CVT System Description - Lock-Up System

Lock-Up System

The lock-up mechanism of the torque converter clutch operates in D position, S position, L position*1, sequential sportshift mode (from 3rd through 7th speed stage)*2, and ECON mode, at transmission fluid temperature exceeding 68 °F (20 °C). The pressurized fluid is drained from the back of the torque converter through a fluid passage, causing the torque converter clutch piston to be held against the transmission fluid pump. As this takes place, the input shaft and the drive pulley shaft rotate as the same as the engine crankshaft. Together with hydraulic control, the PCM optimizes the timing of the lock-up mechanism. When shift solenoid valve B is turned on by the PCM, shift solenoid B pressure switches lock-up ON and OFF. The LC control valve controls the volume of lock-up according to the CVT lock-up clutch control solenoid valve.

*1: Six-position transmission
*2: Five-position transmission

Torque Converter Clutch Lock-Up ON (Engaging Torque Converter Clutch)

Fluid in the chamber between the torque converter cover and the torque converter clutch piston is drained off, and fluid entering from the chamber between the pump and the stator exerts pressure through the torque converter clutch piston against the torque converter cover. The torque converter clutch piston engages with the torque converter cover; torque converter clutch lock-up ON, and the input shaft rotates at the same as the engine.

Power flow

The power flows by way of:

Engine

Drive plate

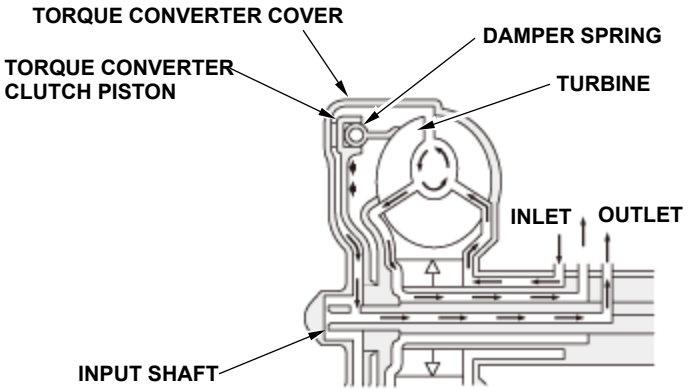
Torque conveter cover

Torque converter clutch piston

Damper spring

Turbine

Input shaft



Torque Converter Clutch Lock-Up OFF (Disengaging Torque Converter Clutch)

Fluid entered from the chamber between the torque converter cover and the torque converter clutch piston passes through the torque converter and goes out from the chambers between the turbine and the stator, and between the pump and the stator. As a result, the torque converter clutch piston moves away from the torque converter cover, and the torque converter clutch lock-up is released; torque converter clutch lock-up OFF.

Power flow

The power flows by way of:

