

DESCRIPTION

OVERVIEW

The Torque Converter Clutch (TCC) assembly consists of a 3-element torque converter with the addition of a converter clutch. The converter clutch is an internal mechanism with friction material attached to front face. It is splined to the turbine assembly in converter.

The purpose of the torque converter clutch feature is to eliminate power loss due to slippage when vehicle is cruising. This allows the convenience of an automatic transmission and the fuel economy of a manual transmission.

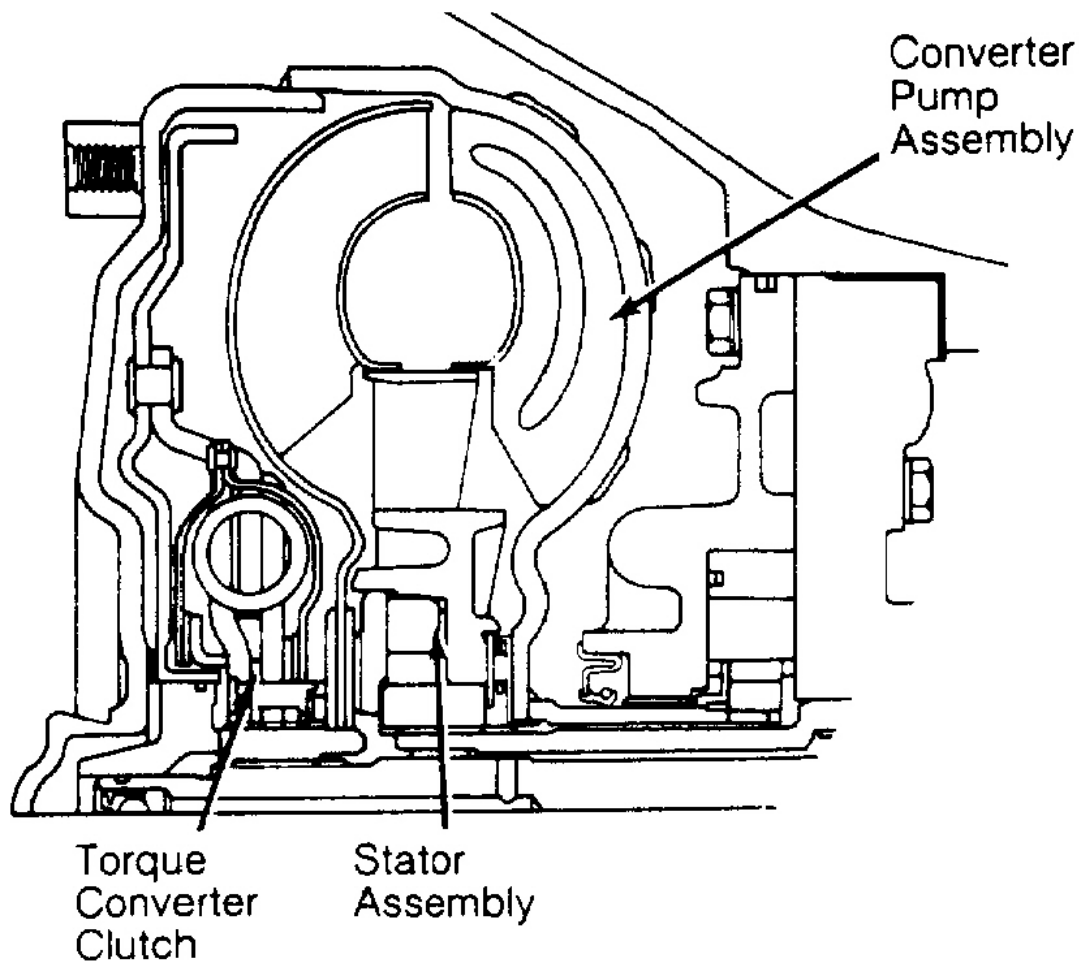
When the TCC solenoid ground circuit is completed by the Electronic Control Module (ECM), the torque converter clutch is applied, resulting in a direct mechanical coupling between engine and transmission. When TCC solenoid is deactivated, the torque converter clutch is released, allowing torque converter clutch to operate in a conventional manner.

TCC CONTROL COMPONENTS

The following components are used to engage/disengage torque converter clutch. Not all components will be present on all vehicles.

Brake Switch

Power from ignition switch passes through brake switch to TCC solenoid. When brake pedal is depressed with TCC engaged, power to TCC solenoid is interrupted, releasing converter clutch and preventing engine from stalling.



