

2014 TRANSMISSION

Automatic Transmission - 6T75 (M7V M7X) - Diagnostic Information and Procedures - Acadia, Enclave And Traverse

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC P0601-P0604 OR P062F

Diagnostic Instructions

- Perform **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 8.6 volts and 18.0 volts.

Conditions for Setting the DTC

P0601

Read only memory (ROM) test has failed 5 or greater times.

P0602

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

P0603

TCM has detected a memory checksum error.

P0604

TCM has detected a random access memory (RAM) test error 5 or greater times.

P062F

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

Action Taken When the DTC Sets

P0601, P0602, P0603, P0604 or P062F

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

P0602

- DTC P0602 is a Type C DTC.
 - TCM limits the transmission to Reverse and 5th gear operation.
 - TCM commands maximum line pressure.
 - TCM forces the torque converter clutch (TCC) OFF.
 - TCM freezes transmission adaptive functions.
-

- TCM commands the high side driver OFF.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.

Conditions for Clearing the DTC**P0601, P0603, P0604 or P062F**

DTCs P0601, P0603, P0604 and P062F are Type A DTCs.

P0602

DTC P0602 is a Type C DTC.

Reference Information

Description and Operation

Electronic Component Description for control solenoid valve assembly

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 OFF for 1 minute.

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.

2. Ignition ON.

3. Verify with a scan tool, that DTC P0602 is not set.
 - **If DTC P0602 is set**
 - Program the K71 transmission control module. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Programming and Setup** . If the DTC resets, replace the Q8 control solenoid valve assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
 - **If DTC P0602 is not set**
4. Verify with a scan tool that DTC P0601, P0603, P0604 or P062F is not set.
 - **If DTC P0601, P0603, P0604 or P062F is set**

Replace the Q8 control solenoid valve assembly.

 - **If DTC P0601, P0603, P0604 or P062F is not set**
5. After performing the above steps, verify that the DTC does not reset by operating the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data. If the vehicle passes the Circuit/System Verification procedure, refer to **Testing for Intermittent Conditions and Poor Connections** .

Repair Instructions

NOTE: Perform the **Reset Transmission Adapts** any time a transmission related component is serviced.

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

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

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 temperature sensor for over temperature protection.

Conditions for Running the DTC

- Ignition voltage is 8.6-32 V.
- TCM temperature is between 0-170°C (32-338°F) for 0.25 s.

Conditions for Setting the DTC**Condition 1**

TCM detects an internal temperature condition of 146°C (295°F) or greater for 5 s.

Condition 2

Ignition voltage is 18 V or greater and the TCM detects an internal temperature of 50°C (122°F) or greater for 2 s.

Action Taken When the DTC Sets

- DTC P0634 is a Type A DTC.
- TCM limits the transmission to Reverse and 3rd or 5th gear operation.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM commands maximum line pressure.
- TCM shuts down.

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

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

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.
2. Verify the scan tool Engine Coolant Temperature parameter was less than 125°C (257°F) when DTC set by reviewing the scan tool Freeze Frame/Failure Records.
 - **If 125°C (257°F) or greater**

Refer to **Engine Overheating** .

- **If less than 125°C (257°F)**
3. Verify transmission fluid level and condition is correct. Refer to **Transmission Fluid Level and Condition Check**.

- **If the transmission fluid level and condition is not correct**

Repair as necessary.

- **If the transmission fluid level and condition is correct**
4. Clear the DTCs from the TCM with a scan tool.
 5. Operate the vehicle until normal engine temperature is reached.

6. Verify the scan tool Transmission Fluid Temperature parameter is less than 140°C (284°F).
 - **If 140°C (284°F) or greater**
 1. Ignition OFF.
 2. Verify the conditions listed below do not exist:
 - Obstructions to the airflow to the radiator or transmission
 - Radiator damage
 - Transmission cooler damage
 - Transmission cooler hose kinked or damaged
 - If conditions exist, repair or replace as necessary.
 - If conditions do not exist, refer to **Transmission Fluid Cooler Flushing and Flow Test**.
 - **If less than 140° C (284° F)**
7. Verify the DTC does not set.
 - **If DTC sets**

Replace the Q8 Control Solenoid Valve Assembly.
 - **If DTC does not set**
8. Operate the vehicle within the conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Record data.
9. Verify the DTC does not set.
 - **If the DTC sets**

Replace the Q8 Control Solenoid Valve Assembly.
 - **If the DTC does not set**
10. All OK.

