

2010 Transmission

Automatic Transmission - 6T30/6T40/6T45 - Equinox & Terrain

DTC P0218

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTOR

DTC P0218

Transmission Fluid Overtemperature

CIRCUIT/SYSTEM DESCRIPTION

The primary source of heat in the transmission is the torque converter. Hot oil exits the torque converter through the torque converter clutch (TCC) control valve and flows to the transmission cooler supply line. The supply line connects to the cooler, which is in the radiator. From the cooler, the oil returns through the oil cooler return line and enters the lubrication circuits. After lubricating the internal components, the oil returns to the oil pan. The transmission fluid temperature (TFT) sensor is located in the control solenoid valve assembly.

CONDITIONS FOR RUNNING THE DTC

The TFT is -39 to +149°C (-38 to +300°F) for 5 seconds.

CONDITIONS FOR SETTING THE DTC

The transmission control module (TCM) temperature is 140°C (284°F) or greater for 1 minute.

ACTION TAKEN WHEN THE DTC SETS

DTC P0218 is a Type C DTC.

CONDITIONS FOR CLEARING THE DTC

DTC P0218 is a Type C DTC.

DIAGNOSTIC AIDS

The driver information center (DIC), if equipped, will display 'TRANSMISSION HOT- Idle Engine' when the TFT reaches 132°C (270°F). The TFT on the scan tool should rise steadily to a normal operating temperature,

and then stabilize. Ask about the customer's driving habits, trailer towing, etc. Trailer towing should occur in D4. Ensure the engine cooling system is functioning normally.

REFERENCE INFORMATION

Schematic Reference

- Park - Engine Running
- Fluid Passages

Description and Operation

- Transmission General Description
- Transmission Component and System Description

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

1. Review the Failure Records when the DTC set. Verify the engine coolant temperature is less than 125°C (257°F).
 - If greater than the specified range, refer to Engine Overheating.
2. Inspect the transmission cooling system for restrictions or damage.
3. Perform the Transmission Fluid Level and Condition Check to verify correct fluid level and condition.
4. Perform the Transmission Fluid Cooler Flushing and Flow Test to verify proper transmission oil cooler flow.
5. Perform the Line Pressure Check to verify proper transmission line pressure.
6. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

REPAIR PROCEDURES

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Perform the Transmission Adaptive Values Learn following all transmission related repairs.

DTC P0562 OR P0563

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0562

System Voltage Low Voltage

DTC P0563

System Voltage High Voltage

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	High Resistance	Short to Voltage	Signal Performance
Battery Voltage	P2534	P0562, P2534	-	P0562, P2534
Ground	-	P0562, P2534	-	P0722, P0723

CIRCUIT/SYSTEM DESCRIPTION

The transmission control module (TCM) continuously monitors the system voltage on the Ignition 1 voltage circuits. Lower than normal voltage may be inadequate to operate the transmission control solenoids properly. Improper solenoid operation may cause erratic transmission operation, which may result in internal damage. Theses DTC detects high or low TCM voltage for an extended period.

CONDITIONS FOR RUNNING THE DTC

P0562

- Ignition voltage was greater than 6.0 volts, and has not dropped below 2.0 volts.
- Engine speed is greater than 1,200 RPM.

P0563

The ignition voltage was greater than 6.0 volts, and has not dropped below 2.0 volts.

CONDITIONS FOR SETTING THE DTC

P0562

The TCM detects system voltage is 11 volts or less for 4 seconds in a period of 12 seconds.

P0563

The TCM detects system voltage is 18 volts or greater for 10 seconds in a period of 12 seconds.

ACTION TAKEN WHEN THE DTC SETS

DTCs P0562 and P0563 are Type C DTCs.

CONDITIONS FOR CLEARING THE DTC

DTCs P0562 and P0563 are Type C DTCs.

DIAGNOSTIC AIDS

- Observe the driver information center (DIC) messaging that would indicate the electrical system requires service.
- Inspect for the following conditions:
 - Loose or damaged terminals at the generator
 - Loose or worn generator drive belt
- Running the engine with a battery charger attached may cause DTC P0563 to set.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Description and Operation

- **Charging System Description and Operation**
- **Transmission Component and System Description**
- **Electronic Component Description**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

DT-48616-10: Adapter Harness

For equivalent regional tools, refer to Special Tools .

CIRCUIT/SYSTEM VERIFICATION

1. Engine running, accessories OFF, measure and record the battery voltage at the battery terminals with a DMM. The voltage should be between 12.6-15.0 volts.
 - If not within the specified range, or the charge indicator light is ON, refer to Charging System Test .
2. Observe the scan tool TCM Ignition Voltage parameter. The reading should be between 12.6-15.0 volts.
3. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the 14-way harness connector at the transmission.
2. Connect the **DT-48616-10:** harness to the 14-way transmission harness connector.
3. Test for less than 5 ohms between the ground circuit terminal 2 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
4. Ignition ON, verify that a test lamp illuminates between the B+ terminal and ground, and the ignition circuit terminals listed below and ground.
 - Terminal 1
 - Terminal 12
 - Terminal 13
 - If the test lamp does not illuminate, test the affected B+ or ignition circuit for a short to ground or an open/high resistance.
5. If all circuits test normal, replace the control solenoid valve assembly.

REPAIR PROCEDURES

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .
- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.

DTC P0601-P0604 OR P062F

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

NOTE: DTCs P0601, P0602, P0603, P0604 or P062F could set in other control modules. Verify the DTCs are set in the transmission control module (TCM).

DTC P0601

Control Module Read Only Memory Performance

DTC P0602

Control Module Not Programmed

DTC P0603

Control Module Long Term Memory Reset

DTC P0604

Control Module Random Access Memory Performance

DTC P062F

Control Module Long Term Memory Performance

CIRCUIT/SYSTEM DESCRIPTION

This is an internal fault detection of the control solenoid valve assembly. This fault is handled inside the control solenoid valve assembly and no external circuits are involved.

CONDITIONS FOR RUNNING THE DTC

Ignition voltage is between 9.0 and 18.0 volts.

CONDITIONS FOR SETTING THE DTC

P0601

The read only memory (ROM) test has failed 5 or more times.

P0602

The TCM has not been programmed and is unable to detect the start program.

P0603

The TCM has detected a memory checksum error.

P0604

The TCM random access memory (RAM) test has failed 5 or more times.

P062F

The TCM has detected a non-volatile memory error during power-down.

ACTION TAKEN WHEN THE DTC SETS

P0601, P0603, P0604, and P062F

- DTCs P0601, P0603, P0604, and P062F are Type A DTCs.
- The TCM commands maximum line pressure.
- The TCM forces the torque converter clutch (TCC) OFF.
- The TCM inhibits TCC engagement.
- The TCM freezes transmission adaptive functions.
- The TCM commands the high side driver OFF.
- The TCM defaults the transmission to 5th gear and reverse.
- Torque management is enabled.
- The TCM inhibits Tap Up/Down function.
- The TCM inhibits manual shifting of forward gears.

P0602

- DTC P0602 is a type C DTC.
- The TCM commands maximum line pressure.
- The TCM forces the torque converter clutch (TCC) OFF.
- The TCM inhibits TCC engagement.

- The TCM freezes transmission adaptive functions.
- The TCM defaults the transmission to 5th gear and reverse.
- The TCM inhibits Tap Up/Down function.
- The TCM inhibits manual shifting of forward gears.

CONDITIONS FOR CLEARING THE DTC

- DTCs P0601, P0603, P0604, and P062F are Type A DTCs.
- DTC P0602 is a type C DTC.

REFERENCE INFORMATION

Description and Operation

Refer to **Electronic Component Description** for control solenoid valve assembly information.

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

CAUTION: Before programming a control module, the following must be observed, or control module damage may occur:

- The TIS terminal, MDI, and/or scan tool must have the latest software.
- The vehicle battery must be fully charged. The battery voltage should be between 12-14 volts.
- The TIS terminal, MDI, and/or scan tool connections must be secure.
- A battery charger must NOT be connected to the battery when programming a control module.

1. Ignition OFF for 1 minute.
2. Ignition ON, with a scan tool, verify that DTC P0602 is not set.
 - If the DTC is set, program the transmission control module (TCM). Refer to **Control Solenoid Valve and Transmission Control Module Assembly Programming and Setup (6T70/6T75)** or **Control Solenoid Valve and Transmission Control Module Assembly Programming and Setup (6T30/6T40/6T45/6T50)** . If the DTC resets, replace the control solenoid valve assembly.

Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .

3. Observe the DTC information with a scan tool. DTCs P0601, P0603, P0604, and P062F should not set.
 - If a DTC P0601, P0603, P0604 or P062F are set, replace the control solenoid valve assembly.
4. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.

DTC P0634

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTOR

DTC P0634

Control Module Overtemperature

CIRCUIT/SYSTEM DESCRIPTION

The transmission control module (TCM) temperature sensor is located inside of the control solenoid valve assembly which has no serviceable components. The TCM monitors the TCM sensor for over temperature protection.

CONDITIONS FOR RUNNING THE DTC

- The TCM temperature is between 0°C (32°F) and 240°C (464°F) for 0.25 second or greater.
- DTC P0634 is not set.
- The ignition voltage is greater than 9.0 volts.

CONDITIONS FOR SETTING THE DTC

Condition 1

The TCM has detected an internal temperature condition greater than 144°C (291°F) for 5 seconds or greater.

Condition 2

Ignition voltage is 18 volts or greater and the TCM temperature is greater than 50°C (122°F) for 2 seconds.

ACTION TAKEN WHEN THE DTC SETS

- DTC P0634 is a Type A DTC.
- The TCM limits the transmission to 5th gear and reverse.
- The TCM inhibits Tap Up/Down function.
- The TCM enables torque management.
- The TCM shuts down.
- The TCM commands maximum line pressure.

CONDITIONS FOR CLEARING THE DTC

DTC P0634 is a Type A DTC.

DIAGNOSTIC AIDS

During a road test, the TCM temperature should steadily increase to a normal operating temperature, and then stabilize.

REFERENCE INFORMATION

Description and Operation

Electronic Component Description for control solenoid valve assembly information.

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

NOTE: **If DTC P0218 is set, diagnose that DTC first.**

1. Ignition ON, review the Failure Records when the DTC set. Verify the scan tool Engine Coolant Temperature parameter was less than 125°C (257°F).
 - If greater than the specified range, refer to **Engine Overheating** .

- 2. Perform the **Transmission Fluid Level and Condition Check** to verify correct fluid level and condition.
- 3. Perform the **Transmission Fluid Cooler Flushing and Flow Test** to verify proper transmission oil cooler flow.
- 4. Operate the vehicle within the conditions for running and setting the DTC until normal engine temperature is reached. Verify the scan tool TCM Temperature parameter is less than 146°C (295°F).
 - If greater than the specified range, inspect the transmission cooling system. Obstructions to the airflow of the radiator or transmission due to debris, kinked or damaged transmission fluid lines, or damage to the transmission cooler. If all the items test normal, replace the control solenoid valve assembly.
- 5. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.
- Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .

DTC P0658 OR P0659

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0658

Actuator High Control Circuit Group 1 Low Voltage

DTC P0659

Actuator High Control Circuit Group 1 High Voltage

DIAGNOSTIC FAULT INFORMATION

	Short to	Open/High	Short to
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Circuit	Ground	Resistance	Voltage
High Side Driver 1	P0658	P0658	P0659

CIRCUIT/SYSTEM DESCRIPTION

The transmission control module (TCM) high side driver 1 is located inside the control solenoid valve assembly which has no serviceable components. The high side driver 1 provides power to the TCM pressure control solenoids and shift solenoids. This fault is handled inside the TCM and no external circuits are involved.

CONDITIONS FOR RUNNING THE DTC

P0658

- High side driver 1 is enabled.
- DTC P0658 has not set this ignition cycle.

P0659

- DTC P0659 has not set this ignition cycle.
- Ignition transitions from OFF to ON.

CONDITIONS FOR SETTING THE DTC

P0658

The TCM detects an internal open or short to ground in the high side driver 1 circuit for 1 second.

P0659

The TCM detects an internal short to voltage on the high side driver 1 circuit for 1 second.

ACTION TAKEN WHEN THE DTC SETS

P0658

- DTC P0658 is a Type A DTC.
- The TCM turns the high side driver OFF.
- The TCM commands all solenoids OFF.
- The TCM commands the TCC OFF.
- The TCM commands maximum line pressure.
- The TCM freezes transmission adaptive functions.
- The TCM inhibits the Tap Up/Tap Down function.
- The TCM inhibits manual shifting of forward gears.
- The TCM defaults the transmission to 5th gear and reverse.

- The TCM enables torque management.

P0659

DTC P0659 is a Type C DTC.

CONDITIONS FOR CLEARING THE DTC

- DTC P0658 is a Type A DTC.
- DTC P0659 is a Type C DTC.

DIAGNOSTIC AIDS

When DTC P0658 sets, the line pressure control solenoid, and pressure control solenoids 2 and 3, will default to maximum pressure. This results in maximum line pressure to the 3-5 reverse clutch, and low/reverse clutch, when reverse is selected, and the 4-5-6 clutch, when forward is selected.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**
- **Electronic Component Description**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

DT-48616-10: Adapter Harness

For equivalent regional tools, refer to **Special Tools** .

CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON, verify with a scan tool the High Side Driver 1 parameter displays ON.
2. Engine Running, gear selector lever in Park position. Verify with a scan tool the following test status parameters displays OK.
 - High Side Driver 1 Circuit High Voltage Test Status
 - High Side Driver 1 Circuit Open Test Status
 - High Side Driver 1 Circuit Low Voltage Test Status
3. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

NOTE: **You must perform the Circuit/System Verification first.**

1. Ignition OFF, remove the control solenoid assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
2. Perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .
3. Place the control solenoid valve assembly on a clean work surface near the transmission assembly.
4. Connect **DT-48616-10:** harness between the vehicle wire harness electrical connector, and the control solenoid valve assembly electrical connector.
5. Ignition ON, verify with a scan tool the following test status parameters displays, OK.
 - High Side Driver 1 Circuit High Voltage Test Status
 - High Side Driver 1 Circuit Open Test Status
 - High Side Driver 1 Circuit Low Voltage Test Status
 - If any test status parameter displays Fault or Malfunction, replace the control solenoid valve assembly.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and

programming.

- Perform the Transmission Adaptive Values Learn following all transmission related repairs.

DTC P0667, P0668, OR P0669

DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0667

Control Module Temperature Sensor Performance

DTC P0668

Control Module Temperature Sensor Circuit Low Voltage

DTC P0669

Control Module Temperature Sensor Circuit High Voltage

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
TCM Temperature Sensor	P0668	P0669	-	P0667

CIRCUIT/SYSTEM DESCRIPTION

The transmission control module (TCM) temperature sensor is located inside of the control solenoid valve assembly which has no serviceable components. The TCM temperature sensor provides the temperature of the TCM. This temperature reading is used in various shifting and diagnostic routines in the TCM software. This fault is handled inside the TCM and no external circuits are involved.

CONDITIONS FOR RUNNING THE DTC

P0667

- No DTCs P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P0401, P042E, P0658, P0667, P0668, P0669, P06AD, P06AE, P0712, P0713, P0716, P0717, P0722, P0723, P0962, P0963, P0966, P0967, P0970, P0971, P215C, P2720, P2721, P2729, or

P2730.

- The engine torque signal is valid.
- The ignition voltage is 9.0 volts or greater.
- The engine speed is greater than 500 RPM for 5 seconds or greater.
- The throttle position signal is valid.

P0668

- The ignition voltage is 9.0 volts or greater.
- The engine speed is greater than 500 RPM for 5 seconds or greater.
- DTC P0668 has not set.

P0669

- No ISS DTCs P0716 or P0717.
- No OSS DTCs P0722 or P0723.
- The ignition voltage is 9.0 volts or greater.
- The engine speed is greater than 500 RPM for 5 seconds or greater.
- DTC P0669 has not set.

CONDITIONS FOR SETTING THE DTC

P0667

- The difference between the transmission fluid temperature (TFT) and TCM substrate temperature is greater than 20-50°C (36-90°F), depending on the average of the TFT, TCM substrate, and TCM power up temperatures.
- The difference between the TCM power up temperature and TCM substrate temperature is greater than 8-10°C (14-18°F) depending on the average of the TFT, TCM substrate, and TCM power up temperatures.
- The above conditions have to be met for 5 minutes within a 6 minute period.

P0668

The TCM internal temperature is 254°C (489°F) or greater for 1 minute.

P0669

The TCM internal temperature is -254°C (-425°F) or less for 1 minute.

ACTION TAKEN WHEN THE DTC SETS

- DTCs P0667, P0668, and P0669 are Type B DTCs.
- The TCM defaults to using the TCM power up temperature sensor value in place of the TCM temperature value.

CONDITIONS FOR CLEARING THE DTC

DTCs P0667, P0668, and P0669 are Type B DTCs.

DIAGNOSTIC AIDS

The TCM temperature sensor is located inside of the control solenoid valve assembly and its output should resemble that of the transmission fluid temperature (TFT) sensor output.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- Component Connector End Views
- Inline Harness Connector End Views

Description and Operation

- Transmission General Description
- Transmission Component and System Description
- Electronic Component Description

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON, Engine OFF. Verify the scan tool TCM Temperature parameter is between -254 and +254°C (-425 and +489°F).

- If not within the specified range, replace the control solenoid valve assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
- 2. Operate the vehicle at 64 km/h (40 mph) for 10 minutes. Monitor the TCM Temperature parameter and the Transmission Fluid Temperature parameter with a scan tool. The TCM Temperature parameter should increase by more than 2°C (3.5°F). Also, the TCM Temperature parameter and the Transmission Fluid Temperature parameter should be within 20°C (36°F) of each other.
 - If the TCM Temperature parameter does not increase by greater than 2°C (3.5°F) or the TCM Temperature parameter value is not within 20°C (36°F) of the Transmission Fluid Temperature parameter, then replace the control solenoid valve assembly.
- 3. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

NOTE: Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.

DTC P06AC, P06AD, OR P06AE

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P06AC

Transmission Control Module Power Up Temperature Sensor Performance

DTC P06AD

Transmission Control Module Power Up Temperature Sensor Circuit Low Voltage

DTC P06AE

Transmission Control Module Power Up Temperature Sensor Circuit High Voltage

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
TCM Temperature Sensor	P06AD	P06AE	P06AE	P06AC

CIRCUIT/SYSTEM DESCRIPTION

The transmission control module (TCM) power up temperature sensor is located inside of the control solenoid valve assembly which has no serviceable components. The TCM power up temperature sensor provides the temperature of the TCM when the TCM power is on. This temperature reading is used in various shifting and diagnostic routines in the TCM software. This fault is handled inside the TCM and no external circuits are involved.

CONDITIONS FOR RUNNING THE DTC

P06AC

- No DTCs ECM: P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P0401, P042E, P0658, P0668, P0669, P06AD, P06AE, P0712, P0713, P0716, P0717, P0722, P0723, P0962, P0963, P0966, P0967, P0970, P0971, P215C, P2720, P2721, P2729, or P2730.
- The throttle position signal is valid.
- The engine speed is 500 RPM or greater for 5 seconds.
- The ignition voltage is 9.0 volts or greater.
- DTC P06AC has not set this ignition cycle.
- The engine torque signal is valid.

P06AD

- No ISS DTCs P0716 or P0717.
- No OSS DTCs P0722 or P0723.
- The engine speed is 500 RPM or greater for 5 seconds.
- The ignition voltage is 9.0 volts or greater.
- DTC P06AD has not set this ignition cycle.

P06AE

- The engine speed is 500 RPM or greater for 5 seconds.
- The ignition voltage is 9.0 volts or greater.
- DTC P06AE has not set this ignition cycle.

CONDITIONS FOR SETTING THE DTC

P06AC

- The difference between the transmission fluid temperature (TFT) and TCM power up temperature is greater than 20-50°C (36-90°F), depending on the average of the TFT, TCM substrate, and TCM power up temperatures.
- The difference between the TCM power up temperature and TCM substrate temperature is greater than 8-10°C (14-18°F) depending on the average of the TFT, TCM substrate, and TCM power up temperatures.
- The above conditions have to be met for 5 minutes within a 6 minute period.

P06AD

The TCM power up temperature is -254°C (-425°F) or less for 1 minute.

P06AE

The TCM power up temperature is 254°C (489°F) or greater for 1 minute.

ACTION TAKEN WHEN THE DTC SETS

DTCs P06AC, P06AD, and P06AE are Type C DTCs.

CONDITIONS FOR CLEARING THE DTC

DTCs P06AC, P06AD, and P06AE are Type C DTCs.

DIAGNOSTIC AIDS

During a road test, the TCM Power-Up temperature should steadily increase to a normal operating temperature, and then stabilize.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**

- **Wiring Repairs**

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**
- **Electronic Component Description**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

1. Operate the vehicle at 64 km/h (40 mph) for 10 minutes.
 - If the DTC resets, replace the control solenoid valve assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
2. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

NOTE: Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.

DTC P0711, P0712, OR P0713

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0711

Transmission Fluid Temperature Sensor Performance

DTC P0712

Transmission Fluid Temperature Sensor Circuit Low Voltage

DTC P0713

Transmission Fluid Temperature Sensor Circuit High Voltage

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
TFT Sensor	P0712	P0713	P0713	P0711

TYPICAL SCAN TOOL DATA

Transmission Fluid Temperature

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Operating Conditions: Drive vehicle, normal operating temperature Parameter Normal Range: -40 to 140°C (-40 to 284°F)			
Transmission Fluid Temperature	>= +254°C / +489°F	<= -254°C / -425°F	<= -254°C / -425°F

CIRCUIT/SYSTEM DESCRIPTION

The transmission fluid temperature (TFT) sensor is located inside of the transmission control solenoid valve assembly which has no serviceable components. The TFT sensor provides transmission fluid temperature to the transmission control module (TCM). This fault is handled inside the TCM and no external circuits are involved.

CONDITIONS FOR RUNNING THE DTC

P0711

- No DTCs P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P0401, P042E, P0658, P0668, P0669, P06AD, P06AE, P0711, P0712, P0713, P0717, P0722, P0723, P0962, P0963, P0966, P0967, P0970, P0971, P215C, P2720, P2721, P2729, or P2730.
- The engine speed is greater than 500 RPM for 5 seconds.
- The ignition voltage is greater than 9.0 volts.
- Throttle position signal is valid.
- The engine torque signal is valid.

P0712

- The engine speed is greater than 500 RPM for 5 seconds.
- The ignition voltage is greater than 9.0 volts.
- DTC P0712 has not set this ignition cycle.
- No DTCs P0716, P0717, P0722, or P0723.

P0713

- The engine speed is greater than 500 RPM for 5 seconds.
- The ignition voltage is greater than 9.0 volts.
- DTC P0713 has not set this ignition cycle.
- No DTCs P0716, P0717, P0722, or P0723.

CONDITIONS FOR SETTING THE DTC

P0711

The difference between the transmission fluid temperature (TFT) and TCM temperature and the difference between the TFT and TCM power up temperature are both greater than 20-50°C (36-90°F). The temperature threshold is dependent on the average temperature of the TFT, TCM temperature, and TCM power up temperature.

P0712

The TFT is greater than 254°C (489°F) for 1 minute.

P0713

The TFT is less than -254°C (-425°F) for 1 minute.

ACTION TAKEN WHEN THE DTC SETS

- DTCs P0711, P0712, and P0713 are Type B DTCs.
- The TCM defaults to a calculated TFT based on the TCM temperature.

CONDITIONS FOR CLEARING THE DTC

DTCs P0711, P0712, and P0713 are Type B DTCs.

DIAGNOSTICS AIDS

The TCM temperature sensor is located inside of the control solenoid valve assembly and its output should resemble that of the TFT sensor's output.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- Component Connector End Views
- Inline Harness Connector End Views

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Description and Operation

- Electronic Component Description for control solenoid valve assembly
- Transmission General Description
- Transmission Component and System Description

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

1. Engine idling at operating temperature, verify the scan tool Trans Fluid Temp. parameter is between -254 and +254°C (-425 and +489°F).
 - If not within the specified range, replace the control solenoid valve assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
2. Operate the vehicle at 64 km/h (40 mph) for 10 minutes. Monitor the Transmission Fluid Temperature parameter and the TCM Temperature parameter with a scan tool. The Transmission Fluid Temperature parameter should increase by greater than 2°C (3.5°F). Also, the Transmission Fluid Temperature parameter and the TCM Temperature parameter should be within 20°C (36°F) of each other.
 - If the Transmission Fluid Temperature parameter does not increase by greater than 2°C (3.5°F) or the Transmission Fluid Temperature parameter is not within 20°C (36°F) of the TCM Temperature parameter, then replace the control solenoid valve assembly.
3. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure

Records data.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

NOTE: Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.

DTC P0716 OR P0717

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0716

Input Speed Sensor Performance

DTC P0717

Input Speed Sensor Circuit No Signal

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Input Speed Sensor Supply Voltage	P0716, P0717	P0716, P0717	P0716, P0717	P0716
Input Speed Sensor Signal	P0716, P0717	P0716, P0717	P0716, P0717	P0716

TYPICAL SCAN TOOL DATA

Transmission ISS

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Operating Conditions: Engine running, normal operating temperature, transmission in PARK Parameter Normal Range: 500-5,800 RPM			

ISS/OSS Supply Voltage	0 RPM	0 RPM	0 RPM
ISS Signal	0 RPM	0 RPM	0 RPM

ISS/OSS Supply Voltage

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Operating Conditions: Key ON, Engine OFF or Engine running, normal operating temperature Parameter Normal Range: OK			
ISS Signal	OK	OK	OK
ISS Supply Voltage	Out of Range	Out of Range	Out of Range

CIRCUIT/SYSTEM DESCRIPTION

The input speed sensor (ISS) is a hall-effect type sensor. The ISS mounts to the inside of the automatic transmission case assembly and connects to the control solenoid valve assembly through a 2-wire harness and connector. The sensor faces the reluctor wheel which is attached to the 4-5-6 clutch and 3-5-R clutch housing assembly. The sensor receives battery voltage on the input speed sensor ISS Supply Voltage circuit from the transmission control module (TCM). As the 4-5-6 clutch and 3-5-R clutch housing rotates, the sensor produces a signal frequency based on the teeth of the reluctor wheel. This signal is transmitted through the ISS signal circuit to the TCM. The TCM uses the ISS signal to determine line pressure, transmission shift patterns, torque converter clutch (TCC) slip speed and gear ratio.

CONDITIONS FOR RUNNING THE DTC

P0716

- No DTCs P0101, P0102, P0103, P0121, P0122, P0123, P0717, P0752, P0973, or P0974.
- Vehicle speed is 10 km/h (6 mph) or greater.
- The engine speed is greater than 500 RPM for 5 seconds.
- The ignition voltage is 9.0 volts or greater.
- DTC P0716 has not set this ignition cycle.
- Torque signal is valid.
- Throttle position signal is valid.

