05ILY–02

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

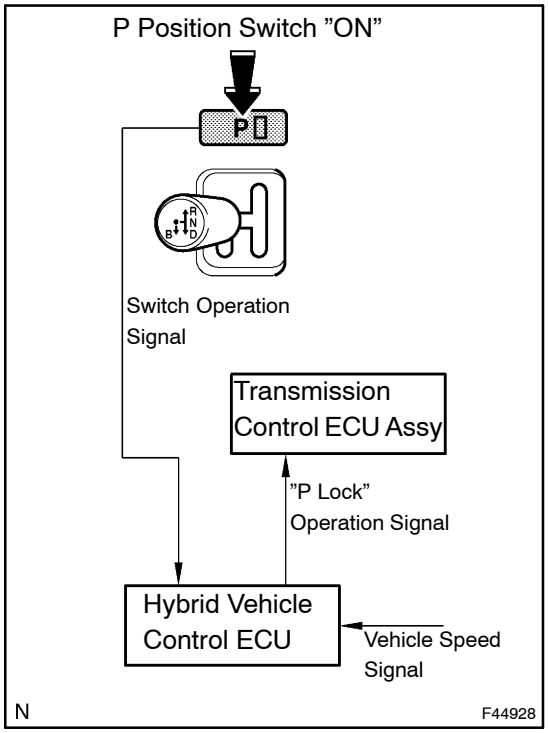
The shift control system (parking lock control) electrically controls the parking lock mechanism, conventionally operated by cable, by using the actuator.

The transmission control ECU controls the shift control actuator assy, and also controls the entire system based on information from the hybrid vehicle control ECU.

The transmission control ECU detects DTCs when there are any malfunction in the system, and informs the driver of the malfunction by illuminating the P position switch indicator light and the master caution light and indicating an error message on the multi–display.

2. FUNCTION OF EACH COMPONENT

Parts name	Function
Shift Control Actuator Assy	• Composed of the parking lock motor and the rotation angle sensor. The motor is activated by electric current from the transmission control ECU assy. • Motor rotation is reduced by the cycloid reduction mechanism in the shift control actuator assy and then output. • The rotation angle sensor detects the motor rotation angle with the three hole ICs.
Transmission Control ECU Assy	• This ECU activates the shift control actuator assy based on signals from the hybrid vehicle control ECU and the power source control ECU. • This ECU controls the application timing of current to the parking lock motor based on signals from the rotation angle sensor.
Parking Lock Mechanism	• The parking lock pawl rotates according to the movement of the parking lock rod when the parking lock motor rotates, and engages with the parking gear on the transaxle side, causing the parking lock mechanism to lock or unlock.
Hybrid Vehicle Control ECU	• This ECU sends a P lock or P unlock demand signal to the transmission control ECU based on information from the selector lever and the P position switch.
Power Source Control ECU	• This ECU sends a signal with power off information to the transmission control ECU. The transmission control ECU then sends the signal to the hybrid vehicle control ECU.
P Position Switch Indicator Light	• This light comes on/goes off to indicate the P lock/unlock status and blinks to indicate a malfunction in the shift control system (parking lock control).
Combination Meter	• A malfunction in the transmission control ECU is indicated by the master caution light on the combination meter.
Multi–display	• A malfunction in the transmission control ECU is indicated on the multi–display.



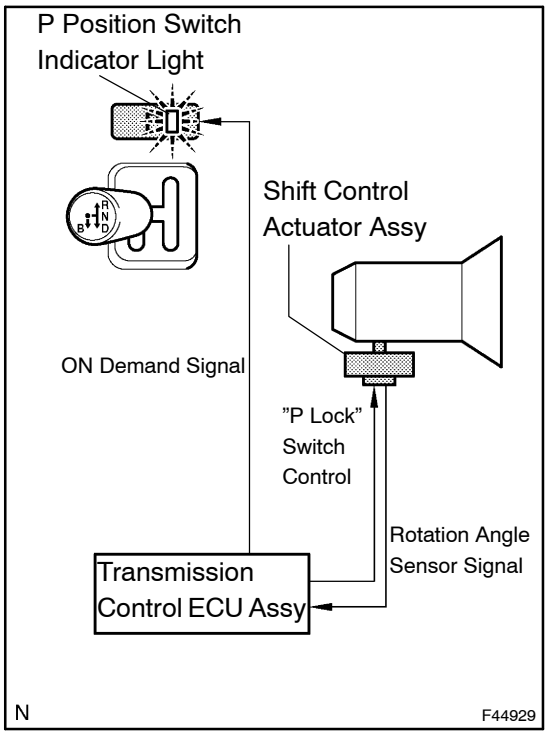
3. OPERATION DESCRIPTION

(a) Operation to switch to the P position:

(1) When the P position switch is turned on to activate parking lock, a signal is sent to the hybrid vehicle control ECU.