Repair Instructions

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

- Perform the **Reset Transmission Adapts** following all transmission repairs.
- **Fluid Cooler Inlet Hose Replacement**
- **Fluid Cooler Outlet Hose Replacement**
- **Transmission Fluid Cooler Pipe Connector Replacement - Radiator**
- **Transmission Fluid Cooler Hose/Pipe Quick-Connect Fitting Disconnection and Connection**
- **Control Module References** for Control Solenoid Valve Assembly replacement, programming and setup

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

Circuit/System Description

The transmission control module (TCM) high side driver 1 is located inside of the control solenoid valve assembly, which has no serviceable components. The high side driver 1 provides power to the pressure control solenoids and shift solenoids.

Conditions for Running the DTC**P0658**

- DTC P0658 is not set.
- High side driver 1 is enabled.

P0659

- DTC P0659 is not set.
- Ignition transitions from OFF to ON

Conditions for Setting the DTC**P0658**

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

P0659

TCM detects an internal short to voltage on the high side driver 1 for 1 s.

Action Taken When the DTC Sets**P0658**

- DTC P0658 is a Type A DTC.
- TCM turns the high side driver OFF.
- TCM turns OFF all solenoids.
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM commands the torque converter clutch (TCC) OFF.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM limits the transmission to Reverse and 5th gear operation.
- TCM requests a reduced torque value based on input speed.

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.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

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Description and Operation

- **Transmission General Description**
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- **Electronic Component Description**

Electrical Information Reference

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- **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-47825-20 Adapter Harness

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

Circuit/System Verification

1. Ignition ON.
2. Verify the scan tool High Side Driver 1 parameter displays ON.
 - **If ON is not displayed**

Refer to **Circuit/System Testing**.

- **If ON is displayed**
3. Engine Running and transmission in Park.
 4. Verify the scan tool parameters listed below do not display Malfunction:
 - High Side Driver 1 Circuit Low Voltage Test Status
 - High Side Driver 1 Circuit Open Test Status
 - High Side Driver 1 Circuit High Voltage Test Status
 - **If Malfunction is displayed**

Refer to **Circuit/System Testing**.

- **If Malfunction is not displayed**
5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
 6. Verify the DTC does not set.
 - **If the DTC sets**

Refer to **Circuit/System Testing**.

- **If the DTC does not set**

7. All OK.

Circuit/System Testing

1. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.

NOTE: You must perform Circuit/System Verification first.

2. Verify the Q8 Control Solenoid Valve Assembly is not contaminated with any debris. Refer to Control Solenoid Valve and Transmission Control Module Assembly Inspection
 - **If contaminated**

Repair as necessary
 - **If not contaminated**
3. Verify the resistance is within the specified range for each solenoid listed in the Control Solenoid Valve and Transmission Control Module Assembly Inspection.
 - **If the resistance is not within range**

Replace the Q8 Control Solenoid Valve Assembly.
 - **If the resistance is within range**
4. Place the Q8 Control Solenoid Valve Assembly on a clean work surface near the transmission assembly.
5. Connect the **DT 47825-20** adapter harness between the vehicle wire harness electrical connector and the Q8 Control Solenoid Valve Assembly electrical connector. Ignition ON.
6. Verify the scan tool parameters listed below do not display Malfunction:
 - High Side Driver 1 Circuit Low Voltage Test Status
 - High Side Driver 1 Circuit Open Test Status
 - High Side Driver 1 Circuit High Voltage Test Status
 - **If Malfunction is displayed**

Replace the Q8 Control Solenoid Valve Assembly.
 - **If Malfunction is not displayed**
7. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repairs.

- Perform the Reset Transmission Adapts following all transmission repairs.
- Control Module References for Control Solenoid Valve Assembly replacement, programming and setup.

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

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**

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, 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 is not set.
- Brake torque is not active.
- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is between 8.6-32 V.
- Engine torque signal is valid.
- Accelerator pedal position signal is valid.

P0668

- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is between 8.6-32 V.

P0669

- DTC P0716, P0717, P0722 or P0723 is not set.
- Engine speed is 400-7, 500 RPM.
- Ignition voltage is between 8.6-32 V.

Conditions for Setting the DTC**P0667**

- TCM detects a 20-50°C (36-90°F) or greater difference between the transmission fluid temperature and TCM substrate temperature, which depends on the average of the transmission fluid temperature, TCM substrate temperature and TCM power up temperature.
- TCM detects an 8-10°C (14-18°F) or greater difference between the TCM power up temperature and TCM substrate temperature, which depends on the average of the transmission fluid temperature, TCM substrate temperature and TCM power up temperature.
- Above conditions have to be met for 5 min within a 6 min period.