P0717

- DTC P0717 has not set this ignition cycle.
- The engine speed is greater than 500 RPM for 5 seconds.
- The ignition voltage is 9.0 volts or greater.
- The vehicle speed is greater than 16 km/h (10 mph).
- The engine torque is greater than 50 N.m (37 lb ft).

CONDITIONS FOR SETTING THE DTC

P0716

Transmission input speed drops 1,350 RPM for greater than 1 second and does not recover.

P0717

Transmission input shaft speed is less than 50 RPM for 5 seconds when output speed is detected.

ACTION TAKEN WHEN THE DTC SETS

P0716

- P0716 is a Type A DTC.
- The TCM freezes transmission adaptive functions.
- The TCM forces TCC OFF.
- The TCM inhibits Tap-Up/Tap-Down functions.
- TCM inhibits manual up, manual down shifts with the shift selector.
- TCM commands maximum line pressure.
- The TCM enables torque management.
- The TCM limits the transmission to reverse and 5th gear.
- The TCM commands the high side driver off.

P0717

- P0717 is a Type A DTC.
- The TCM freezes transmission adaptive functions.
- The TCM forces TCC OFF.
- TCM commands maximum line pressure.
- The TCM inhibits Tap-Up/Tap-Down functions.
- TCM inhibits manual up, manual down shifts with the shift selector.
- The TCM defaults the transmission to 2nd gear when a forward range is selected.

CONDITIONS FOR CLEARING THE DTC

P0716 and P0717 are Type A DTCs.

DIAGNOSTIC AIDS

Inspect the ISS, harness and connector for metallic debris and the reluctor wheel for damage or misalignment.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**
- **Electronic Component Description**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **DT-48616-10:** Adapter Harness
- **J 38522:** Variable Signal Generator

For equivalent regional tools, refer to **Special Tools** .

CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON, verify with a scan tool the transmission ISS/OSS Supply Voltage test status parameter displays OK.
2. Engine idling in PARK, observe the scan tool Transmission ISS parameter while varying the engine speed. The Transmission ISS parameter should change with the engine speed and not drop out.
3. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

NOTE: You must perform the **Circuit/System Verification** first.

1. Ignition OFF, remove the control solenoid valve assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
2. Connect the **DT-48616-10**: harness between the vehicle wire harness electrical connector, and the control solenoid valve assembly.
3. Ignition ON, verify 11-13 volts between the ISS voltage circuit terminal B on the control solenoid valve assembly and ground.
 - o If not within the specified range, replace the control solenoid valve assembly.
4. Perform the **Control Solenoid Valve and Transmission Control Module Assembly Input Shaft Speed/Output Shaft Speed Input Test** .
5. Inspect the reluctor for damage or misalignment. Repair or replace as necessary.
6. If all of the above test normal, replace the input speed sensor.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

NOTE: Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.
- Perform the **Input and Output Speed Sensor Removal** and the **Input and Output Speed Sensor Installation** .

DTC P071A

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTOR

DTC P071A

Transmission Tow Mode Switch Circuit

CIRCUIT/SYSTEM DESCRIPTION

Tow/haul mode enables the operator to achieve enhanced shift performance when towing or hauling a load. When tow/haul mode is selected, the tow/haul switch input signal to the body control module (BCM) is momentarily toggled to zero volts. This signals the transmission control module (TCM) to extend the length of time between upshifts and increase transmission line pressure. Cycling the tow/haul switch again disables tow/haul mode and returns the transmission to a normal shift pattern.

CONDITIONS FOR RUNNING THE DTC

- DTC P1762 is not set.
- The engine speed is greater than 500 RPM for 5 seconds.
- The system voltage is 9-18 volts.

CONDITIONS FOR SETTING THE DTC

The Tow Mode switch remains closed, low voltage, for 10 minutes.

ACTION TAKEN WHEN THE DTC SETS

- DTC P071A is a Type C DTC.
- Tow Mode is disabled.

CONDITIONS FOR CLEARING THE DTC

DTC P071A is a Type C DTC.

DIAGNOSTIC AIDS

If the electrical circuit tests are OK and the shift pattern is not occurring, there may be a mechanical/hydraulic condition that prevents operation. Refer to **Symptoms - Automatic Transmission** .

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Transmission General Description

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL 35616: GM-Approved Terminal Test Kit

For equivalent regional tools, refer to **Special Tools** .

CIRCUIT/SYSTEM VERIFICATION

Turn ON the ignition, with the engine OFF. Cycle the tow/haul switch while observing the Tow/Haul Mode parameter on the scan tool.

CIRCUIT/SYSTEM TESTING

1. Ignition OFF, remove connector from the tow/haul switch.
2. Ignition ON, install a fused jumper wire between the tow/haul switch signal and ground circuits of the tow/haul switch connector. Use a scan tool to verify that the Tow/Haul Mode parameter status changes.
 - If the scan tool Tow/Haul Mode indicates a status change, replace the tow/haul switch.
3. Using the **EL 35616:** kit, install a fused jumper wire from the tow/haul switch signal circuit of the tow/haul switch connector to ground. Use a scan tool to verify that the Tow/Haul Mode parameter status changes.
 - If Tow/Haul Mode status changes, test the tow haul switch ground circuit for an open/high resistance or short to ground.
 - If the Tow/Haul Mode status did not change, test the tow haul mode signal circuit for an open/high resistance or a short to ground. If the circuit tests normal, replace the BCM.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the repair.

DTC P071D

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTOR

DTC P071D

Transmission Sport Mode Switch circuit

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Trans Mode Switch B Signal	P071D	-	-	P071D

CIRCUIT/SYSTEM DESCRIPTION

The sport and economy shift modes allow driver selection of 2 different shift patterns. Sport mode programming in the transmission control module (TCM) increases transmission line pressure and extends shift points for performance enhanced driving. In the economy mode, the TCM uses standard programming, permitting normal line pressure and shifting. The sport mode switch is a console mounted momentary contact switch located on or near the electronic PRNDL assembly. Accessory voltage is supplied to the electronic PRNDL assembly through the ELEC PRNDL fuse. When the sport mode switch is depressed, it momentarily contacts the switch signal circuit. The rear integration module (RIM) recognizes the voltage on the circuit and sends a class 2 serial data message to the dash integration module (DIM). The DIM sends a class 2 message to the engine control module (ECM). The ECM sends a request to the transmission control module (TCM) through the controller area network (CAN) to enable the sport mode program.

The TCM evaluates the request, and if operating conditions are correct for enabling the program, the TCM sends a confirmation message to the ECM. The ECM then requests the instrument panel cluster (IPC) to illuminate the sport mode indicator.

The sport mode feature remains enabled until the sport mode switch is pressed again. Once disabled, the TCM will return to the economy mode programming.

CONDITIONS FOR RUNNING THE DTC

- The engine speed is greater than 500 RPM for 5 seconds.
- Ignition voltage is between 9.0 volts and 19.0 volts.

CONDITIONS FOR SETTING THE DTC

The TCM detects that the Sport Mode Switch has been continuously activated for 10 minutes.

ACTION TAKEN WHEN THE DTC SETS

- DTC P071D is a type C DTC.
- The TCM inhibits the sport mode shift pattern.
- The TCM inhibits Tap Up/Down function.
- The TCM inhibits manual shifting of forward gears.

CONDITIONS FOR CLEARING THE DTC

DTC P071D is a Type C DTC.

DIAGNOSTIC AIDS

Diagnose all communication and body DTCs first.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**
- **Electronic Component Description**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON. While observing the sport mode indicator on the IPC, press the sport mode switch several times. Does the sport mode indicator illuminate On and Off with switch operation?
 - Test the instrument panel cluster (IPC) for proper operation and lamp illumination. Refer to **Diagnostic System Check - Vehicle**.
 - Test the rear integration module (RIM) for proper sport mode switch input and output operation. Refer to **Control Module References**.
 - If the DTC resets, go to Circuit/System Testing.
2. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

IMPORTANT: You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.

1. Ignition ON, engine OFF. While observing the sport mode indicator on the IPC, press the sport mode switch several times. Is the sport mode indicator always ON?
 - Test the accessory voltage circuit for an open.
 - Test the sport mode switch signal circuit for an open.
 - Test the electronic PRNDL ground circuits for on open.
 - If an open circuit is found, replace the electronic PRNDL assembly.
2. While observing the sport mode indicator on the IPC, disconnect the electronic PRNDL assembly from the console wiring harness connector. Is the sport mode indicator still illuminated?
 - If the sport mode indicator is illuminated, replace the electronic PRNDL assembly.
3. Test the sport mode switch signal circuit for a short to ground. If the circuit test good replace the sport mode switch.

COMPONENT TESTING

1. Disconnect the electronic PRNDL assembly.
2. Connect a DMM, between the sport mode switch signal circuit and the ground circuit of the electronic PRNDL assembly.
3. Set the DMM to measure resistance. While observing the DMM, press the sport mode switch several times. Does the resistance toggle between very low resistance to very high resistance as the switch is pressed?
 - If the resistance toggles between very low resistance and very high resistance, replace the electronic PRNDL assembly.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Manual Shift Detent Lever with Shaft Position Switch Assembly Replacement

DTC P0722 OR P0723

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0722

Output Speed Sensor Circuit No Signal

DTC P0723

Output Speed Sensor Intermittent

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
OSS High Signal	P0722, P0723	P0722, P0723	P0722, P0723	-
OSS Supply Voltage	P0722, P0723	P0722, P0723	-	-

TYPICAL SCAN TOOL DATA

Transmission OSS

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Operating Conditions: Drive vehicle, normal operating temperature Parameter Normal Range: 0-7,000 RPM			
OSS Supply Voltage	0 RPM	0 RPM	0 RPM
Transmission OSS Signal	0 RPM	0 RPM	0 RPM

ISS/OSS Supply Voltage

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Operating Conditions: Key ON, Engine OFF or Engine running, normal operating temperature Parameter Normal Range: OK			

Transmission OSS Signal	OK	OK	OK
OSS Supply Voltage	Out of Range	Out of Range	Out of Range

CIRCUIT/SYSTEM DESCRIPTION

The output speed sensor (OSS) is a hall-effect type sensor. The OSS mounts to the automatic transmission case assembly and connects to the control solenoid valve assembly through a 2-wire harness and connector. The sensor faces the park gear teeth. The sensor receives battery voltage on the OSS supply voltage circuit from the transmission control module (TCM). As the output shaft rotates, the sensor produces a signal frequency based on the park gear teeth. This signal is transmitted through the OSS signal circuit to the TCM. The TCM uses the OSS signal to determine line pressure, transmission shift patterns, vehicle speed and gear ratio.

CONDITIONS FOR RUNNING THE DTC

P0722

- No DTCs P0101, P0102, P0103, P0121, P0122, P0123, P0716, P0717, P0722, or P0723.
- The ignition voltage is 9.0 volts or greater.
- The engine speed is greater than 500 RPM for 5 seconds.
- The engine torque signal is valid.
- The throttle position signal is valid.
- The transmission input speed is between 1,000-8,191 RPM.
- The calc. throttle position is greater than 8 percent.
- The engine torque is greater than 30 N.m (22 lb ft).
- The TFT is greater than -40°C (-40°F).

P0723

- No DTCs P0101, P0102, P0103, P0121, P0122, P0123 P0716, P0717, P0723, P0973, P0974, P0976, or P0977.
- The ignition voltage is 9.0 volts or greater.
- Greater than 5 seconds since last range change.
- The engine torque signal is valid.
- The throttle position signal is valid.

CONDITIONS FOR SETTING THE DTC

P0722

The transmission output speed is 35 RPM or less for 5 seconds.

P0723

- The transmission output speed is 105 RPM or greater.

- The transmission output speed drops 1000 RPM for greater than 3 seconds and does not recover.

ACTION TAKEN WHEN THE DTC SETS

P0722

- P0722 is a Type A DTC.
- The TCM freezes transmission adaptive functions.
- TCM commands maximum line pressure.
- The TCM forces the torque converter clutch (TCC) OFF.
- The TCM defaults the transmission to 2nd gear.
- The TCM inhibits Tap-Up/Tap-Down functions.
- The TCM inhibits manual up, manual down shifts with the shift selector.

P0723

- P0723 is a Type A DTC.
- The TCM freezes transmission adaptive functions.
- The TCM forces TCC OFF.
- The TCM commands the high side driver OFF.
- The TCM commands maximum line pressure.
- The TCM enables torque management.
- The transmission defaults to reverse and 5th gear.
- The TCM inhibits Tap-Up/Tap-Down functions.
- The TCM inhibits manual up, manual down shifts with the shift selector.

CONDITIONS FOR CLEARING THE DIC/DTC

DTCs P0722 and P0723 are Type A DTCs.

DIAGNOSTIC AIDS

Inspect the OSS, harness, and connector for metallic debris and proper alignment of the OSS with the park gear. Proper torque of the OSS mounting bolt is critical to proper OSS operation.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**
- **Electronic Component Description** for output speed sensor (OSS)

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **DT-48616-10:** Adapter Harness
- **J 38522:** Variable Signal Generator

For equivalent regional tools, refer to **Special Tools** .

CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON, verify with a scan tool the transmission ISS/OSS Supply Voltage test status parameter displays OK.
2. Operate the vehicle at 16-32 km/h (10-20 mph) while observing the Transmission OSS parameter on the scan tool. The Transmission OSS should vary with the vehicle speed and not drop out.
3. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

NOTE: **You must perform the Circuit/System Verification first.**

1. Ignition OFF, remove the control solenoid valve assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
2. Connect the **DT-48616-10**: harness between the vehicle wire harness electrical connector, and the control solenoid valve assembly.
3. Ignition ON, verify 11-13 volts between the OSS voltage circuit terminal B on the control solenoid valve assembly and ground.
 - If not within the specified range, replace the control solenoid valve assembly.
4. Perform the **Control Solenoid Valve and Transmission Control Module Assembly Input Shaft Speed/Output Shaft Speed Input Test** .
5. Inspect the park gear and OSS alignment with the gear. Repair or replace as necessary.
6. If all of the above test normal, replace the OSS.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

NOTE: Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.
- Perform the **Input and Output Speed Sensor Removal** and the **Input and Output Speed Sensor Installation** .

