ENGINE OIL CONTROL [SKYACTIV-D 2.2]

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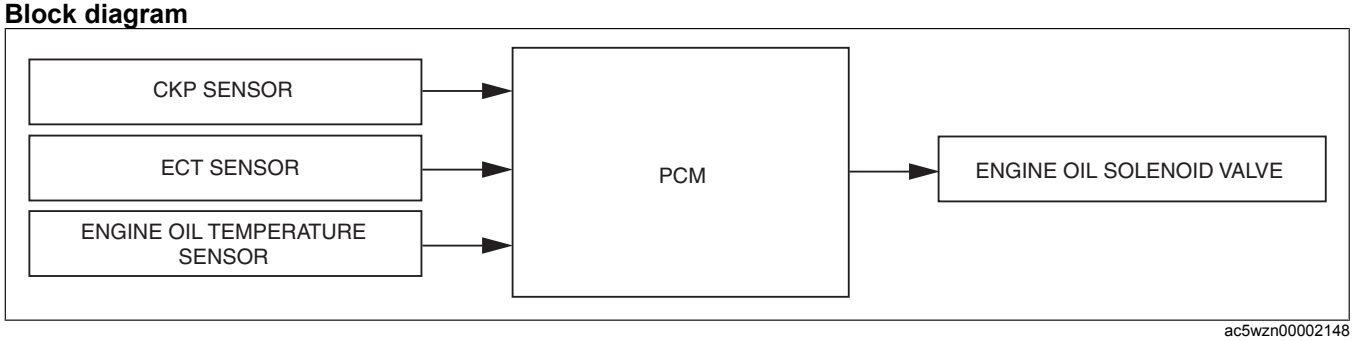
Outline

- The PCM reduces the oil pump load applied to the engine by controlling the appropriate engine hydraulic pressure according to the engine operation conditions.
- The engine hydraulic pressure in two steps. When hydraulic pressure is not needed, the oil pump discharge amount is reduced by the operation of the engine oil solenoid valve.

Block diagram



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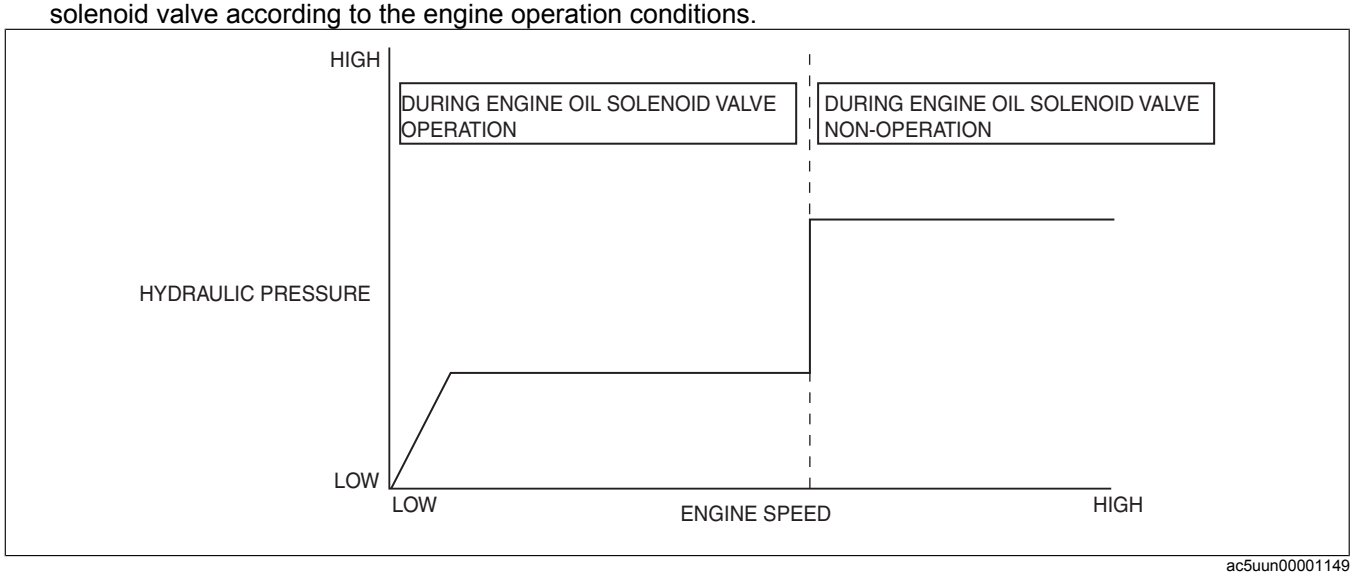
Operation

- The PCM switches the engine oil pressure which lubricates the engine in two steps by driving the engine oil solenoid valve according to the engine operation conditions.