P0668

TCM temperature is -249°C (-416°F) or less for 1 min.

P0669

TCM temperature is 249°C (480°F) or greater for 1 min.

Action Taken When the DTC Sets

- DTCs P0667, P0668 and P0669 are Type B DTCs.
- TCM defaults the TCM substrate temperature to a calculated temperature based on the TCM power up temperature.

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

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

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- **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.
 2. Verify the scan tool TCM Temperature parameter is between -249 and +249°C (-416 and +480°F).
 - **If not between -249 and +249°C (-416 and +480°F)**

Replace the Q8 Control Solenoid Valve Assembly.
 - **If between -249 and +249°C (-416 and +480°F)**
 3. Verify the scan tool TCM Temperature parameter increases greater than 2°C (3.5°F) after operating the vehicle at 64 km/h (40 mph) for 10 min.
 - **If the temperature does not increase greater than 2°C (3.5°F)**
-

Replace the Q8 Control Solenoid Valve Assembly

- **If the temperature increases greater than 2°C (3.5°F)**

4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
5. Verify the DTC does not set.
 - **If the DTC sets**

Replace the Q8 Control Solenoid Valve Assembly

- **If the DTC does not set**

6. All OK.

Repair Instructions

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

- Perform **Reset Transmission Adapts** following all transmission repairs.
- **Control Module References** for Control Solenoid Valve Assembly replacement, programming and setup.

DTC P06AC-P06AE

Diagnostic Instructions

- Perform **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

Control Module Power Up Temperature Sensor Performance

DTC P06AD

Control Module Power Up Temperature Sensor Circuit Low Voltage

DTC P06AE

Control Module Power Up Temperature Sensor Circuit High Voltage

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 and also to protect the control solenoid valve assembly and TCM. This fault is handled inside the TCM and no external circuits are involved.

Conditions for Running the DTC**P06AC**

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, 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 is not set.
- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is between 8.6-32 V.
- Brake torque is not active.
- Engine torque signal is valid.
- Accelerator pedal position signal is valid.

P06AD

- DTC P0716, P0717, P0722 or P0723 is not set.
- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is between 8.6-32 V.

P06AE

- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is between 8.6-32 V.

Conditions for Setting the DTC**P06AC**

- TCM detects a 20-50°C (36-90°F) or greater difference between the transmission fluid temperature and TCM power up temperature, which depends on the average of transmission fluid temperature, TCM substrate temperature and TCM power up temperature.
- TCM detects an 8-10°C (14-18°F) or greater difference between the TCM substrate temperature and TCM power up temperature, which depends on the average of the transmission fluid temperature, TCM substrate temperature and TCM power up temperature.
- Above conditions have to be met for 5 min. within a 6 min. period.

P06AD

TCM power up temperature is -59°C (-74°F) or less for 1 min.

P06AE

TCM power up temperature is 164°C (327°F) or greater for 1 min.

Action Taken When the DTC Sets

- DTC P06AC, P06AD, P06AE are Type B DTCs.
- TCM defaults the TCM power up temperature to a calculated temperature based on the TCM substrate temperature.

Conditions for Clearing the DTC

DTC P06AC, P06AD, P06AE are Type B DTCs.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

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

Electrical Information Reference

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- **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, clear the DTCs with a scan tool.
2. Operate the vehicle at 64 km/h (40 mph) for 10 min.
3. Verify DTC P06AC, P06AD or P06AE is not set.

- **If any of the DTCs are set**

Replace the Q8 Control Solenoid Valve Assembly.

- **If none of the DTCs are set.**

4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
5. Verify the DTC does not set.

- **If the DTC sets**

Replace the Q8 Control Solenoid Valve Assembly.

- **If the DTC does not set**

6. All OK.

Repair Instructions

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

- Perform the **Reset Transmission Adapts** following all transmission repairs.
- **Control Module References** for Control Solenoid Valve Assembly replacement, programming and setup.

DTC P0711-P0713**Diagnostic Instructions**

- Perform **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

Circuit/System Description

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

Conditions for Running the DTC**P0711**

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, 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 is not set.
- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is greater than 8.5 V.
- Brake torque is not active.
- Engine torque signal is valid.
- Throttle position signal is valid.

P0712 and P0713

- DTC P0716, P0717, P0722 or P0723 is not set.
- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is greater than 8.5 V.