DTC P0741 OR P0742

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0741

Torque Converter Clutch (TCC) - System Stuck Off

DTC P0742

Torque Converter Clutch (TCC) - System Stuck On

CIRCUIT/SYSTEM DESCRIPTION

The torque converter clutch (TCC) pressure control (PC) solenoid is part of the control solenoid valve assembly which has no serviceable components. The TCC PC solenoid is a normally low pressure control solenoid. The TCC PC solenoid regulates transmission fluid pressure to the TCC regulator valve in the lower valve body and the TCC control valve in the fluid pump assembly. When vehicle operating conditions are appropriate to apply the converter clutch, the transmission control module (TCM) will increase TCC PC current flow (duty cycle) thereby increasing pressure to move the TCC control valve into the apply position. When the TCC is fully applied, the engine is coupled directly to the transmission. TCC release is accomplished by the TCM decreasing current flow, dropping the apply pressure thereby allowing the TCC control valve to move to the release position. The TCM calculates torque converter slip speed based on the RPM signal from the input speed sensor (ISS) and engine RPM provided by the engine control module (ECM).

CONDITIONS FOR RUNNING THE DTC

P0741

- No DTCs P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P0401, P042E, P0716, P0717, P0722, P0723, P0741, P0742, P2763, or P2764.
- The engine speed is greater than 500 RPM for 5 seconds.
- The ignition voltage is 9.0 volts or greater.
- The transmission fluid temperature (TFT) is 20-130°C (68-266°F).
- The calc. throttle position is greater than 8 percent.
- The engine torque is greater than 50 N.m (36 lb ft).
- The 2nd gear ratio is between 2.75-3.17.
- The 3rd gear ratio is between 1.78-2.04.
- The 4th gear ratio is between 1.35-1.55.
- The 5th gear is between 0.93-1.07.
- The 6th gear is between 0.70-0.80.
- The TCC is commanded ON.
- The engine torque signal is valid.
- The throttle position signal is valid.

P0742

- No DTCs P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P0401, P042E, P0716, P0717, P0722, P0723, P0741, P0742, P2763, or P2764.
- The engine speed is greater than 500 RPM for 5 seconds.
- The ignition voltage is 9.0 volts or greater.
- The TFT is 20-130°C (68-266°F).
- The calc. throttle position is greater than 8 percent.
- The engine torque is greater than 80 N.m (59 lb ft).
- Vehicle speed greater than 16 km/h (10 mph).

- Commanded gear is 2nd or greater.
- The gear ratio is between 0.69-1.97.
- Solenoid A is enabled.

CONDITIONS FOR SETTING THE DTC

P0741

The TCM detects TCC slip greater than 150 RPM for 3 seconds with a TCC commanded ON pressure of 500 kPa or greater. This must occur 9 times during the same ignition cycle.

P0742

The TCM detects the TCC slip between -20 and 30 RPM for 1.2 seconds or greater when the TCC is commanded OFF 6 times during the same ignition cycle.

ACTION TAKEN WHEN THE DTC SETS

P0741

- DTC P0741 is a Type A DTC.
- The TCM inhibits high gear.
- The TCM initiates the Hot Mode shift pattern.

P0742

- DTC P0742 is a Type A DTC.
- The TCM initiates Hot Mode shift pattern.
- The TCM freezes transmission adaptive functions.

CONDITIONS FOR CLEARING THE DIC/DTC

P0741

DTC P0741 is a Type B DTC.

P0742

DTC P0742 is a Type A DTC.

DIAGNOSTIC AIDS

When attempting to set transmission performance DTCs, observe the Freeze Frame and Failure Records to assist in duplicating the failure conditions. Ensure the transmission fluid level is correct and there are no leaks.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

- Transmission General Description
- Transmission Component and System Description
- Electronic Component Description

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

1. Perform the Transmission Fluid Level and Condition Check to verify correct fluid level and condition.
2. Perform the Control Solenoid Valve and Transmission Control Module Assembly Cleaning in order to dislodge debris and free up the valves.
3. Engine idling in Park, verify with a scan tool the transmission ISS/OSS Supply Voltage parameter displays OK.
4. Engine idling in Park, observe the Transmission ISS parameter on the scan tool, while varying the engine speed. The Transmission ISS parameter should vary with engine speed and not drop out.

NOTE: **Perform a scan tool snapshot during the road test.**

5. Perform the Road Test . Verify the transmission operation performs as indicated in the road test instructions.
6. Review the snapshot transmission data parameters. Verify the engine and transmission data parameters display the correct values in all forward gear ranges.

- Engine Speed
 - Engine Coolant Temperature
 - Transmission ISS
 - Transmission OSS
 - Trans. Fluid Temp.
 - Brake Switch
 - TCC PC Sol. Pressure Cmd.
 - TCC Slip Speed
7. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

1. Perform the **Line Pressure Check** . Verify the transmission line pressures are within the range specified in the Line PC Solenoid Valve Pressure table. Refer to **Solenoid Valve Pressure** .
 - If not within the specified ranges, refer to **Fluid Pressure High or Low** .
2. Ignition OFF, remove the control solenoid valve assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
3. Perform the **Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test** .
 - If the control solenoid valve assembly does not pass the test, replace the control solenoid valve assembly.
4. Listed in the table below are conditions for each component that could set a DTC P0741 or P0742. Carefully inspect each component for that condition. Repair or replace as necessary.

DTCs	Component	Condition
P0741 P0742	Upper Valve Body	TCC Control Valve • Stuck TCC control valve • Damaged valve/bore
P0741 P0742	Upper Valve Body	TCC Regulator Valve • Stuck TCC regulator valve • Damaged valve/bore
P0741 P0742	Control Solenoid Valve Assembly	TCC Pressure Control Solenoid • Not pressurizing - Stuck OFF or leaking • Not exhausting - Stuck ON • Control signal fluid supply leak - valve body filter plate assembly cracked, or damaged gasket seal

P0741	Torque Converter	• Torque converter clutch delamination or material worn off • Damaged seal • Converter bolts too long damaging the clutch apply surface
P0741	Support	Damaged seal
P0741 P0742	A/Trans Case Cover (403)	Release Blow-off • Not seating/sealing • Damaged Spring
P0741	Upper Valve Body	Release exhaust port/orifice plugged or blocked
P0741	Turbine Shaft	Turbine shaft O-ring seal cut or damaged

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

NOTE: Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.
- Perform the **Torque Converter Removal** and the **Torque Converter Installation** .

DTC P0751 OR P0752

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0751

Shift Solenoid 1 Valve Performance - Stuck Off

DTC P0752

Shift Solenoid 1 Valve Performance - Stuck On

CIRCUIT/SYSTEM DESCRIPTION

The shift solenoid (SS) valve 1 is part of the control solenoid valve assembly, which has no serviceable components. The SS valve 1 is a normally closed (NC) solenoid valve and controls fluid pressure to the clutch select valve. When SS valve 1 is commanded on, fluid pressure acts on the clutch select valve, moving the valve to another position. Fluid from the R1/4-5-6 regulator valve flows through the clutch select valve and is directed to either the low and reverse clutch or the 4-5-6 clutch, depending on the position of the clutch select valve.

CONDITIONS FOR RUNNING THE DTC

- No DTCs P0121, P0122, P0123, P0716, P0717, P0722, P0723, or P182E.
- The transmission fluid temperature (TFT) is 0°C (32°F) or greater.
- Engine speed is greater than 500 RPM for 5 seconds.
- The output shaft speed is greater than 0 RPM or the throttle is greater than 0.5 percent.
- The ignition voltage is 9.0 volts or greater.
- The shift is complete.
- The engine torque signal is valid.
- The throttle position signal is valid.
- High-Side driver is enabled.

CONDITIONS FOR SETTING THE DTC

P0751

The TCM detects gear slip greater than 200 RPM for 1.5 seconds with 1st gear commanded and the closest gear ratio is 4th gear. This must occur 8 times.

P0752

The TCM detects gear slip greater than 200 RPM for 1.5 seconds when 3rd gear is commanded and the closest gear ratio is 4th gear. This must occur 5 times.

ACTION TAKEN WHEN THE DTC SETS

P0751

- DTC P0751 is a type B DTC.
- The TCM inhibits 1st gear.
- The transmission control module (TCM) inhibits Neutral idle.

P0752

- DTC P0752 is a type A DTC.
- The TCM limits the transmission to 2nd range and reverse.
- The TCM inhibits Tap Up/Down function.
- The TCM inhibits manual shifting of forward gears.

- The TCM disables neutral idle.
- The TCM freezes adapts.
- The TCM commands maximum line pressure.

CONDITIONS FOR CLEARING THE DTC

P0751

DTC P0751 is a type B DTC.

P0752

DTC P0752 is a type A DTC.

REFERENCE INFORMATION

Schematic Reference

Drive Range, First Gear Engine Braking

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **DT-48616:** Control Solenoid Test Plate
- **DT-48616-10:** Adapter Harness
- **J 21867:** Pressure Gauge

For equivalent regional tools, refer to **Special Tools** .

CIRCUIT/SYSTEM VERIFICATION

1. Perform the **Transmission Fluid Level and Condition Check** to verify correct fluid level and condition.
2. From a stop, accelerate to 72 km/h (45 mph) with the calculated throttle position greater than 15 percent. Perform this test 2 times. The DTCs should not set.
3. Verify the scan tool Shift Solenoid 1 and Gear Ratio parameters are correct for each gear range. Refer to **Shift Solenoid Valve State and Gear Ratio** .
4. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

1. Perform the **Line Pressure Check** . Verify the transmission line pressures are within the range specified in the Line PC Solenoid Valve Pressure table. Refer to **Solenoid Valve Pressure** .
 - If not within the specified range, refer to **Fluid Pressure High or Low** .
2. Ignition OFF, remove the control solenoid valve assembly.
3. Perform the **Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test** .
 - If the control solenoid valve assembly does not pass the performance test, replace the control solenoid valve assembly.
4. Listed in the table below, are conditions for each component that could set DTC P0751 or P0752. Carefully inspect each component for that condition.

DTCs	Component	Condition
P0751 P0752	Control Valve Body	Clutch select valve stuck - debris, sediment, binding, or scored bore
P0751	Control Valve Body	Bore Plug - Clutch Select Valve - Undersized bore plug causing a leak. Plug should be a valve fit in the bore.
P0751	Control Valve Body	Check ball #1 missing, damaged/malformed, Seat in the valve body damage/leaking.
P0751 P0752	Control Solenoid Valve Assembly	• Not pressurizing - Stuck OFF or leaking • Not exhausting - Stuck On • Control signal fluid supply leak - valve body filter plate assembly cracked or damaged gasket seal
P0751 P0752	Control Valve Body	Low and Reverse and 4-5-6 Clutch Regulator Valve Stuck or sticking - debris, sediment, binding, or scored bore

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

IMPORTANT: Before replacing the TCM, perform the Control Solenoid Valve and Transmission Control Module Assembly Inspection .

- Refer to Control Module References for control solenoid valve assembly replacement, setup, and programming.
- Perform the Transmission Adaptive Values Learn following all transmission related repairs.

DTC P0776 OR P0777

DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0776

Clutch Pressure Control Solenoid 2 - Stuck Off

DTC P0777

Clutch Pressure Control Solenoid 2 - Stuck On

CIRCUIT/SYSTEM DESCRIPTION

The clutch pressure control (PC) solenoid 2 is part of the control solenoid valve assembly which has no serviceable components. PC solenoid 2 regulates transmission fluid pressure to the 3-5-R regulator valve which controls pressure to the 3-5-R clutch. The transmission control module (TCM) calculates gear ratio based on the RPM signals from the input speed sensor (ISS) and the output speed sensor (OSS). The TCM compares the expected transmission gear ratio to the calculated gear ratio for each commanded gear.

CONDITIONS FOR RUNNING THE DTC

P0776

- No ISS DTCs P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P0401, P042E, P0716, P0717, P0722, P0723, or P182E.
- The engine speed is greater than 500 RPM for 5 seconds.
- The ignition voltage is 9.0 volts or greater.
- The transmission fluid temperature is 0°C (32°F) or greater.
- The transmission output speed is 650 RPM or greater or the throttle position is 0.5 percent or greater.
- The throttle position signal is valid.

- The high side driver (HSD) is enabled.

P0777

- No DTCs P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P0401, P042E, P0716, P0717, P0722, P0723, or P182E.
- The engine speed is greater than 500 RPM for 5 seconds.
- The ignition voltage is 9.0 volts or greater.
- The transmission fluid temperature is 0°C (32°F) or greater.
- The transmission output shaft speed is 200 RPM or greater.
- The throttle position signal is valid.
- The HSD is enabled.

CONDITIONS FOR SETTING THE DTC

P0776

The TCM detects an incorrect on-coming clutch gear ratio, or flare, when the 3-5-R clutch is commanded ON for 3 seconds and the transmission input shaft speed is 200 RPM or greater from the anticipated input shaft speed.

P0777

The TCM detects an incorrect off-going clutch gear ratio, or tie-up, when the 3-5-R clutch is commanded OFF for 1 second and the transmission input shaft speed is 40 RPM or less from the anticipated input shaft speed.

