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| **Model Year:** 2013 | **Model:** RAV4 | **Prod Date Range:** [12/2012 - ] |
| **Title:** POWER ASSIST SYSTEMS: POWER STEERING SYSTEM: POWER STEERING CONTROL; 2013 MY RAV4 [12/2012 - ] | | |

# POWER STEERING CONTROL

### 1. FUNCTION OF MAIN COMPONENTS

| COMPONENT | | FUNCTION |
|---|---|---|
| Steering Gear Assembly | | Changes the rotational force to lateral movement in accordance with the driver's steering operation. |
| Steering Column Assembly | Power Steering Motor | Generates power assist in accordance with a signal received from the power steering ECU assembly. |
| | Rotation Angle Sensor (Built into Power Steering Motor) | Outputs the rotation angle of the power steering motor to the power steering ECU assembly. |
| | Reduction Mechanism | Reduces the speed of the power steering motor through the use of a worm gear and a wheel gear and transmits it to the column shaft. |
| | Power Steering Torque Sensor | Detects the amount of twist of the torsion bar, creates an electrical signal based on the torque applied to the torsion bar and outputs the signal to the power steering ECU assembly. |
| | Power Steering ECU Assembly | • Actuates the power steering motor mounted on the steering column assembly to provide power assist based on the signals received from various sensors and ECUs.<br>• Operates in cooperation with the skid control ECU to control the steering assist torque. |
| Sport Mode Switch | | Turns the Sport mode on and off. |
| ECM | | Outputs the engine speed signal or Sport mode signal to the power steering ECU assembly via CAN communication. |
| Skid Control ECU | | • Outputs the vehicle speed signal to the power steering ECU assembly via CAN communication.<br>• Requests steering torque assist during cooperative control with EPS. |
| Combination Meter Assembly | Power Steering Warning Light | Illuminates to alert the driver when the power steering ECU assembly detects a malfunction in the EPS system. |
| | Sport Mode Indicator Light | Illuminates to inform the driver that Sport mode engaged. |
| | Buzzer | Emits a warning sound to alert the driver when the power steering ECU assembly detects a malfunction in the EPS system. |

## 2. SYSTEM CONTROL

**Controls of EPS System**

| CONTROL | OUTLINE |
|---|---|
| Basic Control | Calculates the assist current and assist direction from the steering torque value and the vehicle speed, and actuates the power steering motor. |
| Inertia Compensation Control | Ensures the starting movement of the power steering motor when the driver starts to turn the steering wheel. |
| Friction Compensation Control | Reduces steering wheel operation friction, improving steering feeling. |
| Recovery Control | Assists the recovery force during the short interval between the time the driver fully turns the steering wheel and the time the wheels try to recover. |
| Damper Control | Regulates the amount of assist when the driver turns the steering wheel while driving at high speeds, thus damping the changes in the yaw rate of the vehicle body. |
| Voltage Boost Control | Boosts the battery voltage in the power steering ECU assembly, and issues the amount of voltage necessary to drive the power steering motor. |
| System Overheat Protection Control | Estimates the power steering motor temperature based on the amperage and the current duration. If the temperature exceeds the standard, this control limits the amperage to prevent the power steering motor from overheating. |
| Sport Mode Control | The assist characteristics are switched to achieve a suitable steering feeling for Sport mode. |

## 3. FAIL-SAFE

(a) Fail-safe operation modes are as follows:

**Fail-safe Control List**

| DETECTED MALFUNCTION | FAIL-SAFE |
|---|---|
| Power Steering Torque Sensor Malfunction | Cancels the assist. |
| Power Steering Motor Overheat | Limits the assist force. |
| Power Steering Motor Short (Including Drive System Malfunction) | Cancels the assist. |
| Rotation Angle Sensor (Built into Power Steering Motor) | Malfunction Cancels the assist. |
| Power Steering ECU Assembly Internal Temperature Sensor Malfunction | Limits the assist force. |
| Power Steering ECU Assembly System Malfunction | Cancels the assist. |
| Vehicle Speed and Engine Speed Signal Malfunction | Limits the assist force. |
| Power Supply Voltage Malfunction | Pauses the assist (provides normal assist after the voltage recovers). |

## 4. DIAGNOSIS

(a) If the power steering ECU assembly detects a malfunction in the EPS system, the power steering ECU assembly lights up the power steering warning light in order to alert the driver. At the same time, Diagnostic Trouble Codes (DTCs) are stored in memory.

(b) The DTCs can be read by connecting the Techstream to the DLC3. For details, refer to the Repair Manual.