Conditions for Setting the DTC**P0711**

- TCM detects a 20-50°C (36-90°F) or greater difference between the transmission fluid temperature and the TCM substrate temperature, which depends on the average of the transmission fluid temperature, TCM substrate temperature and TCM power up temperature.
- TCM detects a 20-50°C (36-90°F) or greater difference between the transmission fluid temperature and the TCM power up temperature, which depends on the average of the transmission fluid temperature, TCM substrate temperature and TCM power up temperature.
- Above conditions have to be met for 5 min within a 6 min period.

P0712

Transmission fluid temperature is -74°C (-101°F) or lower for 1 min.

P0713

Transmission fluid temperature is 174°C (345°F) or greater for 1 min.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

DTCs P0711, P0712 and P0713 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 sensor's output. During a road test, the transmission fluid temperature should steadily increase to a normal operating temperature and then stabilize.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

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Electrical Information Reference

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- **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. Engine idling at the normal operating temperature.
2. Verify the scan tool Transmission Fluid Temperature parameter is between -74 and +174°C (-101 and +345°F).
 - **If not between -74 and +174°C (-101 and +345°F)**
Replace the Q8 Control Solenoid Valve Assembly.
 - **If between -74 and +174°C (-101 and +345°F)**
3. Verify the scan tool Transmission Fluid Temperature parameter increases greater than 2°C (3.6°F) after operating the vehicle at 64 km/h (40 mph) for 10 min.
 - **If the temperature does not increase greater than 2°C (3.6°F)**
Replace the Q8 Control Solenoid Valve Assembly.
 - **If the temperature increases greater than 2°C (3.6°F)**
4. Verify the scan tool Transmission Fluid Temperature and the TCM Temperature parameters are within 20°C (36°F).
 - **If the temperatures are not within 20°C (36°F)**
 1. Ignition OFF, remove the control valve body cover. Refer to **Control Valve Body Cover Replacement**.
 2. Verify the heat sink on the control valve channel upper plate and the control solenoid valve spring are in place and undamaged.
 - If the heat sink on the control valve channel upper plate or the control solenoid valve spring are damaged, replace as necessary
 - If the heat sink on the control valve channel upper plate and the control solenoid valve spring are in place and undamaged, replace the Q8 Control Solenoid Valve Assembly
 - **If the temperatures are within 20°C (36°F)**
5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
6. Verify the DTC does not set.
 - **If the DTC sets**

2014 GMC Acadia Denali

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Replace the Q8 Control Solenoid Valve Assembly.

- **If the DTC does not set**

7. All OK.

Repair Instructions

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

- Perform the **Reset Transmission Adapts** following all transmission repairs.
- **Control Valve Lower Body and Upper Body Replacement** for control valve channel upper plate assembly and control solenoid valve spring replacement.
- **Control Module References** for Control Solenoid Valve Assembly replacement, programming and setup.

DTC P0716 OR P0717

Diagnostic Instructions

- Perform **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	Short to Voltage	Signal Performance
8.6 V Reference	P0716, P0717	P0716, P0717	-	P0716
Signal	P0716, P0717	P0716, P0717	P0716, P0717	P0716

Typical Scan Tool Data

Transmission ISS

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Engine running, normal operating temperature, transmission in PARK			

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Parameter Normal Range: 450-7000 RPM

8.6 V Reference	0 RPM	0 RPM	-
Signal	0 RPM	0 RPM	0 RPM

ISS/OSS Supply Voltage

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: OK			
8.6 V Reference	Out of Range	OK	Out of Range
Signal	OK	OK	OK

Circuit/System Description

The input shaft speed (ISS) sensor is a hall-effect type sensor. The ISS sensor 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. The sensor receives 8.3-9.3 volts on the 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 sensor signal circuit to the TCM. The TCM uses the ISS sensor signal to determine line pressure, transmission shift patterns, torque converter clutch (TCC) slip speed and gear ratio.

Conditions for Running the DTC**P0716**

- DTC P0101, P0102, P0103, P0121, P0122, P0123, P0717, P0752, P0973 or P0974 is not set.
- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is greater than 8.5 V.
- Engine torque signal is valid.
- Throttle position signal is valid.
- Vehicle speed is 10 km/h (6 mph) or greater.

P0717

- DTC P0101, P0102, P0103, P0722 or P0723 is not set.
- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is greater than 8.5 V.
- Vehicle speed is 16 km/h (10 mph) or greater.
- Engine torque is 50 N.m (37 lb ft) or greater.
- Engine torque signal is valid.

Conditions For Setting the DTC

P0716

TCM detects the transmission input shaft speed signal dropped greater than 1350 RPM for 1 s.

P0717 - Condition 1

TCM detects the transmission input shaft speed signal is less than 33 RPM for 5 s.