ACTION TAKEN WHEN THE DTC SETS

P0776

- DTC P0776 is a Type A DTC.
- The TCM commands maximum line pressure.
- The TCM limits the transmission to 2nd gear operation.
- The TCM freezes transmission adaptive functions.
- The TCM inhibits TAP Up/TAP Down function.
- The TCM inhibits manual shifting of forward gears.

P0777

- DTC P0777 is a Type A DTC.
- The TCM commands maximum line pressure.
- The TCM limits the transmission to 3rd gear operation.
- The TCM freezes transmission adaptive functions.

- The TCM inhibits TAP Up/TAP Down function.
- The TCM inhibits manual shifting of forward gears.

CONDITIONS FOR CLEARING THE DIC/DTC

DTCs P0776 and P0777 are Type A DTCs.

REFERENCE INFORMATION

Schematic Reference

- Drive Range, Third Gear
- Drive Range, Fifth Gear

Description and Operation

- Transmission General Description
- Transmission Component and System Description

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

WARNING: Apply the parking brake and block the drive wheels before performing this procedure in order to prevent bodily injury.

NOTE: If other DTCs are set, diagnose those DTCs first.

1. Engine idling in Park, with parking brake applied and drive wheels chocked.
2. Perform the Transmission Fluid Level and Condition Check , to verify correct fluid level and condition.
3. Perform the Control Solenoid Valve and Transmission Control Module Assembly Cleaning , to dislodge debris and free up the valves.
4. Monitor the Transmission Fluid Pressure (TFP) switch 1 with a scan tool. Place the gear select lever in Park, Reverse, and Neutral range. Verify the TFP switch 1 parameter states are correct for Park, Reverse, and Neutral. Refer to Transmission Fluid Pressure Switch Logic .
5. Place the gear select lever in Drive range. Command the shift transmission with a scan tool through all forward ranges. Verify the TFP switch 1 parameter states are correct for all forward ranges. Refer to

Transmission Fluid Pressure Switch Logic

6. Engine idling in Park, verify with a scan tool the Transmission ISS/OSS Supply Voltage test status parameter displays OK.
7. Engine idling in Park. Observe the Transmission ISS parameter on the scan tool, while varying the engine speed. The Transmission ISS parameter should vary with engine speed and not drop out.
8. Operate the vehicle at 16-32 km/h (10-20 mph) while observing the Transmission OSS parameter on the scan tool. The Transmission OSS parameter should vary with the vehicle speed and not drop out.

NOTE: **Perform a Tech 2 snapshot during the road test.**

9. Perform the **Road Test** . Verify the transmission operation performs as indicated in the road test instructions.
10. Review the Tech 2 snapshot data. Verify the following transmission data parameters display the correct values for each gear range.
 - Transmission ISS
 - Transmission OSS
 - PC Solenoid 2
 - TFP Switch 1
11. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

NOTE: **You must perform the Circuit/System Verification first.**

1. Perform the **Line Pressure Check** . Verify the transmission line pressures are within the range specified in the Line PC Solenoid Valve Pressure table. Refer to **Solenoid Valve Pressure** .
 - If not within the specified ranges, refer to **Fluid Pressure High or Low** .
2. Ignition OFF, remove the control solenoid valve assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
3. Perform the **Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test** .
 - If the control solenoid valve assembly does not pass the performance test, replace the control solenoid valve assembly.
4. Inspect for the following conditions and repair or replace as necessary.

DTCs	Component	Condition
P0776 P0777	Control Valve Body Assembly	3-5-R Regulator Valve stuck/sticking - debris, binding, damaged valve, or scored bore
P0776	Control Solenoid Valve Assembly	• Clutch Pressure Control Solenoid 2 • O-ring seals leaking

P0777		Valve body filter plate assembly cracked, blocked, or damaged gasket seal
P0776 P0777	Control Valve Body Assembly	- Actuator feed limit circuit supply fluid to solenoids restricted or not available - debris or sediment blockage 3-5-R clutch regulator valve not in the applied position - debris, binding, damaged valve, or scored bore - Control valve body ball check valve not seating correctly - debris
P0776 P0777	Torque Converter (w/Fluid Pump) Housing Assembly	Fluid pump housing/gear damaged/scored
P0776	3-5-R and 4-5-6 Clutch Housing Assembly	3-5-R clutch backing plate retaining ring not seated, causing clutch pack overtravel

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

IMPORTANT: Before replacing the TCM, perform the Control Solenoid Valve and Transmission Control Module Assembly Inspection .

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.
- Perform the:
 - Internal Components Removal**
 - 3-5-Reverse and 4-5-6 Clutch Housing Disassemble**
 - 3-5-Reverse and 4-5-6 Clutch Housing Assemble**
 - 3-5-Reverse and 4-5-6 Clutch Housing, and Input, Reaction, and Output Carrier Installation**

DTC P0796 OR P0797

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0796

Clutch Pressure Control Solenoid 3 - Stuck Off

DTC P0797

Clutch Pressure Control Solenoid 3 - Stuck On

CIRCUIT/SYSTEM DESCRIPTION

The clutch pressure control (PC) solenoid 3 is part of the control solenoid valve assembly which has no serviceable components. PC solenoid 3 regulates transmission fluid pressure to the reverse/4-5-6 regulator valve which controls pressure to the reverse/4-5-6 clutch. The transmission control module (TCM) calculates gear ratio based on the RPM signals from the automatic transmission input speed sensor (ISS) and the output speed sensor (OSS). The TCM compares the expected transmission gear ratio to the calculated gear ratio for each commanded gear.

CONDITIONS FOR RUNNING THE DTC

P0796

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P0401, P042E, P0716, P0717, P0722, P0723, or P182E is not set.
- The engine speed is greater than 500 RPM for 5 seconds.
- The transmission output speed is 650 RPM or greater or the throttle position is 0.5 percent or greater.
- The ignition voltage is 9.0 volts or greater.
- The transmission fluid temperature is 0°C (32°F) or greater.
- The high side driver (HSD) is enabled.
- The throttle position signal is valid.

P0797

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P0401, P042E, P0716, P0717, P0722, P0723, or P182E is not set.
- The ignition voltage is 9.0 volts or greater.
- The transmission fluid temperature is 0°C (32°F) or greater.
- The HSD is enabled.
- The transmission output shaft speed is 200 RPM or greater.

CONDITIONS FOR SETTING THE DTC

P0796

The TCM detects an incorrect on-coming clutch gear ratio (incorrect gear ratio), or flare.

P0797

The TCM detects an incorrect off-going clutch gear ratio (incorrect gear ratio), or shift tie-up.

ACTION TAKEN WHEN THE DTC SETS

P0796

- DTC P0796 is a Type A DTC.
- The TCM commands maximum line pressure.
- The TCM inhibits torque converter clutch (TCC).
- The TCM freezes transmission adaptive functions.
- The TCM inhibits TAP Up/TAP Down functions.
- The TCM inhibits manual up, manual down shifts with the shift selector.
- The TCM limits the transmission to 3rd gear operation.

P0797

- DTC P0797 is a Type A DTC.
- The TCM commands maximum line pressure.
- The TCM inhibits TCC.
- The TCM freezes transmission adaptive functions.
- The TCM inhibits TAP Up/TAP Down functions.
- The TCM inhibits manual up, manual down shifts with the shift selector.
- The TCM limits the transmission to 4th gear operation.

CONDITIONS FOR CLEARING THE DIC/DTC

DTCs P0796 and P0797 are Type A DTCs.

DIAGNOSTIC AIDS

Before performing a road test, configure and setup the scan tool for snapshot mode. This allows you to monitor, display, and verify multiple transmission data parameters at one time, after the road test.

REFERENCE INFORMATION

Schematic Reference

- **Drive Range - Fourth Gear**
- **Drive Range, Fifth Gear**
- **Drive Range, Sixth Gear**

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**
- **Electronic Component Description**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

WARNING: Apply the parking brake and block the drive wheels before performing this procedure in order to prevent bodily injury.

NOTE: If other DTCs are set, diagnose those DTCs first.

1. Engine idling in Park, with parking brake applied and drive wheels chocked.
2. Perform the **Transmission Fluid Level and Condition Check** to verify correct fluid level and condition.
3. Perform the **Control Solenoid Valve and Transmission Control Module Assembly Cleaning** , to dislodge debris and free up the valves.
4. Monitor the Transmission Fluid Pressure (TFP) switch 5 with a scan tool. Place the gear select lever in Park, Reverse, and Neutral range. Verify the TFP switch 5 parameter states are correct for Park, Reverse, and Neutral. Refer to **Transmission Fluid Pressure Switch Logic** .
5. Place the gear select lever in Drive range. Command the shift transmission with a scan tool through all forward ranges. Verify the TFP switch 5 parameter states are correct for all forward ranges. Refer to **Transmission Fluid Pressure Switch Logic** .
6. Engine idling in Park, verify with a scan tool the Transmission ISS/OSS Supply Voltage test status parameter displays OK.
7. Engine idling in Park. Observe the Transmission ISS parameter on the scan tool, while varying the engine speed. The Transmission ISS parameter should vary with engine speed and not drop out.
8. Operate the vehicle at 16-32 km/h (10-20 mph) while observing the Transmission OSS parameter on the scan tool. The Transmission OSS parameter should vary with the vehicle speed and not drop out.

NOTE: Perform a scan tool snapshot, during the road test.

9. Perform the **Road Test** . Verify the transmission operation performs as indicated in the road test instructions.
10. Review the scan tool snapshot data. Verify the following transmission data parameters display the correct values for each gear range.
 - Transmission ISS

- Transmission OSS
- PC Solenoid 3
- Transmission Fluid Pressure Switch 5

11. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

NOTE: You must perform the Circuit/System Verification first.

1. Perform the **Line Pressure Check** . Verify the transmission line pressures are within the range specified in the Line PC Solenoid Valve Pressure table. Refer to **Solenoid Valve Pressure** .
 - If not within the specified range, refer to **Fluid Pressure High or Low** .
2. Ignition OFF, remove the control solenoid valve assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
3. Perform the **Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test** .
 - If the control solenoid valve body does not pass the performance test, replace the control solenoid valve assembly.
4. Inspect for the following conditions and repair/replace as necessary.

DTCs	Component	Condition
P0796 P0797	Control Valve Body Assembly	4-5-6 Regulator Valve stuck/sticking - debris, binding, damaged valve, or scored bore
P0796	Input Shaft Support	Input shaft tower seals damaged or leaking
P0796 P0797	Control Solenoid Valve Assembly	• Clutch Pressure Control Solenoid 3 • O-ring seals leaking • Valve body filter plate assembly cracked, blocked, or damaged gasket seal
P0796	4-5-6 Clutch Housing Assembly	4-5-6 Clutch Piston Assembly damaged/leaking
P0796	Transmission Cooling/Lubrication	• Restriction/leak in OAC (oil to air) cooler/radiator • Restricted/leaking/kinked/damaged transmission oil cooler lines • Restriction/leak in transmission fluid pump assembly
P0796	Torque Converter (w/Fluid Pump) Housing Assembly	• Fluid pump housing vanes/rotor/slide damaged/scored • Fluid pump or torque converter overstressed due to high temperature

P0796	4-5-6 Reaction carrier hub assembly	4-5-6 reaction carrier Hub/Shaft - broken hub weld
P0796	Automatic Transmission Fluid Filter Assembly	Oil filter or filter seal loose or damaged
P0796	3-5-R and 4-5-6 Clutch Housing Assembly	4-5-6 Clutch Backing Plate Retaining Ring not seated/oriented, causing clutch pack/piston overtravel

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

IMPORTANT: Before replacing the TCM, perform the Control Solenoid Valve and Transmission Control Module Assembly Inspection .

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.
- Perform the:
 - **Internal Components Removal**
 - **3-5-Reverse and 4-5-6 Clutch Housing Disassemble**
 - **3-5-Reverse and 4-5-6 Clutch Housing Assemble**
 - **3-5-Reverse and 4-5-6 Clutch Housing, and Input, Reaction, and Output Carrier Installation**

DTC P0815, P0816, OR P0826

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0815

Upshift Switch Circuit

DTC P0816

Downshift Switch Circuit

DTC P0826

Up and Down Shift Switch Circuit

TYPICAL SCAN TOOL DATA

Driver Shift Request

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Tap Up/Tap Down Switch Signal Circuit	Invalid	None	Invalid/None

CIRCUIT/SYSTEM DESCRIPTION

When the shift lever is placed in manual mode (M), the driver shift request (DSR), also known as the tap shift function is activated. The DSR allows the vehicle operator to shift gears by pushing the plus (+) button for an upshift or minus (-) button for a downshift. The body control module (BCM) supplies battery voltage, ground, and a signal circuit to the shift controller. The shift controller has Hall-effect switches connected to a resistor array. When the lever is in the M position, a voltage drop occurs across the resistor network. When the plus or minus button is pushed, a corresponding voltage drop occurs across the resistor network. This voltage drop is monitored by the BCM. The BCM will send the request to the transmission control module to perform the upshift or downshift.

CONDITIONS FOR RUNNING THE DTC

P0815 or P0816

- The engine speed is greater than 500 RPM for at least 5 seconds.
- The ignition voltage is 9.0 volts or greater.
- No DTCs P0815, P0816, P0826, P182E, P1761, P1876, P1877, or P1915.
- The time since the last gear range change is greater than 1 second.

P0826

- The engine speed is greater than 500 RPM for at least 5 seconds.
- The ignition voltage is 9.0 volts or greater.
- No DTCs P0826 or P1761.

CONDITIONS FOR SETTING THE DTC

P0815 - Condition 1

The transmission control module (TCM) detects an upshift request for 1 second with the shift lever in PARK, or NEUTRAL.

