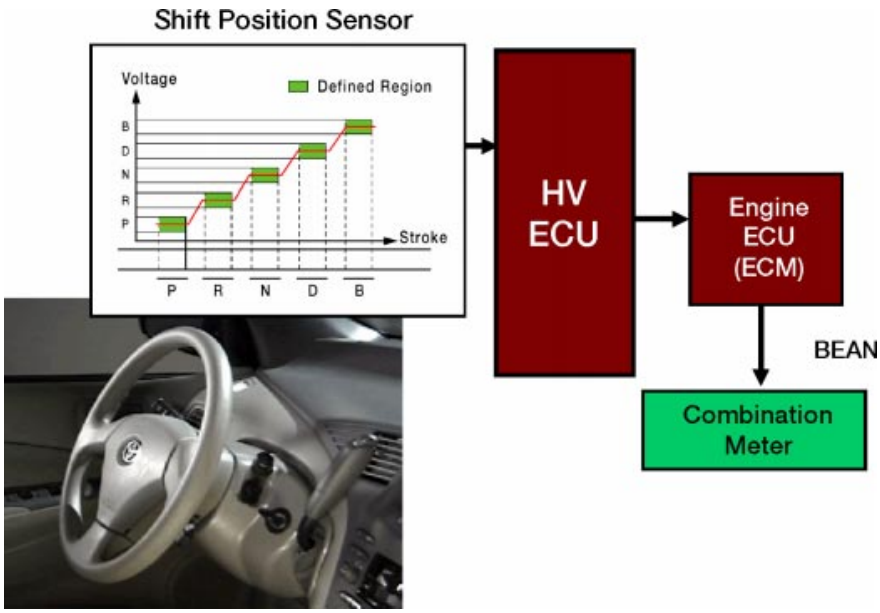

Figure 5.1 T071f501c

Shift Lock

('01-'03 Prius)

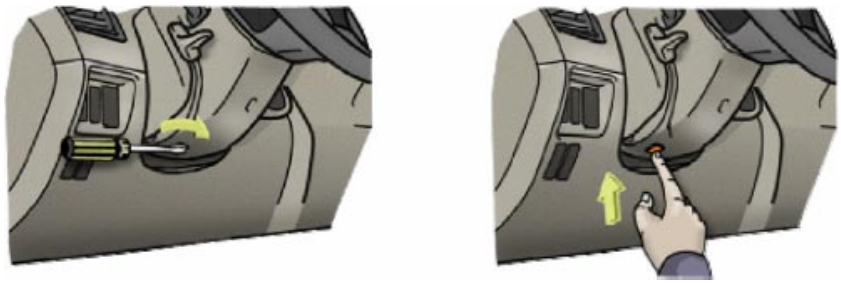

Figure 5.2 T071f502c

Shift Assembly

('04 & later Prius)

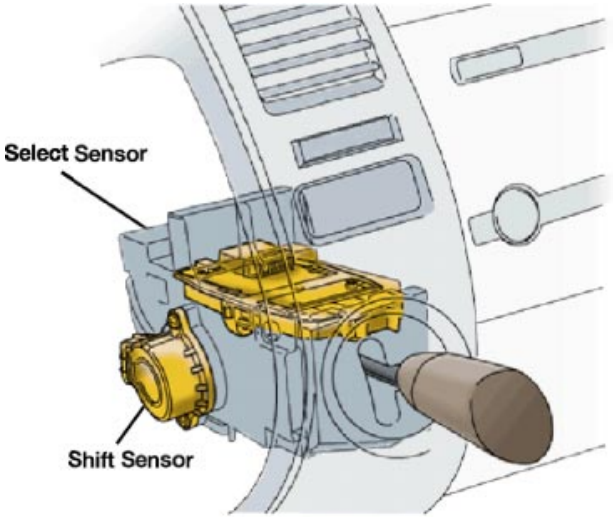

Figure 5.3 T072f107c

Shift Control Actuator ('04 & later Prius)

The '04 & later Prius uses an electronic Shift Control Actuator to engage the parking pawl. When the Shift Control Actuator receives a lock signal from the transmission ECU it rotates, which moves the parking lock rod and forces the parking lock pawl to engage the parking gear. The Shift Control Actuator detects its own position when the battery is reconnected, so it does not require initialization.

Shift Control Actuator

('04 & later Prius)

