

## CVT System Description - General Operation

### General Description

The continuously variable transmission (CVT) is an electronically controlled automatic transmission with drive and driven pulleys, steel belt, and new transmission fluid (HCF-2). The CVT provides non-stage speeds forward and non-stage speeds reverse. The entire unit is positioned in line with the engine.

### Transmission

The torque converter consists of a pump, a turbine, and a stator assembly in a single unit. The torque converter cover is connected to the engine crankshaft and turns as the engine turns. Around the outside of the torque converter is a ring gear which meshes with the starter drive gear when the engine is being started. The torque converter assembly serves as a flywheel, transmitting power to the transmission input shaft. The transmission has four parallel shafts: the input shaft, the drive pulley shaft, the driven pulley shaft, and the final drive shaft. The input shaft is connected to the torque converter turbine, and integrates the forward clutch on the drive pulley shaft end. The drive pulley shaft and the driven pulley shaft consist of movable and fixed face pulleys. Both pulleys are linked by the steel belt. The input shaft includes the forward clutch. The drive pulley shaft connects the drive pulley, the ring gear, and the forward clutch hub/sun gear. The input shaft is connected with the drive pulley shaft by the forward clutch hub/sun gear, and by the ring gear and the planetary carrier. The planetary carrier is positioned between the ring gear and the sun gear, and engaged with the planetary pinion gears. The driven pulley shaft includes the driven pulley (with the park gear). The secondary drive gear is splined to the driven pulley shaft. The final drive shaft is positioned between the secondary drive gear and the final driven gear. The final drive shaft integrates the secondary driven gear and the final drive gear which serves to change the rotational direction of the drive and driven pulley shafts, because the drive pulley shaft and the driven pulley shaft rotate the same direction. When the input shaft is joined with the drive pulley shaft by engaging the forward clutch or by engaging the reverse brake, power is transmitted through the input shaft, the drive pulley shaft, the driven pulley shaft, then to the final drive shaft provide drive.

### Electronic Control

The electronic control system consists of the powertrain control module (PCM), sensors, and solenoid valves. Shifting and lock-up are electronically controlled for comfortable driving under all conditions. The PCM is located in the engine compartment.

### Hydraulic Control

The hydraulic control system consists of the transmission fluid pump, the valve body assembly, and the manual valve body. The transmission fluid pump is located on the transmission housing in the transmission, and it is linked with the stator shaft by the drive/driven sprockets and the drive chain. The valve body assembly is located on the transmission housing in the transmission. The valve body assembly includes the main valve body, the secondary valve body, and the clutch reducing valve body. The valve body assembly must not be disassembled. The manual valve body is located on the stator shaft flange.

### Shift Control

To shift pulley ratio, the PCM controls shift solenoid valve B, the CVT drive pulley pressure control solenoid valve, the CVT driven pulley pressure control solenoid valve, the CVT clutch pressure control solenoid valve, and the CVT lock-up clutch control solenoid valve while receiving input signals from various sensors and switches located throughout the vehicle. The PCM actuates the CVT drive pulley pressure control solenoid valve and the CVT driven pulley pressure control solenoid valve to change drive and driven pulley pressures. The drive pulley pressure is applied to the drive pulley, and the driven pulley pressure is applied to the driven pulley, and pulley ratio is changed to their effective ratio.

### Lock-Up Mechanism

The lock-up mechanism of the torque converter clutch operates in D position, S position, L position<sup>\*1</sup>, sequential sportshift mode (from 3rd through 7th speed stage)<sup>\*2</sup>, 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 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 activates, the shift solenoid valve B pressure changes to switch 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. Shift solenoid valve B is mounted on the clutch reducing valve body, and the CVT lock-up clutch control solenoid valve is included in the secondary valve body located in the transmission housing. They are all controlled by the PCM.

\*1: Six-position transmission

\*2: Five-position transmission

### Gear Selection

The shift lever has following position;

Position		Description
P: PARK		Front wheels locked; the park pawl engages with the park gear on the driven pulley. The forward clutch disengage.
R: REVERSE		The reverse brake engages, and it locks with the planetary carrier to the transmission housing.
N: NEUTRAL		The forward clutch disengage.
D: DRIVE		Transmission automatically adjusts to keep the engine at the best rpm for driving under all conditions. The lock-up mechanism operates in this position.
S: SPORT	Automatic Shift Mode (Sport Driving Mode)	Transmission automatically adjusts to keep the engine at a higher rpm than in D driving conditions for sport driving. The lock-up mechanism operates in this position.
	Sequential Sportshift Mode <sup>*1</sup>	The transmission can be manually shifted from 1st through 7th speed stage using the steering wheel-mounted paddle shifters. The lock-up mechanism operates in this position.
L: LOW <sup>*2</sup>		For engine braking and power for climbing; the transmission shifts into the lowest pulley ratio. The lock-up mechanism operates in this position.

<sup>\*1</sup>: Five-position transmission

<sup>\*2</sup>: Six-position transmission

Starting the engine is possible only when the transmission is in P or N position because of a neutral-safety switch.

### Automatic Transmission (A/T) Gear Position Indicator

The A/T gear position indicator in the gauge control module shows which shift lever position has been selected without having look down at the console.