Engine

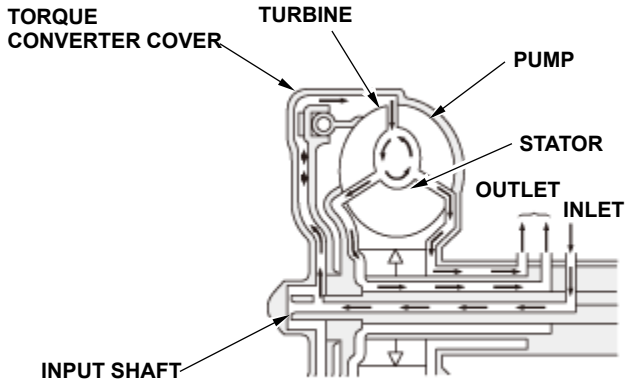
Drive plate

Torque converter cover

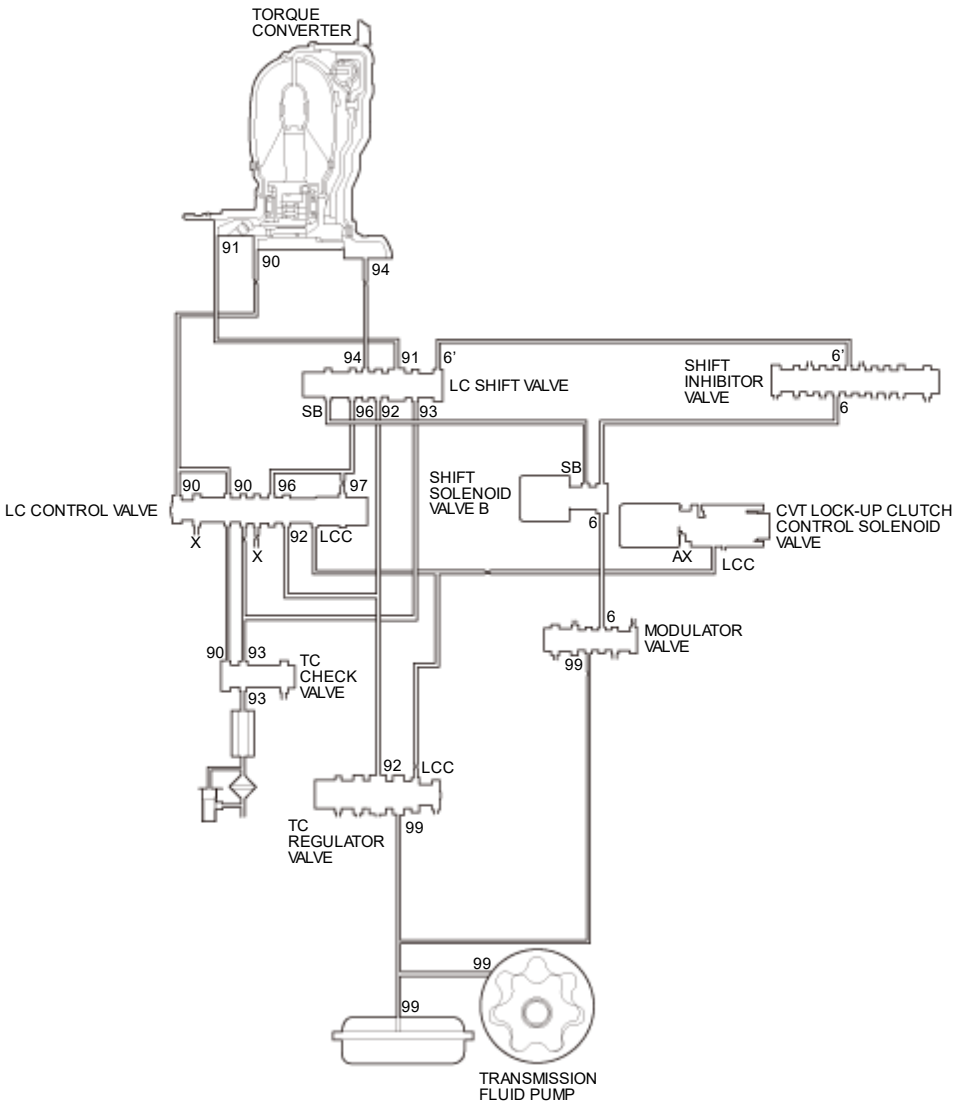
Pump

Turbine

Input shaft



Lock-Up System Hydraulic Pressure Flow Circuit



No Lock-Up

Shift solenoid valve B is turned off by the PCM. The LC shift valve receives shift solenoid B pressure (SB). The LC shift valve uncovers the port leading torque converter pressure (92) to the back of the torque converter. Torque converter pressure (92) becomes torque converter pressure (94), and enters into the back of the torque converter not to engage the torque converter clutch. While shift solenoid valve B keeps off, torque converter clutch lock-up does not start; the torque converter clutch is OFF.

Partial Lock-Up

As the speed of the vehicle reaches the prescribed value, shift solenoid valve B is turned on by the PCM to release shift solenoid B pressure (SB) in the LC shift valve. Modulator pressure (6') is applied to the right side of the LC shift valve, then the LC shift valve is moved to the left side to switch the port leading torque converter pressure (91) to the torque converter. Torque converter pressure (91) is applied to the torque converter to engage the lock-up clutch. The PCM also controls the CVT lock-up clutch control solenoid valve, and LC control pressure (LCC) is applied to the LC control valve. When LC control pressure (LCC) is lower, torque converter pressure (91) from the torque converter regulator valve is lower. The torque converter clutch is engaged partially. LC control pressure (LCC) increases, and the LC control valve is moved to the left side to release torque converter pressure (96). The torque converter clutch is then engaged securely. Under this condition, the torque converter clutch is engaged by pressure from the torque converter; this condition is partial lock-up.

Full Lock-Up

When the vehicle speed further increases, the PCM controls the CVT lock-up clutch control solenoid valve to increase LC control pressure (LCC). LC control pressure (LCC) is applied to the LC control valve, and moves the LC control valve. Under this condition, torque converter back pressure is released fully, causing the torque converter clutch to be fully engaged.