P0815 - Condition 2

The TCM detects an upshift for 10 minutes with the shift lever in a forward range.

P0816 - Condition 1

The TCM detects a downshift request for 1 second with the shift lever in PARK, or NEUTRAL.

P0816 - Condition 2

The TCM detects a downshift request for 10 minutes with the shift lever in a forward range.

P0826

The TCM detects an invalid voltage on the TAP up/down signal circuit for 1 minute.

ACTION TAKEN WHEN THE DTC SETS

- DTCs P0815, P0816, and P0826 are Type C DTCs.
- The TCM disables TAP shift operation.

CONDITIONS FOR CLEARING THE DTC

DTCs P0815, P0816, and P0826 are Type C DTCs.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON, observe the scan tool Driver Shift Control Mode parameter while moving the transmission shift lever through all the positions. The parameter should display Inactive in the park, reverse, neutral and drive positions, and Active in the M position.
2. Shift lever in the M position, verify the scan tool Driver Shift Request parameter changes from None to Upshift when the plus button is pressed, and from none to Downshift when the minus button is pressed.
3. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the shift lever assembly electrical connector from the shift lever assembly.
2. Test for less than 10 ohms between the shift lever harness connector terminal 2 and ground.
 - If greater than the specified range, repair the ground circuit.
3. Ignition ON, verify the scan tool Driver Shift Control parameter displays inactive.
 - If not the expected results, test the signal circuit between shift lever assembly connector terminal 3 and the BCM for a short to voltage or ground. If the circuit tests normal, replace the BCM.
4. Ignition OFF, connect a test lamp between shift lever harness connector B+ terminal 1 and ground circuit terminal 2.
5. Ignition ON, verify the test lamp is illuminated.
 - If the light stays off, test the B+ circuit for an open/high resistance. If the circuit tests normal, replace the BCM.
6. Test for 11-13 volts at the shift lever assembly harness connector between signal circuit terminal 3 and ground.
 - If not within the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the BCM.
7. Ignition OFF, connect the shift lever harness connector.
8. Ignition ON, back probe the shift lever assembly connector and test for 11-13 volts between terminal 3 and ground with the shift lever in park, reverse, neutral, and drive.
 - If not within the specified range, replace the shift lever assembly.
9. Use a DMM to monitor the voltage between shift lever assembly connector terminal 3 and ground with the shift lever in the M position, with the tap up plus button depressed, and the M position with the tap down minus button depressed. Compare the readings and verify the voltages are correct for each position as follows:
 - Manual: 8.0-10.6 volts
 - Tap down: 5.1-7.3 volts
 - Tap up: 2.0-4.6 volts

- If not within the specified range, test the signal circuit for a short to ground or open/high resistance. If the circuit tests normal, replace the shift lever assembly.

10. If all circuits test normal, replace the BCM.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- Refer to **Control Module References** for BCM replacement, setup, and programming.
- Refer to **Transmission Control Replacement** for AT TAP shift switch replacement.

DTC P0842 OR P0843

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0842

Transmission Fluid Pressure Switch 1 Circuit Low Voltage

DTC P0843

Transmission Fluid Pressure Switch 1 Circuit High Voltage

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
TFP Switch 1 Signal	P0842	P0843	P0843	-
TFP Switch 3 Signal	P0872	P0873	P0873	-
TFP Switch 4 Signal	P0877	P0878	P0878	-
TFP Switch 5 Signal	P0989	P0990	P0990	-

TYPICAL SCAN TOOL DATA

TFP Switch 1

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Operating Conditions: Engine running, normal operating temperature			

Parameter Normal Range: High or Low

TFP Switch 1 Signal	Low	High	High
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CIRCUIT/SYSTEM DESCRIPTION

The transmission fluid pressure (TFP) switch 1 assembly is part of the control solenoid valve assembly which has no serviceable components. The transmission control module (TCM) supplies a signal circuit to the TFP switch 1. The TFP switch 1 has an internal case ground. TFP switch 1 is normally closed or Low. When oil pressure is present at the TFP switch 1, the switch is open or High. The normally high clutch pressure control (PC) solenoid 2 controls pressure to the 3-5 reverse clutch regulator valve. The TCM monitors the TFP switch 1 to determine the position of the 3-5 reverse clutch regulator valve. When the 3-5 reverse clutch is commanded OFF, pressure is present on the TFP switch 1. When the 3-5 reverse clutch is commanded ON, the 3-5 reverse clutch regulator valve moves and pressure to the TFP switch 1 is exhausted through the 3-5 reverse clutch regulator valve.

CONDITIONS FOR RUNNING THE DTC

P0842 or P0843

- No DTCs P0711, P0712, P0713, P0716, P0717, P0722, P0723, P0742, P0751, P0756, P0757, P0973, P0974, P0976, P0977, P182E, or P1915.
- The engine speed is 500 RPM or greater for 5 seconds.
- Ignition voltage is 9.0 volts or greater.
- The transmission fluid temperature (TFT) is 0-100°C (32-230°F).
- The High Side Driver is ON.
- The engine speed is 550 RPM or greater.

CONDITIONS FOR SETTING THE DTC

P0842

The TCM detects that the TFP switch 1 signal voltage remains LOW after the 3-5-R clutch transitions from a HIGH pressure state to a LOW pressure state. The TCM counts each incident. The DTC sets when 30 counts are accumulated.

P0843

The TCM detects that the TFP switch 1 signal voltage remains HIGH after the 3-5-R clutch transitions from a LOW pressure state to a HIGH pressure state. The TCM counts each incident. The DTC sets when 50 counts are accumulated.

ACTION TAKEN WHEN THE DTC SETS

- DTCs P0842 and P0843 are type C DTCs.
- The TCM freezes transmission adaptive functions on the 3-5-R clutch.

CONDITIONS FOR CLEARING THE DTC

DTCs P0842, P0843 are type C DTCs.

DIAGNOSTIC AIDS

A TFP switch may malfunction due to normal debris in the transmission fluid causing a TFP Switch DTC to intermittently set. This type of condition should not be immediately noticeable to a customer, as the switch outputs are used for shift adaptive pressure and do not cause transmission symptoms unless the switch malfunctions continuously for an extended period of time.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- Component Connector End Views
- Inline Harness Connector End Views

Description and Operation

- Transmission General Description
- Electronic Component Description for control solenoid valve assembly
- Transmission Component and System Description

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

WARNING: Chock the wheels to prevent the vehicle from moving. Failure to chock the wheels can cause personal injury when the electrical system is repaired.

1. Engine idling in PARK with parking brake applied, and drive wheels chocked.
2. Monitor the Transmission Fluid Pressure Switch 1, Transmission Fluid Pressure Switch 3, Transmission Fluid Pressure Switch 4, and Transmission Fluid Pressure Switch 5 parameters with a scan tool.
3. Place the gear select lever in Park, Reverse, and Neutral range. Verify the TFP switch parameter states are correct for each range. Refer to **Transmission Fluid Pressure Switch Logic** .
4. Place the gear select lever in Drive range. Command the shift transmission with a scan tool through all forward ranges. Verify the TFP switch parameter states are correct for each range. Refer to **Transmission Fluid Pressure Switch Logic** .
 - If any TFP switch parameter state does not match the logic table, replace the control solenoid valve assembly.
5. Operate the vehicle within the conditions for running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

REPAIR PROCEDURES

NOTE:

- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.
- Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for control solenoid valve assembly replacement, setup, or programming

DTC P0850-P0852

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0850

Park/Neutral Position Switch Circuit

DTC P0851

Park/Neutral Position Switch Circuit Low Voltage

DTC P0852

Park/Neutral Position Switch Circuit High Voltage

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Park/Neutral Signal	P0850/P0851	P0850/P0852	P0850/P0852	-

TYPICAL SCAN TOOL DATA

PNP Switch

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: 12 Volts = In-Gear, 0 Volts = Park/Neutral			
Park/Neutral Signal	Park/Neutral	In-Gear	In-Gear

CIRCUIT/SYSTEM DESCRIPTION

The transmission manual shift shaft switch assembly, also known as the internal mode switch (IMS), is a sliding contact switch attached to the manual shift shaft inside the transmission case. The park/neutral position (PNP) switch is integrated into the IMS and connects to the transmission control module (TCM) lead-frame through a short wire harness. The circuit uses the TCM as a pass-through connector only.

The Park/Neutral Signal is sent from the park/neutral switch directly to the engine control module (ECM) and is used for engine start enable.

CONDITIONS FOR RUNNING THE DTC

- Ignition voltage is between 8-18 volts.
- Engine speed is greater than 1000 RPM.

CONDITIONS FOR SETTING THE DTC

P0850 and P0851

- The ECM detects the Park/Neutral switch signal equals 0 volts (Park/Neutral) when the IMS reports a Drive range for 0.2 second.
- TP is equal to or greater than 10 percent.
- Engine torque is equal to or greater than 75 N.m (55 lb ft).
- Vehicle speed is equal or greater than 10 km/h (6 mph).

P0852

The ECM detects the Park/Neutral switch signal equals 12 volts (In-Gear) when the IMS reports a Park/Neutral range for 0.2 second.

ACTION TAKEN WHEN THE DTC SETS

- DTCs P0850, P0851, and P0852 are Type C DTCs.
- The ECM uses IMS Range for engine start-up.

CONDITIONS FOR CLEARING THE DTC

DTCs P0850, P0851, and P0852 are Type C DTCs.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Electronic Component Description

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

DT-48616-10: Adapter Harness

For equivalent regional tools, refer to **Special Tools** .

CIRCUIT/SYSTEM VERIFICATION

1. If there are any other transmission DTCs set, diagnose those DTCs first. Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .
2. Ignition ON, observe the scan tool ECM Park/Neutral Position Switch parameter while moving the gear shift lever from Park and through all ranges. The parameter should display Park/Neutral when in Park or Neutral and In-Gear when in Reverse or Drive.
3. Observe the scan tool TCM Internal Mode Switch A/B/C/P parameter while slowly moving the gear shift lever from Park through all ranges. Verify the gear shift lever position matches the scan tool Internal Mode Switch A/B/C/P parameter. Refer to **Transmission Internal Mode Switch Logic** .
 - If not the specified value, refer to **Range Selector Lever Cable Adjustment** .
4. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the 14-way harness connector at the transmission.
2. Install the **DT-48616-10:** harness to the 14-way harness connector to the vehicle harness.
3. Test for less than 10 ohms between the ground circuit terminal 2 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
4. Ignition ON, verify with a scan tool the ECM Park/Neutral Position Switch parameter displays In Gear.
 - If not the expected results, test the signal circuit for a short to ground. If the circuit tests normal, replace the ECM.
5. Ignition ON, connect a 3A fused jumper wire between terminal 3 on the **DT-48616-10:** harness and ground at the transmission case. Verify with a scan tool the Park/Neutral Position Switch parameter displays Park/Neutral.
 - If not the expected results, test the signal circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
6. Ignition OFF, disconnect the **DT-48616-10:** harness from the vehicle harness connector.
7. Remove the transmission control valve body cover. Refer to **Control Valve Body Cover Replacement** .
8. Connect the vehicle harness connector to the control solenoid valve assembly.
9. Disconnect the automatic transmission internal mode switch electrical connector from the TCM.
10. Ignition ON, test for 11-13 volts between terminal F on the TCM and ground at the transmission case.
 - If not within the specified range, replace the control solenoid valve assembly.
11. If all circuits test normal, replace the automatic transmission internal mode switch.

REPAIR PROCEDURES

NOTE:

- Perform the **Transmission Adaptive Values Learn** following all

transmission related repairs.

- Before replacing the TCM, perform the Control Solenoid Valve and Transmission Control Module Assembly Inspection .

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Control Module References for ECM or control solenoid valve assembly replacement, setup, and programming
- Range Selector Lever Cable Adjustment
- Control Valve Body Cover Replacement
- Manual Shift Detent Lever with Shaft Position Switch Assembly Replacement

DTC P0872 OR P0873

DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0872

Transmission Fluid Pressure Switch 3 Circuit Low Voltage

DTC P0873

Transmission Fluid Pressure Switch 3 Circuit High Voltage

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
TFP Switch 1 Signal	P0842	P0843	P0843	-
TFP Switch 3 Signal	P0872	P0873	P0873	-
TFP Switch 4 Signal	P0877	P0878	P0878	-
TFP Switch 5 Signal	P0989	P0990	P0990	-

TYPICAL SCAN TOOL DATA

TFP Switch 3

Circuit	Short to Ground	Open/High Resistance	Short to Voltage

Operating Conditions: Engine running, normal operating temperature

Parameter Normal Range: High, Low

TFP Switch 3 Signal	Low	High	High
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CIRCUIT/SYSTEM DESCRIPTION

The transmission fluid pressure (TFP) switch 3 assembly is part of the control solenoid valve assembly which has no serviceable components. The transmission control module (TCM) supplies a signal circuit to the TFP switch 3. The TFP switch 3 has an internal case ground. TFP switch 3 is normally closed, or Low. When oil pressure is present at the TFP switch 3, the switch is open, or High. The normally low clutch pressure control (PC) solenoid 4 controls pressure to the 2-6 clutch regulator valve. The TCM monitors the TFP switch 3 to determine the position of the 2-6 clutch regulator valve. When the 2-6 clutch is commanded OFF, pressure is present on the TFP switch 3. When the 2-6 clutch is commanded ON, the 2-6 clutch regulator valve moves and pressure to the TFP switch 3 is exhausted through the 2-6 clutch regulator valve.