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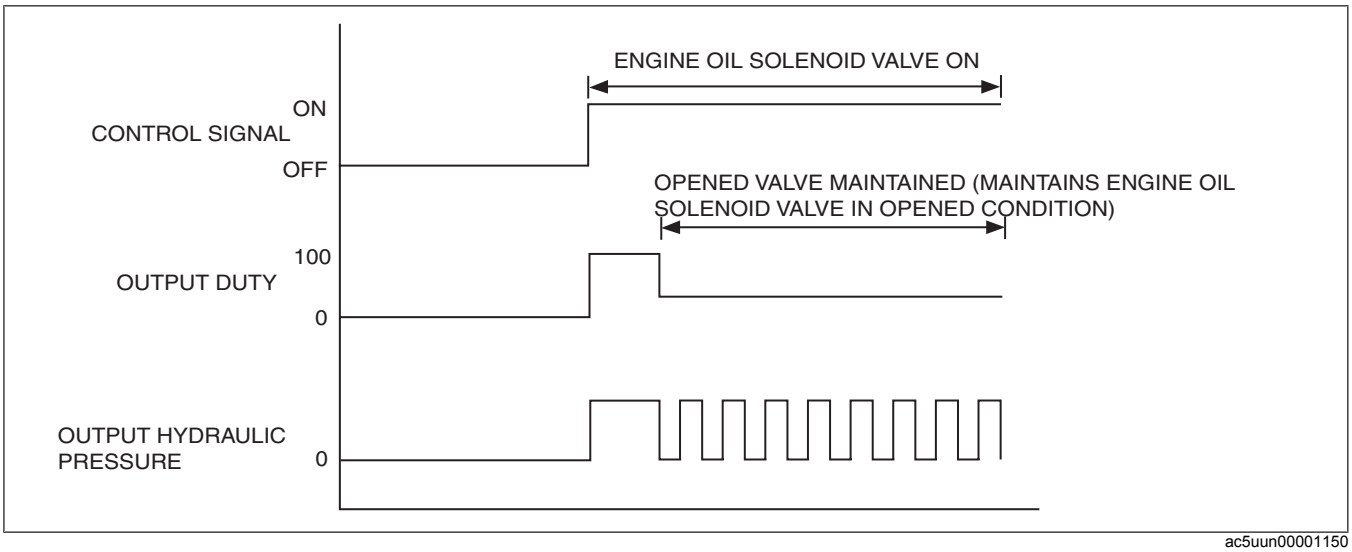
Output duty value determination

- The PCM controls the operational voltage energizing the engine oil solenoid according to the duty signal. After opening the engine oil solenoid valve at the output duty ratio of 100%, load applied to the parts is reduced by lowering the duty value to the output duty value at which the open valve condition can be maintained. The output duty value for maintaining the opening value changes according to the battery voltage.



