05I9T–01

SYSTEM DESCRIPTION

1. ENGINE IMMOBILIZER SYSTEM DESCRIPTION

(a) The immobilizer system is a theft deterrent system that determines whether or not to disable starting of the TOYOTA Hybrid System II (THS II) depending on a comparison of the key's ID code and the vehicle's pre–registered code.

The immobilizer system compares the vehicle transponder key ECU's pre–registered ID code with the key–embedded transponder chip's ID code. If the ID codes do not match, the immobilizer system activates and the THS II cannot be started. The transponder key ECU manages communication with the hybrid vehicle control ECU and power source control ECU. When the ID codes of the transponder chip and transponder key ECU match, the transponder key ECU authorizes the starting of the THS II and the changing between the power switch's power modes.

2. FUNCTION OF MAIN COMPONENTS

Components	Outline
Transponder key coil/amplifier	Receives key ID code, amplifies ID code and outputs it to transponder key ECU. Key ID code is received when key is inserted into key slot.
Halfway switch (inside key slot)	Detects if key is/isn't inserted into key slot and outputs results to transponder key ECU.
Full switch (inside key slot)	Detects if key is/isn't inserted into key slot and outputs results to power source control ECU.
Room oscillator	Transmits key detection signals within detection area in vehicle interior upon receiving transmission request signal from smart key ECU. Smart key ECU request signal is activated when key is brought into vehicle interior and, without inserting key into key slot, power switch is pushed.
Door control receiver	Transmits ID code to smart key ECU. Key ID code is received when key is brought into vehicle interior and, without inserting key into key slot, power switch is pushed.
Security indicator	Illuminates or starts blinking. Illumination is controlled by multiplex network body ECU.

3. SYSTEM FUNCTION

(a) Starting hybrid control system with smart key inserted into the key slot

(1) When the transponder key ECU detects that the halfway switch is ON, the ECU provides current to the transponder key coil and produces a faint electric wave. A transponder chip in the key receives the faint electric wave. Upon receiving the faint electric wave, the transponder chip outputs a key ID code signal. The transponder key coil receives this signal, the transponder key amplifier amplifies it, and then the signal is transmitted to the transponder key ECU.

The transponder key ECU matches the key's ID code with the vehicle's ID code, which was previously registered in the ECU. If the ID code match, then when the power switch is pushed, the code match results are set to the power source control ECU via the transponder key ECU. When the check results reveal that the ID codes is legitimate, the power source control ECU authorizes the transition of the power switch's power modes. The ACC, IG1 and IG2 relays are turned ON, supplying power to the power switch ON (ACC) and ON (IG) power modes.

Also, the power source control ECU changes the power switch's indicator lamp to amber, informing the driver that the power mode is sent to ON (IG). Then, the power source control ECU sends a system start signal to the hybrid vehicle control ECU. The hybrid vehicle control ECU confirms that the key ID code has been verified. If the ID code has been verified, the hybrid vehicle control ECU bypasses the immobilizer system and starts the hybrid control system.

The ECU transmits a security indicator signal that communicates "indicator off" to the multiplex network body ECU. Then, the multiplex network body ECU turns off the security indicator lamp.

(b) Starting hybrid control system without inserting the smart key into key slot

(1) If a user operates the power switch while the key is in the user's possession, the smart key ECU outputs a request signal to the room oscillator. The room oscillator emits signals in order to form a smart key detection area in the vehicle interior. The key then sends its ID code signal to the smart key ECU via the door control receiver.

The smart key ECU matches the key's ID code with the vehicle's ID code, and then the code match results are sent to the power source control ECU via the transponder key ECU. When the check results reveal that the ID code is legitimate, the power source control ECU authorizes the transition of the power switch's power modes. The ACC, IG1 and IG2 relays are turned ON, supplying power to the power switch ON (ACC) and ON (IG) power modes.

Also, the power source control ECU changes the power switch's indicator lamp to amber, informing the driver that the power mode is set to ON (IG). Then, the power source control ECU sends a system start signal to the hybrid vehicle control ECU. THe hybrid vehicle control ECU confirms that the key ID code has been verified. If the ID code has been verified, the hybrid vehicle control ECU bypasses the immobilizer system and starts the hybrid control system.