CONDITIONS FOR RUNNING THE DTC

- No DTCs P0711, P0712, P0713, P0716, P0717, P0722, P0723, P0742, P0751, P0756, P0757, P0973, P0974, P0976, P0977, P182E, or P1915.
- The engine speed is 500 RPM or greater for 5 seconds.
- Ignition voltage is 9.0 volts or greater.
- The transmission fluid temperature (TFT) is 0-110°C (32-230°F).
- The High Side Driver is ON.
- The engine speed is 550 RPM or greater.

CONDITIONS FOR SETTING THE DTC

P0872

The TCM detects that the TFP switch 3 signal voltage remains LOW after the 2-6 clutch transitions from a HIGH pressure state to a LOW pressure state. The TCM counts each incident. The DTC sets when 16 counts are accumulated.

P0873

The TCM detects that the TFP switch 3 signal voltage remains HIGH after the 2-6 clutch transitions from a LOW pressure state to a HIGH pressure state. The TCM counts each incident. The DTC sets when 28 counts are accumulated.

ACTION TAKEN WHEN THE DTC SETS

- DTCs P0872 and P0873 are type C DTCs.
- The TCM freezes transmission adaptive functions on the 2-6 clutch.

CONDITIONS FOR CLEARING THE DTC

DTCs P0872 and P0873 are type C DTCs.

DIAGNOSTIC AIDS

A TFP switch may malfunction due to normal debris in the transmission fluid causing a TFP Switch DTC to intermittently set. This type of condition should not be immediately noticeable to a customer, as the switch outputs are used for shift adaptive pressure and do not cause transmission symptoms unless the switch malfunctions continuously for an extended period of time.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Description and Operation

- **Transmission General Description**
- **Electronic Component Description** for control solenoid valve assembly
- **Transmission Component and System Description**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

WARNING: Chock the wheels to prevent the vehicle from moving. Failure to chock the wheels can cause personal injury when the electrical

system is repaired.

1. Engine idling in PARK with parking brake applied, and drive wheels chocked.
2. Monitor the Transmission Fluid Pressure Switch 1, Transmission Fluid Pressure Switch 3, Transmission Fluid Pressure Switch 4, and Transmission Fluid Pressure Switch 5 parameters with a scan tool.
3. Place the gear select lever in Park, Reverse, and Neutral range. Verify the TFP switch parameter states are correct for each range. Refer to **Transmission Fluid Pressure Switch Logic** .
4. Place the gear select lever in Drive range. Command the shift transmission with a scan tool through all forward ranges. Verify the TFP switch parameter states are correct for each range. Refer to **Transmission Fluid Pressure Switch Logic** .
 - If any TFP switch parameter state does not match the logic table, replace the control solenoid valve assembly.
5. Operate the vehicle within the conditions for running the DTC to verify the TDC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

REPAIR PROCEDURES

NOTE:

- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.
- Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for control solenoid valve assembly replacement, setup, or programming.

DTC P0877 OR P0878

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0877

Transmission Fluid Pressure Switch 4 Circuit Low Voltage

DTC P0878

Transmission Fluid Pressure Switch 4 Circuit High Voltage

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
TFP Switch 1 Signal	P0842	P0843	P0843	-
TFP Switch 3 Signal	P0872	P0873	P0873	-
TFP Switch 4 Signal	P0877	P0878	P0878	-
TFP Switch 5 Signal	P0989	P0990	P0990	-

TYPICAL SCAN TOOL DATA

TFP Switch 4

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: High, Low			
TFP Switch 4 Signal	Low	High	High

CIRCUIT/SYSTEM DESCRIPTION

The transmission fluid pressure (TFP) switch 4 assembly is part of the control solenoid valve assembly which has no serviceable components. The transmission control module (TCM) supplies a signal circuit to the TFP switch 4. The TFP switch 4 has an internal case ground. TFP switch 4 is normally closed, or Low. When oil pressure is present at the TFP switch 4, the switch is open, or High. The normally low clutch pressure control (PC) solenoid 5 controls pressure to the 1-2-3-4 clutch regulator valve. The TCM monitors the TFP switch 4 to determine the position of the 1-2-3-4 clutch regulator valve. When the 1-2-3-4 clutch is commanded OFF, pressure is present on the TFP switch 4. When the 1-2-3-4 clutch is commanded ON, the 1-2-3-4 clutch regulator valve moves and pressure to the TFP switch 4 is exhausted through the 1-2-3-4 clutch regulator valve.

CONDITIONS FOR RUNNING THE DTC

- No DTCs P0711, P0712, P0713, P0973, P0974, P0976, P0977, P182E or P1915.
- The engine speed is 500 RPM or greater for 5 seconds.
- Ignition voltage is 9.0 volts or greater.
- The transmission fluid temperature (TFT) is 0-110°C (32-230°F).
- The High Side Driver is ON.
- The engine speed is 550 RPM or greater.

CONDITIONS FOR SETTING THE DTC

P0877

The TCM detects that the TFP switch 4 signal voltage remains LOW after the 1-2-3-4 clutch transitions from a HIGH pressure state to a LOW pressure state. The TCM counts each incident. The DTC sets when 8 counts are accumulated.

P0878

The TCM detects that the TFP switch 4 signal voltage remains HIGH after the 1-2-3-4 clutch transitions from a LOW pressure state to a HIGH pressure state. The TCM counts each incident. The DTC sets when 8 counts are accumulated.

ACTION TAKEN WHEN THE DTC SETS

- DTCs P0877 and P0878 are type C DTCs.
- The TCM freezes transmission adaptive functions on the 1-2-3-4 clutch.

CONDITIONS FOR CLEARING THE DTC

DTCs P0877 and P0878 are type C DTCs.

DIAGNOSTIC AIDS

A TFP switch may malfunction due to normal debris in the transmission fluid causing a TFP Switch DTC to intermittently set. This type of condition should not be immediately noticeable to a customer, as the switch outputs are used for shift adaptive pressure and do not cause transmission symptoms unless the switch malfunctions continuously for an extended period of time.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Description and Operation

- **Transmission General Description**
- **Electronic Component Description** for control solenoid valve assembly
- **Transmission Component and System Description**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

WARNING: Chock the wheels to prevent the vehicle from moving. Failure to chock the wheels can cause personal injury when the electrical system is repaired.

1. Engine idling in PARK with parking brake applied, and drive wheels chocked.
2. Monitor the Transmission Fluid Pressure Switch 1, Transmission Fluid Pressure Switch 3, Transmission Fluid Pressure Switch 4, and Transmission Fluid Pressure Switch 5 parameters with a scan tool.
3. Place the gear select lever in Park, Reverse, and Neutral range. Verify the TFP switch parameter states are correct for each range. Refer to Transmission Fluid Pressure Switch Logic .
4. Place the gear select lever in Drive range. Command the shift transmission with a scan tool through all forward ranges. Verify the TFP switch parameter states are correct for each range. Refer to Transmission Fluid Pressure Switch Logic .
 - o If any TFP switch parameter state does not match the logic table, replace the control solenoid valve assembly.
5. Operate the vehicle within the conditions for running the DTC to verify the TDC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

REPAIR PROCEDURES

NOTE:

- Perform the Transmission Adaptive Values Learn following all transmission related repairs.
- Before replacing the TCM, perform the Control Solenoid Valve and Transmission Control Module Assembly Inspection .

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for control solenoid valve assembly replacement, setup, or programming.

DTC P0961-P0963

DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0961

Line Pressure Control Solenoid Valve System Performance

DTC P0962

Line Pressure Control Solenoid Valve Control Circuit Low Voltage

DTC P0963

Line Pressure Control Solenoid Valve Control Circuit High Voltage

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Line PC Solenoid Control	P0962	P0963	P0963	P0961

TYPICAL SCAN TOOL DATA

Line Pressure Control Solenoid Valve Performance Test Status

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: OK				
Line Pressure Control Solenoid Valve Control	-	-	-	Fault or Malfunction

Line Pressure Control Solenoid Valve Control Circuit Low Voltage Test Status

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: OK				
Line Pressure Control Solenoid Valve Control	Fault or Malfunction	-	-	-

Line Pressure Control Solenoid Valve Control Circuit High Voltage Test Status

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Operating Conditions: Engine running, normal operating temperature				

Parameter Normal Range: OK

Line Pressure Control Solenoid Valve Control	-	Fault or Malfunction	Fault or Malfunction	-
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CIRCUIT/SYSTEM DESCRIPTION

The line pressure control (PC) solenoid is part of the control solenoid valve assembly which has no serviceable components. The normally high line PC solenoid regulates and directs the PC solenoid oil pressure to the pressure regulator valve. Increasing line PC solenoid pressure increases transmission line pressure. The transmission control module (TCM) varies the current to the line PC solenoid through a low side driver. Decreasing the current to the line PC solenoid increases line PC solenoid oil pressure by closing OFF the solenoid exhaust port. Increasing the current to the line PC solenoid decreases line PC oil pressure by opening the solenoid exhaust port. Line PC solenoid power is supplied by the TCM through a high side driver (HSD). The HSD protects the circuit and components from excessive current flow. If excessive current flow is detected, the HSD will turn OFF. When the fault is corrected the HSD will reset.

CONDITIONS FOR RUNNING THE DTC

P0961, P0962, or P0963

- The engine speed is 500 RPM or greater for 5 seconds.
- The ignition voltage is 9.0 volts or greater.

CONDITIONS FOR SETTING THE DTC

P0961

The TCM detects an internal electrical malfunction of the line PC solenoid where the measured line PC solenoid current does not equal the commanded line PC solenoid current for 5 seconds.

P0962

The TCM detects a short to ground on the line PC solenoid control circuit for 2 seconds.

P0963

The TCM detects an open circuit or short to voltage on the line PC solenoid control circuit for 5 seconds.

ACTION TAKEN WHEN THE DTC SETS

P0961

- DTC P0961 is a Type C DTC.
- The TCM freezes transmission adaptive functions.
- The TCM commands maximum line pressure.

P0962

- DTC P0962 is a Type A DTC.
- The TCM defaults the transmission to 5th gear and reverse.
- The TCM inhibits the torque converter clutch (TCC).
- The TCM commands maximum line pressure.
- The TCM freezes transmission adaptive functions.
- The TCM turns the high side driver OFF.
- The TCM inhibits Tap Up/Down function.
- The TCM inhibits manual shifting of forward gears.
- The TCM enables torque management.

P0963

- DTC P0963 is a Type B DTC.
- The TCM freezes transmission adaptive functions.
- The TCM commands maximum line pressure.

CONDITIONS FOR CLEARING THE DIC/DTC

- DTC P0961 is a Type C DTC.
- DTC P0962 is a Type A DTC.
- DTC P0963 is a Type B DTC.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**
- **Electronic Component Description**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

DT-48616-10: Adapter Harness

For equivalent regional tools, refer to **Special Tools** .

CIRCUIT/SYSTEM VERIFICATION

1. Engine running in PARK position. Move the gear shifter lever into each gear position and back into PARK position. Verify with a scan tool, the following test status parameters display OK.
 - Line Pressure Control Solenoid Valve Performance Test Status
 - Line Pressure Control Solenoid Valve Control Circuit High Voltage Test Status
 - Line Pressure Control Solenoid Valve Control Circuit Low Voltage Test Status
2. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

NOTE: **You must perform the Circuit/System Verification first.**

1. Ignition OFF, remove the control solenoid assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
2. Perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .
3. Place the control solenoid valve assembly on a clean work surface near the transmission assembly.
4. Connect **DT-48616-10:** harness between the vehicle wire harness electrical connector, and the control solenoid valve assembly electrical connector.
5. Ignition ON, verify with a scan tool the following test status parameters display OK.
 - Line Pressure Control Solenoid Valve Performance Test Status
 - Line Pressure Control Solenoid Valve Control Circuit High Voltage Test Status

- Line Pressure Control Solenoid Valve Control Circuit Low Voltage Test Status

- If any test status parameter displays Fault or Malfunction, replace the control solenoid valve assembly.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

NOTE: Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.
- Perform the **Control Solenoid Valve and Transmission Control Module Assembly Cleaning** procedure.

DTC P0965-P0967

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0965

Pressure Control Solenoid Valve 2 System Performance

DTC P0966

Pressure Control Solenoid Valve 2 Control Circuit Low Voltage

DTC P0967

Pressure Control Solenoid Valve 2 Control Circuit High Voltage

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Pressure Control Solenoid Valve 2 Control	P0966	P0977	P0977	P0965

TYPICAL SCAN TOOL DATA

Pressure Control Solenoid Valve 2 Performance Test Status

Circuit	Short to Ground	Open	Short to Voltage	Signal Performance
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: OK				
Pressure Control Solenoid Valve 2 Control	-	-	-	Fault or Malfunction

Pressure Control Solenoid Valve 2 Control Circuit Low Voltage Test Status

Circuit	Short to Ground	Open	Short to Voltage	Signal Performance
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: OK				
Pressure Control Solenoid Valve 2 Control	Fault or Malfunction	-	-	-

Pressure Control Solenoid Valve 2 Control Circuit High Voltage Test Status

Circuit	Short to Ground	Open	Short to Voltage	Signal Performance
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: OK				
Pressure Control Solenoid Valve 2 Control	-	Fault or Malfunction	Fault or Malfunction	-

CIRCUIT/SYSTEM DESCRIPTION

The clutch pressure (PC) solenoid 2 is part of the control solenoid valve assembly which has no serviceable components. The normally high clutch PC solenoid 2 regulates and directs the clutch PC solenoid 2 oil pressure to the 3-5 reverse clutch regulator valve. Increasing clutch PC solenoid 2 pressure increases pressure to the 3-5 reverse clutch. The transmission control module (TCM) varies the current to the PC solenoid 2 through a low side driver. Decreasing the current to the clutch PC solenoid 2 increases clutch PC solenoid 2 oil pressure by closing OFF the solenoid exhaust port. Increasing the current to the clutch PC solenoid 2 decreases clutch PC solenoid 2 oil pressure by opening the solenoid exhaust port. Clutch PC solenoid 2 power is supplied by the TCM through a high side driver (HSD). The HSD protects the circuit and components from excessive current flow. If excessive current flow is detected, the HSD will turn OFF. When the fault is corrected, the HSD will reset.