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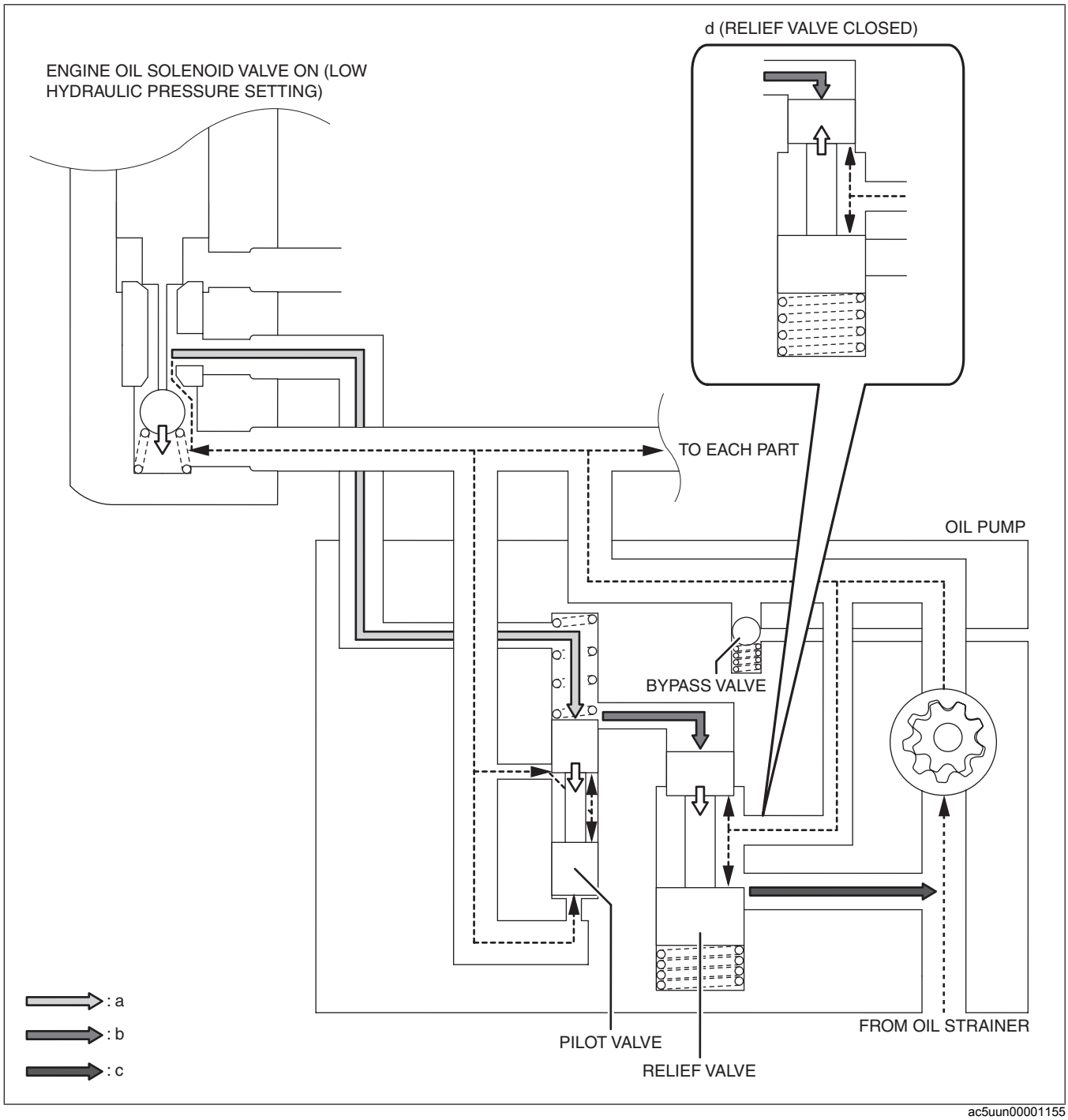
Engine oil solenoid valve operation conditions

- The PCM operates the engine oil solenoid valve when all of the following conditions are met:
  - — Engine speed: Less than 4,000 rpm
  - — Engine coolant temperature: Less than 98 °C {208 °F}
  - — Charging efficiency: Less than specification (varies according to engine speed.)
- For details on the engine oil solenoid valve, refer to the LUBRICATION SYSTEM. (See ENGINE OIL SOLENOID VALVE [SKYACTIV-D 2.2].)

Hydraulic pressure switching mechanism

- When the engine oil solenoid valve operates, the hydraulic circuit changes according to the following. The engine oil supply amount is controlled by changing the hydraulic circuit.
  Engine oil flow when setting low oil pressure (engine oil solenoid valve ON)
  a. When the engine oil solenoid valve is turned ON, oil pressure is also applied to the upper part of the pilot valve. Because the oil pressure applied to the upper and lower parts of the pilot valve is almost same, the pilot valve is pressed up by the spring force.
  b. Oil pressure is applied to the upper part of the relief valve.
  c. When oil pressure exceeds the relief valve opening pressure, the relief valve is pressed down and engine oil flows.
  d. When oil pressure is less than the relief valve opening pressure, the relief valve closes. As a result, engine oil flowing stops (oil pressure increase).
  e. Oil pressure is adjusted by repeating Step (c) to (d).