THM 4L60 shown. Other models are similar.

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Fig. 1: Torque Converter Assembly With TCC

Courtesy of GENERAL MOTORS CORP.

Coolant Temperature Sensor

This sensor provides ECM with engine coolant temperature information. ECM will not allow TCC operation until signal from this sensor indicates coolant temperature greater than 130-150 deg. F (55-65 deg. C).

Electronic Control Module (ECM)

To determine application of torque converter clutch, ECM receives and processes information from various input devices. On the most sophisticated vehicles, these devices may include the vehicle speed sensor, coolant temperature sensor, throttle position sensor, 3rd or 4th gear switch and brake switch. The ECM controls application of torque converter clutch by providing a ground circuit for the TCC solenoid circuit.

TCC Solenoid Assembly

Energized by ECM to redirect transaxle fluid to the converter clutch apply valve in the auxiliary control

valve assembly.

Throttle Position Sensor (TPS)

Provides ECM with throttle position information. TCC operation is prevented when throttle position signal is less than a specified value.

Vacuum Sensor

Sends engine vacuum (load) information to ECM.

Vehicle Speed Sensor (VSS)

This sensor sends vehicle speed information to ECM. Vehicle speed must be greater than a certain value before TCC can be applied. Two types of speed sensor are used. A light emitting diode type is used in the instrument cluster on some models. Other models use a Permanent Magnet (PM) generator mounted in the transmission.

3rd & 4th Gear Switch

When open, 3rd and 4th gear switches prevent TCC operation. Switch status may be monitored by ECM, or switch may be an integral portion (series circuit) of TCC solenoid power supply.

TROUBLE SHOOTING

NOTE: Every diagnosis of automatic transmission problems should begin with a check of the transmission fluid and linkage. Most of the following conditions can be caused by one or more of the following factors: (1) Incorrect fluid level, (2) Contaminated fluid, (3) Improperly adjusted linkage, or (4) Damaged or worn linkage. When diagnosing Converter Clutch problems, ensure engine and vacuum systems are in perfect operating order.

NO CONVERTER CLUTCH APPLY**Problem in Electronic Control Module**

- Verify Electronic Control Module (ECM) operation. See appropriate CHART C-8 in this article.

Electrical Problems

- Voltage not reaching transmission. Ensure 12 volts reach transmission to engage solenoid.
- Ground inside transmission. Ensure solenoid is not grounded inside case.
- Defective connector, wiring harness, or solenoid. Check and repair or replace as required. Defective pressure switch (if equipped). Check and replace pressure switch as required.
- 3rd and 4th gear switch inoperative. Check and replace switch(es) as required.

Valve Body Assembly

- Sticking converter clutch shift and/or apply valve. Clean, service and/or replace valve body as required.

- Sticking throttle valve. Clean, service and/or replace valve body as required.
- Inspect valve body and service as required.

Oil Pump Assembly

- Orifice plugged for converter signal oil in pump. Clean and inspect orifice for blockage.
- Solenoid "O" ring damaged or missing. Check and replace "O" ring.
- Oil pump wear plate or gasket mispositioned or damaged. Check and replace wear plate or gasket.
- Improper torque on oil pump-to-converter housing bolts. Tighten bolts to specifications.
- Turbine shaft seals damaged. Check and replace seals.
- Orifice cup plug omitted from cooler in passage. Check and install plug.
- Check and replace converter clutch blow-off check ball if not seated or if damaged. Check and replace torque converter clutch accumulator piston or seal if damaged.

CONVERTER CLUTCH APPLY SLIPS, ROUGH OR SHUDDERS

- Converter clutch pressure plate faulty. Check plate for damage and service as required.
- Damaged or missing check ball in end of turbine shaft. Check and replace turbine shaft, if required.
- Converter clutch regulator valve stuck. Clean, service and/or replace valve body as required.
- Converter clutch accumulator piston or seal damaged. Check and service as required.
- Channel plate seals damaged or missing. Check and service as required.

CONVERTER CLUTCH DOES NOT RELEASE

- Solenoid does not exhaust. Verify Electronic Control Module operation. See appropriate CHART C-8 in this article.
- Converter clutch apply valve stuck. Clean, service and/or replace valve body as required.
- Check damaged converter. Replace torque converter.
- Cup plug missing from pump release passage. Check and replace plug or pump assembly.
- Turbine shaft end seal damaged or missing. Check and replace end seal or turbine shaft as required.
- Hole not drilled through turbine shaft. Replace turbine shaft.