CONDITIONS FOR RUNNING THE DTC

P0965, P0966, or P0967

- The engine speed is 500 RPM or greater for 5 seconds.
- The ignition voltage is 9.0 volts or greater.

CONDITIONS FOR SETTING THE DTC

P0965

The TCM detects an internal electrical performance malfunction of the clutch PC solenoid 2 control circuit where the measured clutch PC solenoid 2 current does not equal the commanded clutch PC solenoid 2 current for 5 seconds.

P0966

The TCM detects a short to ground on the clutch PC solenoid 2 control circuit for 1 second.

P0967

The TCM detects an open or short to voltage on the clutch PC solenoid 2 control circuit for 1 second.

ACTION TAKEN WHEN THE DTC SETS

P0965

- DTC P0965 is a Type C DTC.
- The TCM freezes transmission adaptive functions on the 3-5 Reverse clutch.

P0966

- DTC P0966 is a Type A DTC.
- The TCM defaults the transmission to 5th gear or reverse.
- The TCM commands maximum line pressure.
- The TCM freezes transmission adaptive functions.
- The TCM forces TCC OFF.
- The TCM forces HSD 1 OFF.
- The TCM inhibits Tap Up/Down function.
- The TCM inhibits manual shifting of forward gears.
- The TCM enables torque management.

P0967

- DTC P0967 is a Type A DTC.
- The TCM forces TCC OFF.
- The TCM defaults the transmission to 3rd gear or reverse.
- The TCM freezes transmission adaptive functions.
- The TCM commands maximum line pressure.
- The TCM inhibits Tap Up/Down function.
- The TCM inhibits manual shifting of forward gears.

CONDITIONS FOR CLEARING THE DTC

- DTC P0965 is a Type C DTC.
- DTCs P0966 and P0967 are Type A DTCs.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- Component Connector End Views
- Inline Harness Connector End Views

Description and Operation

- Transmission General Description
- Transmission Component and System Description
- Electronic Component Description

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

DT-48616-10: Adapter Harness

For equivalent regional tools, refer to Special Tools .

CIRCUIT/SYSTEM VERIFICATION

1. Operate the vehicle in second gear long enough to ensure at least a 3°C (5°F) rise in TCM temperature, then operate the vehicle in PARK for 5 seconds.
2. Operate the vehicle in drive range. Allow the transmission to shift through all forward gear ranges. Verify with a scan tool, the following test status parameters display OK.
 - Pressure Control Solenoid Valve 2 Performance Test Status
 - Pressure Control Solenoid Valve 2 Control Circuit High Voltage Test Status
 - Pressure Control Solenoid Valve 2 Control Circuit Low Voltage Test Status
3. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

NOTE: You must perform the **Circuit/System Verification** first.

1. Ignition OFF, remove the control solenoid assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement**.
 2. Perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection**.
 3. Place the control solenoid valve assembly on a clean work surface near the transmission assembly.
 4. Connect **DT-48616-10**: harness between the vehicle wire harness electrical connector, and the control solenoid valve assembly electrical connector.
 5. Ignition ON, verify with a scan tool the following test status parameters display OK.
 - Pressure Control Solenoid Valve 2 Performance Test Status
 - Pressure Control Solenoid Valve 2 Control Circuit High Voltage Test Status
 - Pressure Control Solenoid Valve 2 Control Circuit Low Voltage Test Status
- If any test status parameter displays Fault or Malfunction, replace the control solenoid valve assembly.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

NOTE: Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection**.

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.
- Perform the **Control Solenoid Valve and Transmission Control Module Assembly Cleaning** procedure.

DTC P0969-P0971

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0969

Pressure Control Solenoid Valve 3 Performance

DTC P0970

Pressure Control Solenoid Valve 3 Control Circuit Low Voltage

DTC P0971

Pressure Control Solenoid Valve 3 Control Circuit High Voltage

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Pressure Control Solenoid 3 Control	P0970	P0971	P0971	P0969

TYPICAL SCAN TOOL DATA

Pressure Control Solenoid Valve 3 Performance Test Status

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: OK				
Pressure Control Solenoid Valve 3 Control	-	-	-	Fault or Malfunction

Pressure Control Solenoid Valve 3 Control Circuit Low Voltage Test Status

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: OK				
Pressure Control Solenoid Valve 3 Control	Fault or Malfunction	-	-	-

Pressure Control Solenoid Valve 3 Control Circuit High Voltage Test Status

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: OK				
Pressure Control Solenoid Valve 3 Control	-	Fault or Malfunction	Fault or Malfunction	-

CIRCUIT/SYSTEM DESCRIPTION

The clutch pressure control (PC) solenoid 3 is part of the control solenoid valve assembly which has no serviceable components. The normally high clutch PC solenoid 3 regulates and directs oil pressure to the R1/4-5-6 regulator valve. Increasing clutch PC solenoid 3 pressure increases pressure to the reverse low or 4-5-6 clutch, depending on the position of the clutch select valve. The transmission control module (TCM) PC Solenoid 3 low side driver varies current to the solenoid. Decreasing the current to clutch PC solenoid 3 increases oil pressure by closing off the solenoid exhaust port. Increasing the current to the clutch PC solenoid 3 decreases oil pressure by opening the exhaust port. Clutch PC solenoid 3 power is supplied by the TCM through a high side driver (HSD). The HSD protects the circuit and components from excessive current flow. If excessive current flow is detected, the HSD will turn OFF. When the fault is corrected, the HSD will reset.

CONDITIONS FOR RUNNING THE DTC

P0969, P0970, or P0971

- The engine speed is greater than 500 RPM for 5 seconds.
- The ignition voltage is 9.0 volts or greater.

CONDITIONS FOR SETTING THE DTC

P0969

The TCM detects an internal electrical performance malfunction of the clutch PC solenoid 3 control circuit where the measured clutch PC solenoid 3 currents does not equal the commanded clutch PC solenoid 3 current for 5 seconds.

P0970

The TCM detects a short to ground on the clutch PC solenoid 3 control circuit for 1 second.

P0971

The TCM detects an open or short to voltage on the clutch PC solenoid 3 control circuit for 1 second.

ACTION TAKEN WHEN THE DTC SETS

P0969

- DTC P0969 is a Type C DTC.

- The TCM freezes transmission adaptive functions on the low and reverse clutch and the 4-5-6 clutch.

P0970

- DTC P0970 is a Type A DTC.
- The TCM limits the transmission to 5th gear and reverse.
- The TCM commands maximum line pressure.
- The TCM freezes transmission adaptive functions.
- The TCM forces the torque converter clutch (TCC) OFF.
- The TCM forces the high side driver OFF.
- The TCM enables torque management.
- The TCM inhibits Tap Up/Down function.
- The TCM inhibits manual shifting of forward gears.

P0971

- DTC P0971 is a Type A DTC.
- The TCM limits the transmission to 4th gear and reverse.
- The TCM freezes transmission adaptive functions.
- The TCM commands maximum line pressure.
- The TCM enables torque management.
- The TCM inhibits Tap Up/Down function.
- The TCM inhibits manual shifting of forward gears.

CONDITIONS FOR CLEARING THE DTC

- DTC P0969 is a Type C DTC.
- DTCs P0970 and P0971 are Type A DTCs.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Description and Operation

- **Transmission General Description**

- **Transmission Component and System Description**
- **Electronic Component Description**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

DT-48616-10: Adapter Harness

For equivalent regional tools, refer to **Special Tools** .

CIRCUIT/SYSTEM VERIFICATION

1. Operate the vehicle in second gear long enough to ensure at least a 3°C (5°F) rise in TCM temperature, then operate the vehicle in PARK for 5 seconds.
2. Operate the vehicle in drive range. Allow the transmission to shift through all forward gear ranges. Verify with a scan tool, the following test status parameters display OK.
 - Pressure Control Solenoid Valve 3 Performance Test Status
 - Pressure Control Solenoid Valve 3 Control Circuit High Voltage Test Status
 - Pressure Control Solenoid Valve 3 Control Circuit Low Voltage Test Status
3. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

NOTE: **You must perform the Circuit/System Verification first.**

1. Ignition OFF, remove the control solenoid assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
2. Perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .

- 3. Place the control solenoid valve assembly on a clean work surface near the transmission assembly.
 - 4. Connect **DT-48616-10:** harness between the vehicle wire harness electrical connector, and the control solenoid valve assembly electrical connector.
 - 5. Ignition ON, verify with a scan tool the following test status parameters display OK.
 - Pressure Control Solenoid Valve 3 Performance Test Status
 - Pressure Control Solenoid Valve 3 Control Circuit High Voltage Test Status
 - Pressure Control Solenoid Valve 3 Control Circuit Low Voltage Test Status
- If any test status parameter displays Fault or Malfunction, replace the control solenoid valve assembly.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

NOTE: Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.
- Perform the **Control Solenoid Valve and Transmission Control Module Assembly Cleaning** procedure.

DTC P0973 OR P0974

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0973

Shift Solenoid Valve 1 Control Circuit Low Voltage

DTC P0974

Shift Solenoid Valve 1 Control Circuit High Voltage

DIAGNOSTIC FAULT INFORMATION

	Short to	Open/High	Short to	Signal
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Circuit	Ground	Resistance	Voltage	Performance
Shift Solenoid Valve 1 Control	P0973	P0974	P0974	-

TYPICAL SCAN TOOL DATA

Shift Solenoid Valve 1 Control Circuit High Voltage Test Status

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: OK			
Shift Solenoid Valve 1 Control	-	-	Fault or Malfunction

Shift Solenoid Valve 1 Control Circuit Open Test Status

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: OK			
Shift Solenoid Valve 1 Control	-	Fault or Malfunction	-

Shift Solenoid Valve 1 Control Circuit Low Voltage Test Status

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: OK			
Shift Solenoid Valve 1 Control	Fault or Malfunction	-	-

CIRCUIT/SYSTEM DESCRIPTION

The shift solenoid (SS) valve 1 is part of the control solenoid valve assembly which has no serviceable components. SS valve 1 is a normally closed (NC) ON/OFF solenoid and is controlled by the transmission control module (TCM) through a low side driver. When the SS valve 1 is energized (ON), SS 1 fluid pressure is directed to the clutch select valve. Power to the SS 1 is supplied by the TCM through a high side driver (HSD). The HSD protects the circuit and components from excessive current flow. If excessive current flow is detected, the HSD will turn OFF. When the fault is corrected the HSD will reset.

CONDITIONS FOR RUNNING THE DTC

P0973 or P0974

- The engine speed is 500 RPM or greater for 5 seconds.
- The ignition voltage is 9.0 volts or greater.

CONDITIONS FOR SETTING THE DTC

P0973

The control solenoid valve assembly detects an internal low voltage electrical malfunction of the SS 1 control circuit when the SS 1 is commanded OFF for 2 seconds.

P0974

The control solenoid valve assembly detects an internal high voltage electrical malfunction of the SS 1 control circuit when the SS 1 is commanded ON for 2 seconds.

ACTION TAKEN WHEN THE DTC SETS

P0973

- DTC P0973 is a Type A DTC.
- The TCM freezes transmission adaptive functions.
- The TCM commands maximum line pressure.
- The TCM defaults the transmission to 2nd gear and reverse.
- The TCM inhibits the Tap Up/Tap Down function.
- The TCM inhibits manual shifting of forward gears.

P0974

- DTC P0974 is a Type B DTC.
- The TCM inhibits 1st gear.

CONDITIONS FOR CLEARING THE DIC/DTC

- DTC P0973 is a Type A DTC.
- DTC P0974 is a Type B DTC.

REFERENCE INFORMATION

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**
- **Electronic Component Description**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

DT-48616-10: Adapter Harness

For equivalent regional tools, refer to **Special Tools** .

CIRCUIT/SYSTEM VERIFICATION

1. Operate the vehicle in 2nd gear long enough to ensure at least a 3°C (5°F) rise in TCM temperature.
2. Place the gear selector in Reverse for 5 seconds and then idle vehicle for 5 seconds. Verify with a scan tool, the following test status parameters displays OK.
 - Shift Solenoid Valve 1 Control Circuit Open Test Status
 - Shift Solenoid Valve 1 Control Circuit High Voltage Test Status
 - Shift Solenoid Valve 1 Control Circuit Low Voltage Test Status
3. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

CIRCUIT/SYSTEM TESTING

NOTE: **You must perform the Circuit/System Verification first.**

1. Ignition OFF, remove the control solenoid assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
2. Perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .
3. Place the control solenoid valve assembly on a clean work surface near the transmission assembly.
4. Connect **DT-48616-10:** harness between the vehicle wire harness electrical connector, and the control solenoid valve assembly.
5. Ignition ON, verify with a scan tool the following test status parameters display, OK.

- Shift Solenoid Valve 1 Control Circuit Open Test Status
- Shift Solenoid Valve 1 Control Circuit High Voltage Test Status
- Shift Solenoid Valve 1 Control Circuit Low Voltage Test Status

○ If any test status parameter displays Fault or Malfunction, replace the control solenoid valve assembly.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

NOTE: Before replacing the TCM, perform the **Control Solenoid Valve and Transmission Control Module Assembly Inspection** .

- Refer to **Control Module References** for control solenoid valve assembly replacement, setup, and programming.
- Perform the **Transmission Adaptive Values Learn** following all transmission related repairs.