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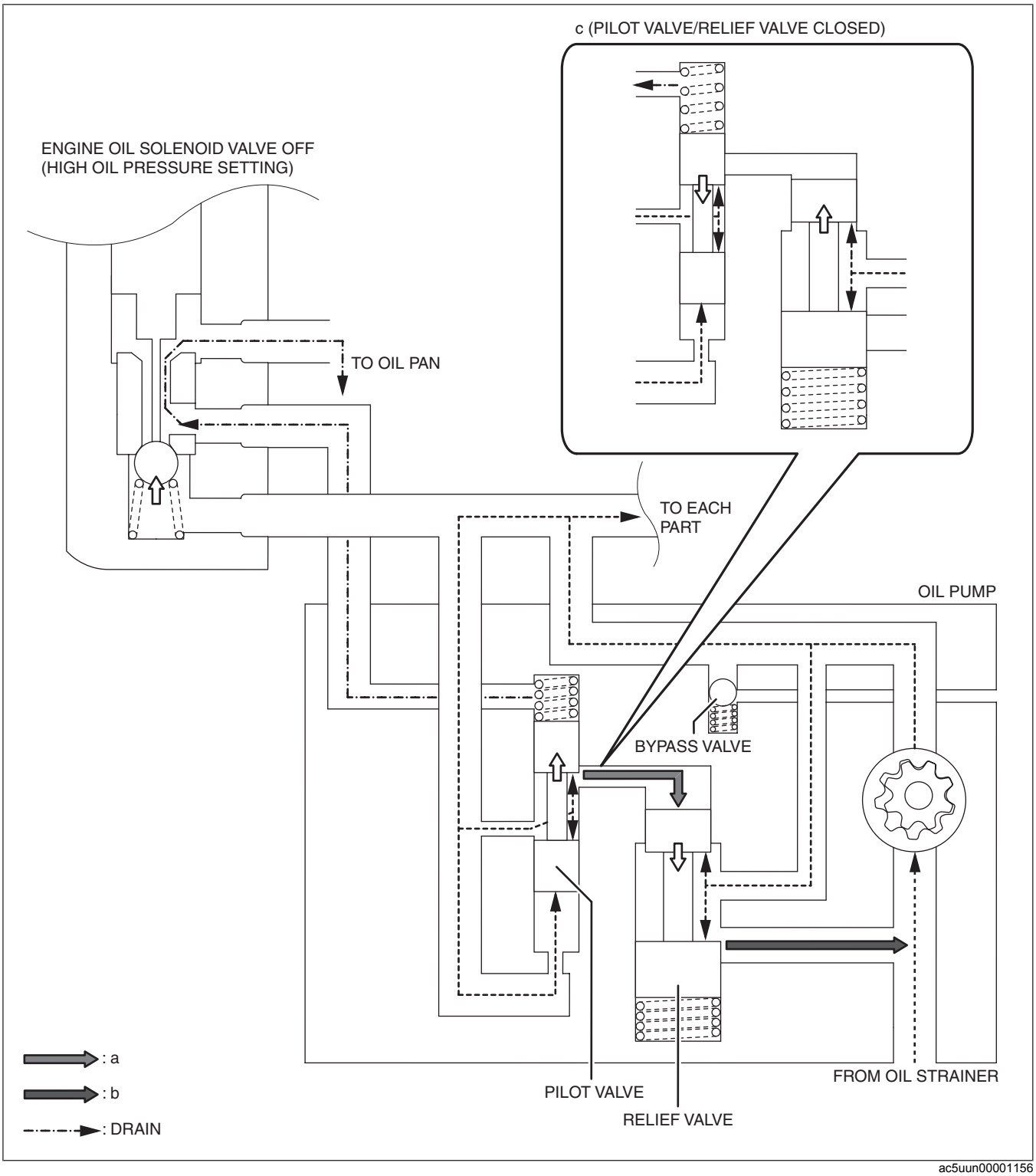
Engine oil flow when setting high oil pressure (engine oil solenoid valve OFF)

a. When oil pressure exceeds the pilot valve opening pressure, the pilot valve is pressed up and oil pressure is applied to the upper part of the relief valve.
b. Because the relief valve opening pressure is exceeded by applying oil pressure to the upper part of the relief valve, the relief valve is pressed down and engine oil flows (oil pressure decrease).
c. When oil pressure is less than the pilot valve opening pressure, the pilot valve closes. As a result, the relief valve closes and engine oil flow stops (oil pressure increase).
d. Oil pressure is adjusted by repeating Step (c) to (d).



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