05IE3–01

SYSTEM DESCRIPTION

1. CHECK PUSH BUTTON START SYSTEM DESCRIPTION

(a) The push button start system uses a push–type power switch, which the driver operates by inserting a key into the key slot or by merely carrying the key*. This system consists primarily of a power source control ECU, power switch, key slot, key, ACC relay, IG1 relay, IG2 relay and transponder key ECU. The power source control ECU controls the system. This system operates in cooperation with the engine immobilizer system and the smart entry system*.

The table below shows the transition of the power switch, which depends on whether the brake pedal is depressed or released.

*: w/ Smart entry system

Brake Pedal	Power Switch Operation
Released	Power mode changes OFF, ON (ACC), ON (IG) and OFF, every time power switch is pressed
Depressed	Power mode changes to ON (READY) from any power mode

2. FUNCTION OF COMPONENT

Components	Function
Key	• When driver inserts key into key slot, built–in transponder chip transmits ID code signal to transponder key amplifier, which is provided in key slot. • For models with smart entry system, if driver operates power switch with key in driver's possession, key receives signals from oscillators and transmits ID code to wireless door lock receiver.
Key slot	• Halfway switch: Detects whether key is inserted and outputs signal to transponder key ECU. • Full switch: Detects whether key is inserted and outputs signal to power source control ECU. • Transponder key amplifier and coil: Receives ID code signal from transponder chip, which is built into key, and outputs it to transponder key ECU. • Key interlock solenoid: Power source control ECU operates this solenoid in accordance with power switch mode and shift position to keep key locked in key slot.
Power switch	• In accordance with shift position and stop light switch's condition, changes power modes in 4 stages as follows: OFF, ON (ACC), ON (IG) and ON (READY). • Power mode or abnormal condition of push button start system can be discerned from illuminating condition of indicator on power switch.
● IG1 relay ● IG2 relay ● ACC relay	Operates in accordance with power source control ECU to supply power to respective system.
Stop light switch	Outputs brake pedal's state to power source control ECU.
Parking lock actuator	• Operates in accordance with signals from transmission control ECU to actuate parking lock mechanism. • Detects actuation state of parking lock (whether shift position is in P or other position) and outputs it to transmission control ECU.
Power source control ECU	Controls push button start system in accordance with signals received from switches and ECUs.
Transponder key ECU	• Controls engine immobilizer system by recognizing key ID code transmitted by transponder key amplifier. • Receives ID code check results from smart ECU*. • Transmits key ID code check results to power source control ECU. • Transmits hybrid control system start authorization signal to hybrid vehicle control ECU.
Transmission control ECU	• Actuates parking lock actuator upon receiving power switch OFF signal from power source control ECU. • Transmits actuation state of parking lock (whether shift position is in P or other position) to power source control ECU.
Hybrid vehicle control ECU	• Starts hybrid control system in accordance with system start signal received from power source control ECU. • Receives hybrid control system start authorization signal from transponder key ECU.
Smart ECU*	Checks ID code received from wireless door lock receiver and transmits check results to transponder key ECU.

