2. TORQUE CONVERTER

▶ Function (4WD)

Torque converter is installed between engine and automatic transmission. It consists of pump impeller, turbine and stator. The pump impeller is welded at converter housing and the converter housing is bolted at the drive plate. The torque converter converts the mechanical energy from engine to hydraulic energy, and the turbine connected to transmission input shaft converts this hydraulic energy to mechanical energy again.

The stator between pump and turbine increases the output torque from turbine by converting the flowing direction. The stator has a torque converter area that changes the flowing direction and a fluid coupling area where the stator rotates. And, the lockup clutch integrated in torque converter prevents the power from losing and reduces fuel consumption.
Lock Up Clutch

Lockup clutch consists of multiple disc clutches as shown in the figure and is activated in 3rd, 4th and 5th gears.

The aim of using torque converter lockup clutch is to reduce the fuel consumption and exhaust gas emissions of the vehicle by reducing torque converter slip. This stands in contradiction to the ride comfort demands made on the drive train with regard to its vibration behaviors. The task of the electronic transmission control is therefore to close the clutch in all driving situations relevant to fuel consumption, if possible, and ensure that the engine vibrations are isolated from the drive train.

The characteristic curves shown in the diagram illustrate the different operating states of the torque converter lockup clutch in relation to the accelerator pedal position and the transmission output speed, plotted for one transmission gear.

Variables influencing the states of the torque converter lockup clutch:

1. Accelerator pedal movement
2. Uphill and downhill gradients
3. Transmission shift functions
4. Transmission oil temperature
5. Load conditions
6. Engine control influences
7. If the fluid temperature is over 130°C, the lock up clutch is operated at 1st and 2nd gears. (to reduce the fluid temperature)
**Lock-up Clutch Control Valve**

The lock-up clutch regulating valve controls the lockup clutch in the torque converter and distributes the lubricating oil to the friction parts. TCU generates the lockup clutch control pressure by duty controlling the lockup solenoid valve, and this pressure is applied to the lockup clutch regulating valve to engage, disengage and slip the lockup clutch.

When the lockup clutch control pressure is increased, the lockup clutch regulating valve moves up and the working pressure is applied to the lockup clutch. In its regulating position (slipping, torque converter lockup clutch pressurized), a reduced volume of lubricating oil flows through the annular passage bypassing the torque converter and passing direct through the oil cooler into the transmission. The rest of the lubricating oil is directed via the throttle “a” into the torque converter in order to cool the torque converter lockup clutch.