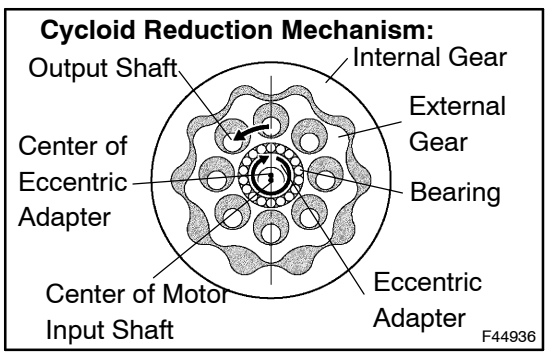
(2) The hybrid vehicle control ECU determines whether "P lock" is possible or not based on this signal and other vehicle information.

(3) If the hybrid vehicle control ECU determines that "P lock" is possible, it sends a "P lock" operation demand signal to the transmission control ECU.



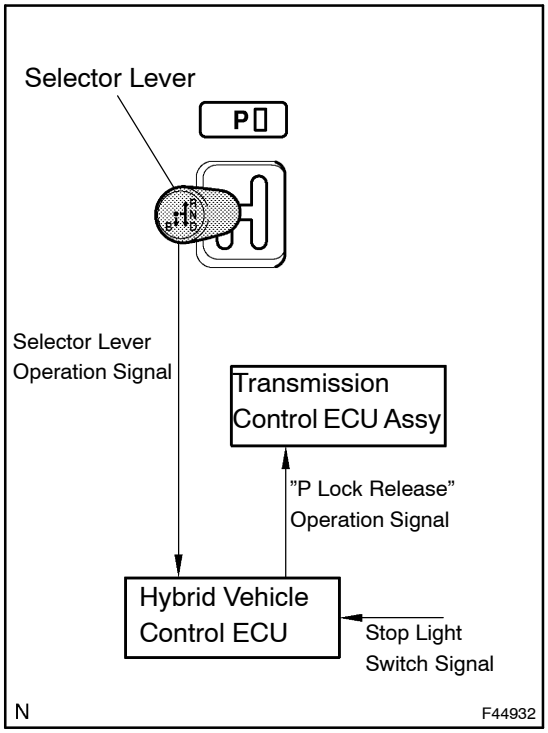
(4) Receiving the signal, the transmission control ECU activates the shift control actuator assy in order to lock the parking lock mechanism and turns on the P position switch indicator light.

(5) At that time, the transmission control ECU controls motor rotation angle based on signals from the rotation angle sensor in the shift control actuator assy.



HINT:

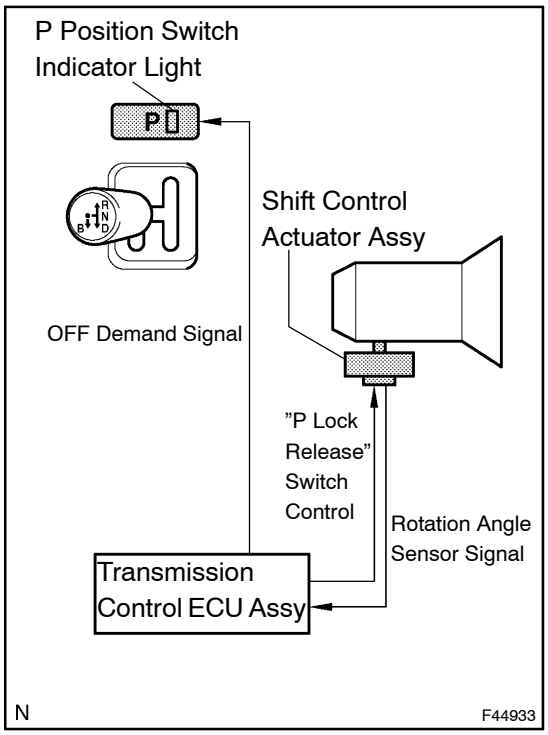
In the cycloid reduction mechanism, the output shaft is linked to the external gear. Together, they rotate only a single tooth when the eccentric adapter, which is linked to the motor, rotates once. Driving force is increased like this so that the parking lock mechanism can be switched even when high output is required for parking on a hill, etc.



