

Transmission Control Systems: Description and Operation

CVT Automatic Transmission

Transaxle Electronic Control System

This is a list of components that are incorporated within the mechatronic assembly:

- ^ Transmission control module (TCM)
- ^ Transmission fluid temperature (TFT) sensor
- ^ Speed sensors
- ^ Turbine shaft speed (TSS) sensor and primary variator speed sensor
- ^ Main control valve body
- ^ Pressure control solenoids
- ^ Pressure sensors

The output shaft speed (OSS) is part of the transaxle electronic control system but it is not part of the mechatronic assembly. The OSS sensor is bolted to the case and reads the differential gear.

Mechatronic Assembly

The mechatronic assembly is a large assembly located in the transaxle fluid pan. The assembly consists of:

- ^ Hydraulic main control valve body
- ^ Five pressure control (VFS) solenoids
- ^ Two pressure sensors
- ^ Transmission control module (TCM)
- ^ Transmission fluid temperature sensor
- ^ Two speed sensors

Main Control Valve Body

The valve body controls the system hydraulic pressure, clutch apply pressure and variator pressure using hydraulic valves actuated by pressure control solenoids controlled by the TCM.

Pressure Control Solenoids

The 5 pressure control solenoids are of a variable force solenoid (VFS) type:

- ^ Main pressure control (PCA) solenoid A
- ^ Main system pressure
- ^ TCC torque converter clutch apply
- ^ Pressure control (PCB) solenoid B primary variator pulley pressure
- ^ Pressure control (PCC) solenoid C secondary variator pulley pressure
- ^ Pressure control (PCD) solenoid supplies pressure for forward and reverse clutches

Pressure Sensors

There are 2 pressure sensors:

- ^ Main system pressure sensor
- ^ Secondary variator (output pulley) pressure

Transmission Control Module (TCM)

The transmission control module controls transaxle function. It is the transaxle-to-vehicle-system interface. Also supplies the signal to the powertrain control module (PCM) for starter interlock. Diagnostic trouble codes that are transaxle-related are supplied to the PCM, ABS and AWD modules from the TCM. The transmission fluid temperature sensor is built into the TCM.

TCM monitored inputs from other electronic modules:

- ^ Electronic control module (ECM)
 - throttle position sensor
 - engine torque
 - engine speed
- ^ ABS module
 - vehicle speed
 - wheel speed
 - active states
- ^ Traction control module (AWD)
 - vehicle speed
 - wheel speed
 - active states
- ^ Anti-lock brake system

Transmission Fluid Temperature (TFT) Sensor

The TCM utilizes one transmission fluid temperature sensor which is integrated within the TCM. The TCM uses the sensor input to activate various operational strategies.

Speed Sensors

The CVT transaxle uses 3 speed sensors:

- ^ Primary variator speed sensor
- ^ Turbine shaft speed (TSS) sensor
- ^ Output shaft speed (OSS) sensor

Turbine Shaft Speed (TSS) Sensor and Primary Variator Speed Sensor

The primary variator speed sensor and the turbine shaft speed (TSS) sensor are housed in the transmission control module (TCM). The TCM is attached to the mechatronic unit. Both speed sensors are Hall-effect.

The primary variator speed sensor reads the primary pulley shaft speed.

The speed sensor for the primary pulley is part of the transmission control module. It is a non-contact Hall sensor which measures the rotational speed of the primary pulley.

Output Shaft (OSS) Sensor

The OSS sensor functions as 2 sensors in one. The OSS sensor indicates output shaft speed by reading the differential spur gear. The OSS sensor also provides rotational direction for forward and reverse motion. The OSS sensor connects to the mechatronic assembly electronically.

Transmission Range Sensor

The transaxle range sensor is located within the transaxle. This sensor is a Hall-effect type sensor. It detects the driver selected transaxle range through a mechanical linkage from the range selector lever.