*: w/ Smart entry system

3. SYSTEM FUNCTION

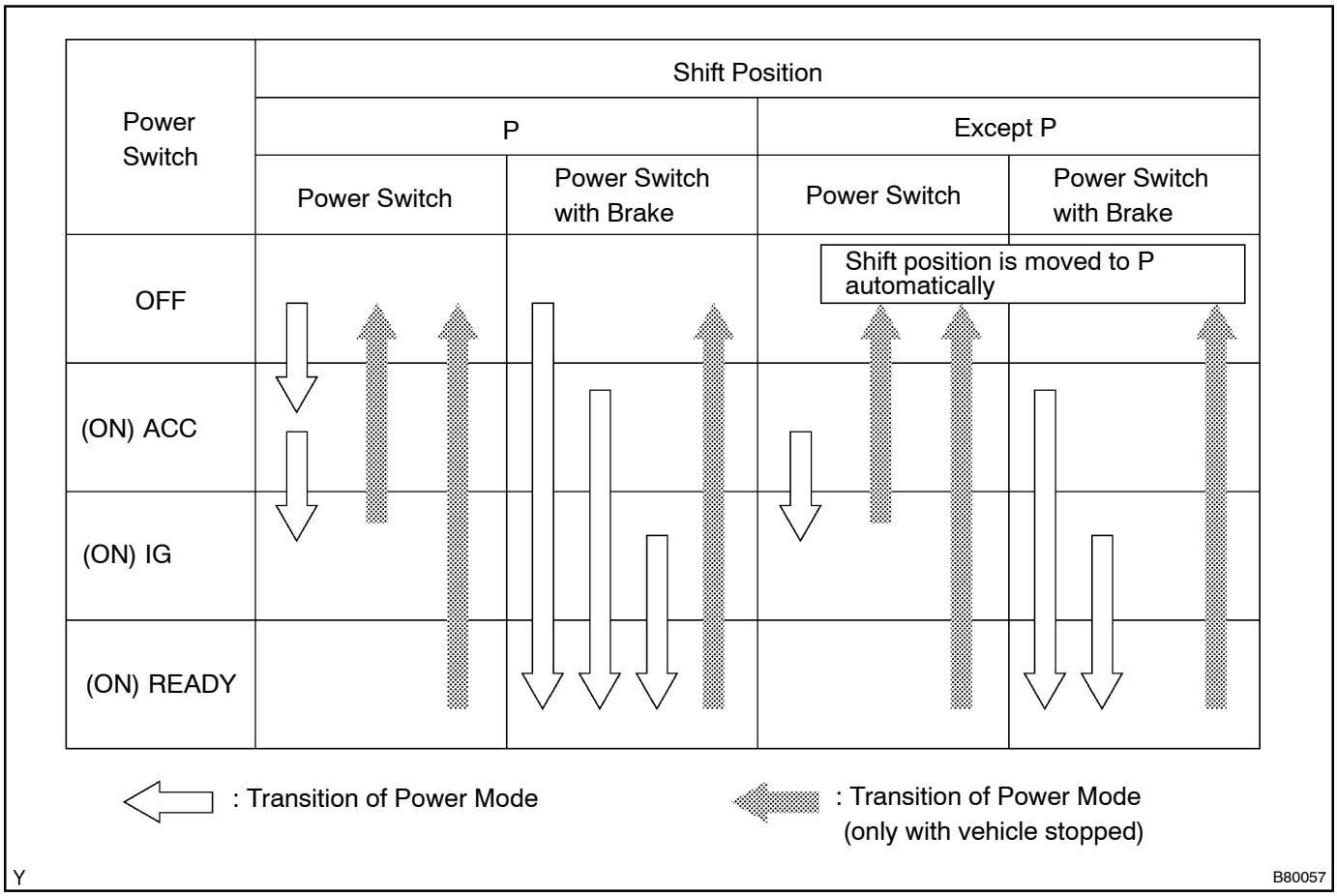
The electric controls of the push button start system are described below:

Control	Outline
Power switch control (w/o smart entry system)	Transponder key ECU checks ID code when key is inserted into key slot. Power source control ECU verifies check results and authorizes operation of switch.
Power switch control (w/ smart entry system)	• When driver operates power switch with key in driver's possession, power source control ECU starts room oscillator, which transmits request signal to key. Upon receiving this signal, key transmits ID code signal to smart ECU. • Transponder key ECU verifies check results received from smart ECU via BEAN and sends them to power source control ECU. Based on these results, power source control ECU authorizes operation of power switch.
Auto P control	If power switch is set to OFF when shift position is other than P, transmission control ECU activates parking lock actuator on command from hybrid vehicle control ECU in order to change shift position to P.
Diagnosis	When power source control ECU detects malfunction, power source control ECU diagnoses and memorizes failed section.

4. POWER SWITCH CONTROL (WITH KEY)

- When a key is inserted into the key slot and the transponder key ECU recognizes the ID code of the key, the power source control ECU authorizes operation of the power switch. As a result, the power mode changes to the mode selected by power switch operation.
- Every time the power switch is pushed, power modes change in 3 stages as follows: OFF, ON (ACC), ON (IG) and OFF. If the driver pushes the power switch while depressing the brake pedal (the stop light switch turns ON), power mode will change to ON (READY) regardless of the previous power mode.
- After approximately 1 hour has passed with the power switch at ON (ACC) and the shift position in P, the power source control ECU will automatically turns off the power (the power mode changes to OFF).
- The illustration below shows the transition of power modes:

Transition of power mode:



NOTE:

While the vehicle is being driven normally, operation of the power switch is disabled. However, if the hybrid control system must be stopped in an emergency while the vehicle is being driven, pressing the power switch for at least 3 seconds can stop the hybrid control system. Power mode changes from ON (READY) to ON (ACC).

5. Diagnosis

If a malfunction occurs in the IG circuit, the power source control ECU will perform the controls listed in the table below and record a DTC.

IG Circuit Malfunction	Details
Malfunction occurs during ON (IG) mode	• Hold circuit in power source control ECU continues to supply power to IG1 and IG2 relays. At this time, power source control ECU continuously flashes amber–colored indicator on power switch. • After power switch is set to OFF, power source control ECU continues flashing indicator on power switch for 15 seconds. • Hybrid system cannot be restarted.
Malfunction occurs during ON (ACC) or OFF mode	• When power switch is set to ON (IG) and malfunction is detected, power switch automatically turns OFF. • If same malfunction is detected as above continuously 3 times, power source control ECU continuously flashes amber–colored indicator on power switch for 15 seconds. • Hybrid system cannot be restarted.