DESCRIPTION AND OPERATION

Four-Wheel Drive Systems

The vehicle is equipped with an intelligent 4-wheel drive (4WD) system that is always active and requires no driver input. The system has no mode select switch. The system combines transparent all-surface operation with highly capable 4WD, and is capable of handling all road conditions, including street and highway driving as well as off-road and winter driving.

The 4WD system continuously monitors vehicle conditions and automatically adjusts the torque distribution between the front and rear wheels. During normal operation, most of the torque is sent to the front wheels. If wheel slip between the front and rear wheels is detected, or if the vehicle is under heavy acceleration (high throttle position), the 4WD system increases torque to the rear wheels to prevent or control wheel slip.

The 4WD system consists of a power take off unit (PTU), rear driveshaft, coupling device control module (4WD control module), rear axle and coupling device.

The 4WD control module varies the torque sent to the rear wheels by sending a duty cycle based on the amount of current sent to the clutch to the active torque coupling device located inside the rear axle. The 4WD control module also provides the brake system with its current clutch duty cycle and whether or not the brake system may take command of the clutch duty cycle.

NOTE: The active torque coupling is not repairable. If replacement is required, the active torque coupling and rear axle are replaced as an assembly. For additional information, refer to Section 205-02.

The PTU is a gearbox that attaches to the transaxle. On automatic transaxle vehicles, the right hand halfshaft passes through the transfer case and engages the differential side gear as in normal FWD applications. The transaxle halfshaft drives the PTU. The PTU then drives the driveshaft at all times. The driveshaft drives one half of the rear axle clutch pack. The other half of the rear axle clutch pack drives the rear axle ring and pinion.

NOTE: PTU repair is limited to seals, gaskets and output flanges. If any of the geared components, bearings, case cover or internal shafts fail, a new transfer case must be installed.

The PTU is sealed from the transaxle and has its own oil sump. The PTU on an automatic transaxle vehicle uses 355 ml (12 oz.) of SAE 75W-140 gear lubricant. The PTU on a manual transaxle vehicle uses 350 ml (12 oz.) of SAE 80W-90 gear lubricant.

The active, on-demand 4WD system uses data from other systems as inputs to the 4WD control module. The 4WD control module uses the inputs to determine the appropriate amount of current to send to the active torque coupling that delivers the desired torque to the rear wheels. Specific inputs to the 4WD control module are:

- throttle position.
- transaxle range from the powertrain control module (PCM).
- brake system status from the anti-lock brake system (ABS).
- wheel speed from all 4 wheels from the ABS.

Some outputs of the 4WD control module are:

- solid-state clutch (pulse-width modulated signal) to the active torque coupling.
- 4WD indicator received by the instrument cluster.
- percent of torque transfer commanded signal to the PCM.
- torque request available signal to the ABS.

Heat Protection Mode

During very extreme off-road operation, the 4WD system has a heat protection system to protect the active torque coupling from damage. If the system detects an overheat condition, it enters a locked mode and turns on the 4WD indicator light in the instrument cluster. If the heat in the system continues to rise once in the locked mode, the 4WD control module disables the active torque coupling and causes the 4WD indicator light to flash continuously.

DESCRIPTION AND OPERATION (Continued)

4WD Indicator Light

4WD — Illuminates continuously when the 4WD system is locked into permanent 4WD due to its heat protection mode. In the locked mode, the vehicle resists turning and binds up when driven on dry pavement. To exit the locked mode, stop the vehicle and allow it to cool for 5 minutes with the engine running. When the 4WD indicator turns OFF, normal 4WD system function is restored.

4WD — Blinks continuously when the 4WD system is disabled due to its heat protection mode. To exit the disabled mode, stop the vehicle and allow it to cool for 5 minutes with the engine running. When the indicator turns OFF, normal 4WD system function is restored.

4WD — Blinks 3, 6, 8 or 10 times every minute when the 4WD system requires service. Use a diagnostic tool to check for diagnostic trouble codes (DTCs). Refer to the Four-Wheel Drive (4WD) Control Module Diagnostic Trouble Code (DTC) Index in this section.

Blinks	Cause
3	Cluster is not receiving the 4WD indicator message from the 4WD control module
6	Invalid throttle position data received from the PCM
8	Invalid wheel speed data received from the ABS module
10	Active torque coupling circuit fault

4WD Messages in Message Center

SERVICE 4WD — Displayed when the 4WD system requires service. Use a diagnostic tool to check for DTCs. Refer to the Four-Wheel Drive (4WD) Control Module Diagnostic Trouble Code (DTC) Index in this section.

4WD LOCKED TEMPORARILY — Displayed when the 4WD system is locked due to heat protection. In the locked mode the vehicle resists turning and binds up when driven on dry pavement. To exit the locked mode, stop the vehicle and allow it to cool.

4WD DISABLED TEMPORARILY — Displayed when the 4WD system is disengaged due to heat protection. To exit the disabled mode, stop the vehicle and allow it to cool.

4WD AUTO RESTORED — Displayed when normal 4WD system function is restored after a heat protection system occurrence.