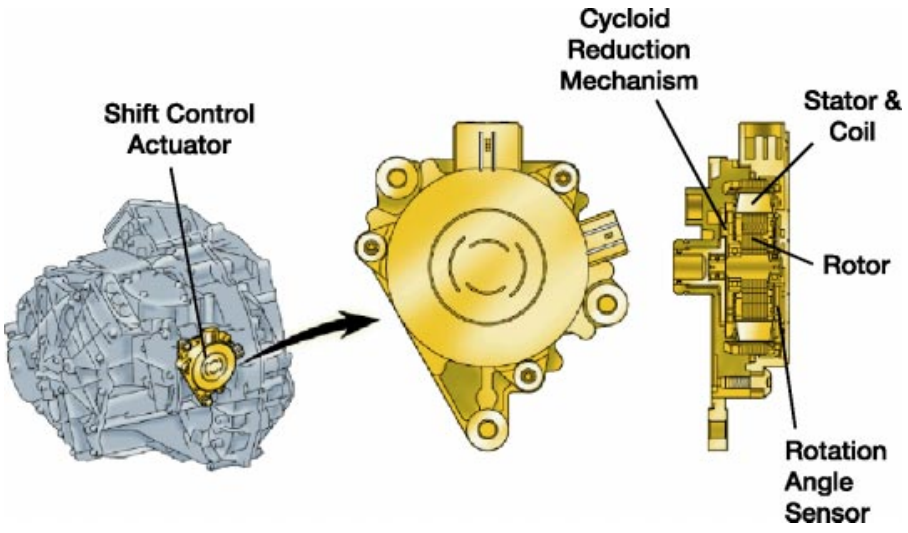

Figure 5.4 T072f406c

SERVICE TIP

If there is a malfunction in the shift control actuator, the vehicle will not go into park. The Master Warning Light will illuminate, the shift position indicators on the dash will flash, and the Park button light will flash.

In this case, the vehicle cannot be turned OFF unless the parking brake is applied. Then the vehicle can be turned OFF but cannot be turned back ON again.

Cycloid Reduction Mechanism ('04 & later Prius)

The Shift Control Actuator includes a cycloid gear reduction mechanism that increases the actuator's torque, ensuring that the parking lock will release when the vehicle is parked on a slope.

This mechanism consists of an eccentric plate mounted on the motor's output shaft, a 61-tooth fixed gear that is secured to the motor housing and a 60-tooth driven gear. As the output shaft rotates, the eccentric plate presses the driven gear against the fixed gear. The driven gear, which has one tooth less than the fixed gear, rotates one tooth for every complete rotation of the eccentric plate. The result is a gear reduction ratio of 61:1, along with an equivalent increase in torque.

Cycloid Reduction Mechanism

1. Eccentric shaft rotates with motor shaft, pressing driven gear against fixed gear.

2. Driven gear rotates one tooth for every full rotation of the motor shaft.

3. Reduction Ratio: 61:1.

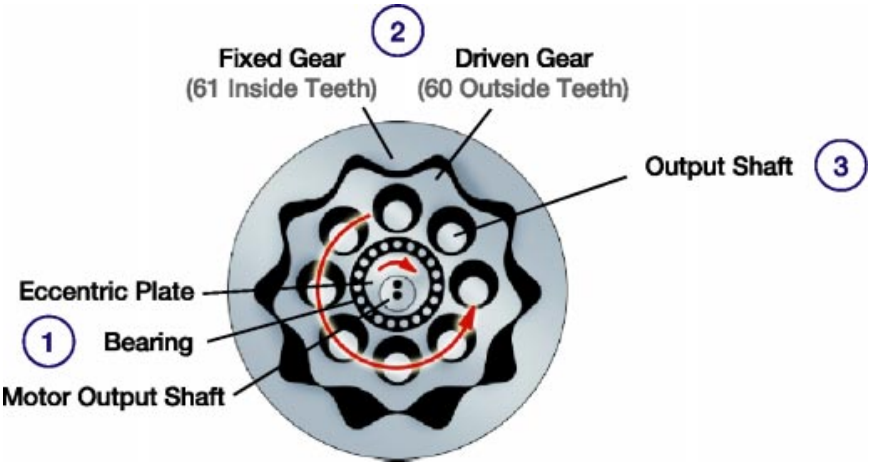

Figure 5.5 T071f505c

SERVICE TIP

The Diagnostic Tester cannot turn off the shift control system. To power down the system remove the 30-amp main fuse located on the left side of the fuse box on the driver's side of the engine compartment. This may be necessary if the vehicle needs to be pushed out of the shop.

Fuse Location

Removing the 30A PCON MTR fuse disables the shift control system.

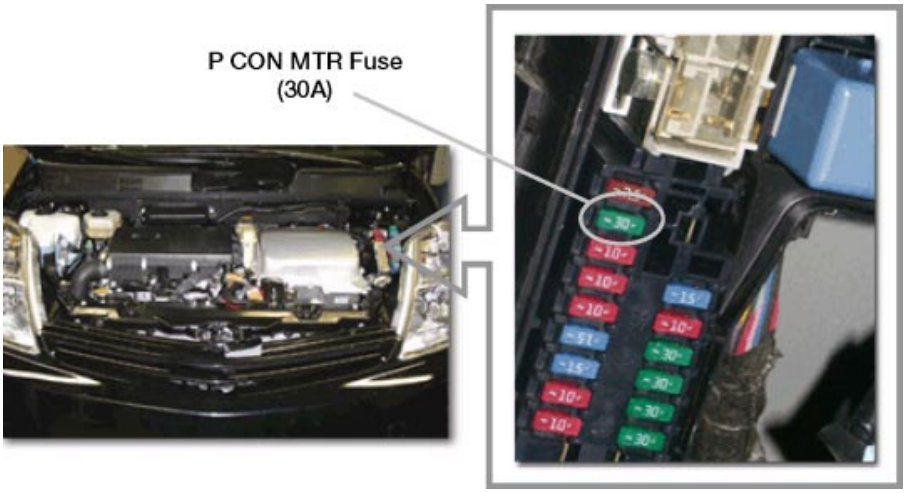

Figure 5.6 T071f506c