(b) Operation to switch to a non–P position:

(1) When the hybrid system is started (the vehicle is ready to be driven) and the selector lever is moved to the R, N, or the D position with the brake pedal depressed, a signal is sent to the hybrid vehicle control ECU.

(2) This signal is then sent from the hybrid vehicle control ECU to the transmission control ECU as a "P lock release" operation demand signal.



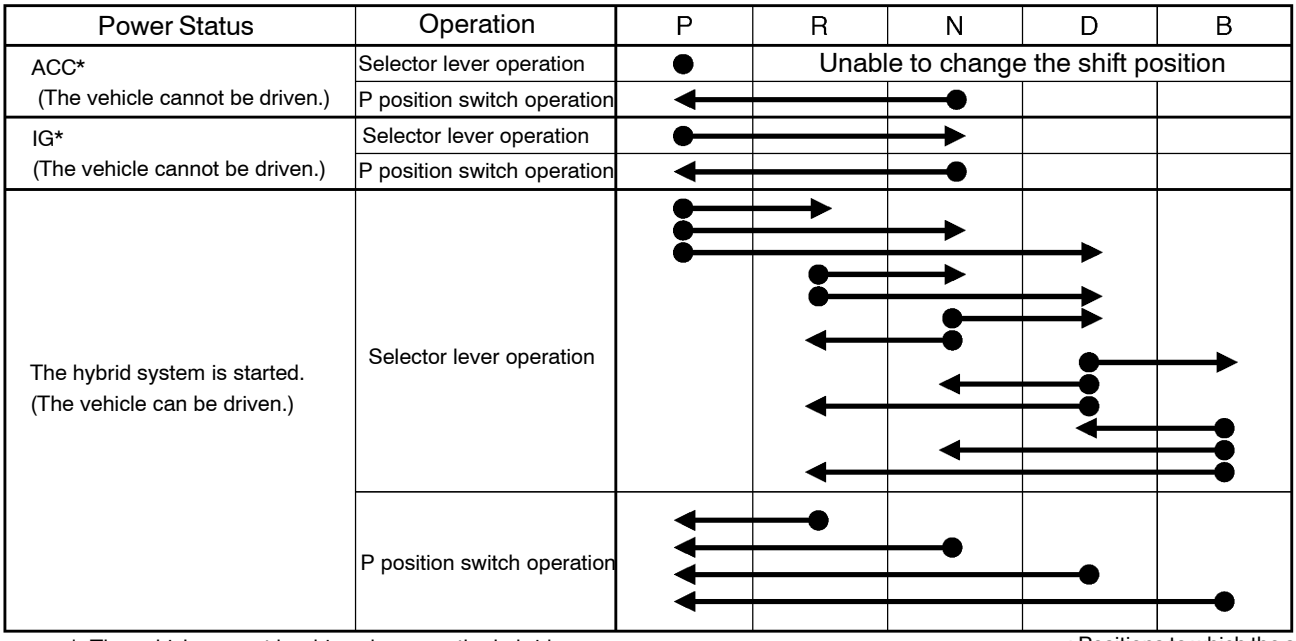
(3) Receiving the signal, the transmission control ECU activates the shift control actuator assy in order to unlock the parking lock mechanism and turns off the P position switch indicator light.

(4) At that time, the transmission control ECU controls motor rotation angle based on signals from the rotation angle sensor in the shift control actuator assy.

4. SHIFT POSITION CHANGE FUNCTION

(a) The shift control system (parking lock control) comprehensively determines vehicle conditions and changes the shift position, as shown in the following chart, by cooperating with the shift control function of the hybrid system (except when the reject function, described later, is in operation).

(b) Other than indicated in the following chart, when the power switch is turned off with the vehicle stopped, the shift position is automatically changed to the P position.



5. REJECT FUNCTION

In the shift control system (parking lock control), there may be a situation in which a shift change cannot be done for safety reasons. When attempting to move the selector lever in such a situation, the system sounds a reject buzzer inside the meter and changes the shift position as shown in the following table.

Shift operation which causes the reject function to operate	Shift position after rejection
Shifting from the P position without depressing the brake pedal	Held in the P position
Shifting to the P position while driving	Changed to the N position
Shifting between forward and reverse positions while driving	Changed to the N position
Shifting to the B position from the position other than D	Changed to the N position