P0717 - Condition 2

The TCM detects that P0722 set and the Transmission input speed is less than 1000 RPM for 5 s.

Action Taken When the DTC Sets

- DTCs P0716 and P0717 are Type A DTCs.
- TCM freezes transmission adaptive functions.
- TCM commands the high side driver OFF.
- TCM commands TCC OFF.
- TCM commands maximum line pressure.
- TCM disables neutral idle.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- Torque management is enabled.
- TCM limits the transmission to Reverse and 3rd or 5th gear operation.

Conditions for Clearing the DTC

DTCs P0716 and P0717 are Type A DTCs.

Diagnostic Aids

If the scan tool ISS/OSS supply voltage parameter is out of range, the fault could also be caused by the transmission output shaft speed sensor.

Damage or misalignment of the 4-5-6 clutch and 3-5-R clutch housing reluctor machined teeth surface may cause a speed sensor malfunction.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

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.
2. Verify the scan tool ISS/OSS Supply Voltage parameter displays OK.
 - **IF OK is not displayed**

Refer to **Circuit/System Testing**.

- **If OK is displayed**

3. Engine idling, transmission in Park, parking brake applied and drive wheels chocked.
4. Verify the scan tool Transmission ISS parameter changes or does not drop out while varying the engine speed.
 - **If the Transmission ISS does not vary with engine speed or drops out**

Refer to **Circuit/System Testing**.

- **If the Transmission ISS varies with engine speed and does not drop out**

5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

6. Verify the DTC does not set.

- o **If the DTC sets**

Refer to Circuit/System Testing.

- o **If the DTC does not set**

7. All OK.

Circuit/System Testing

1. Ignition OFF, remove the control valve body cover.

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

2. Connect the vehicle wire harness electrical connector to the Q8 Control Solenoid Valve Assembly electrical connector.

3. Disconnect the B14C Transmission Input Shaft Speed Sensor wiring harness connector from the Q8 Control Solenoid Valve Assembly.

4. Ignition ON.

5. Test for 8.3-9.3 V between the ISS sensor supply voltage circuit terminal A at the Q8 Control Solenoid Valve Assembly and ground at the transmission case.

- o **If not between 8.3-9.3 V**

1. Ignition OFF, disconnect the B14A Transmission Output Shaft Speed Sensor wiring harness connector from the Q8 Control Solenoid Valve Assembly. Ignition ON.

2. Test for 8.3-9.3 V between the OSS sensor supply voltage circuit terminal A X3 at the Q8 Control Solenoid Valve Assembly and ground at the transmission case.

- o If not between 8.3-9.3 V, replace the Q8 Control Solenoid Valve Assembly.

- o If between 8.3-9.3 V, replace the B14A Transmission Output Shaft Speed Sensor.

- o **If between 8.3-9.3 V**

6. Verify the scan tool Transmission ISS parameter is between 495-505 RPM when performing the input shaft speed test. Refer to Control Solenoid Valve and Transmission Control Module Assembly Input Shaft Speed/Output Shaft Speed Input Test.

- o **If not between 495-505 RPM**

Replace the Q8 Control Solenoid Valve Assembly.

- o **If between 495-505 RPM**

7. Verify there is no damage to the reluctor, which is attached to the 4-5-6 clutch and 3-5-R clutch housing assembly or misalignment between the B14C Transmission Input Shaft Speed Sensor and reluctor.

- o **If the reluctor is damaged or misaligned**

Repair or replace as necessary.

- **If the reluctor is not damaged or misaligned**

8. Replace the B14C Transmission Input Shaft Speed Sensor.

Repair Instructions

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

- Perform **Reset Transmission Adapts** following all transmission repairs.
- **Input Speed Sensor Replacement**
- **Output Speed Sensor Replacement**
- **Control Valve Body Cover Replacement**
- **Control Module References** for Control Solenoid Valve Assembly replacement, programming and setup.

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 Descriptors

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 400 RPM or greater for 5 seconds.
- The ignition voltage is 8.6 volts or greater.

Conditions for Setting the DTC

The Tow Mode switch signal circuit has low voltage for 10 minutes.

Action Taken When the DTC Sets

DTC P071A is a type C DTC.

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 - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

Electrical Information Reference

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

Description and Operation

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. Ignition ON, engine OFF, observe the Tow/Haul parameter with a scan tool. Operate the Tow/Haul

switch several times. The Tow/Haul parameter should toggle between Active and Inactive when the switch is operated.

2. If the electrical circuit checks are OK and the tow/haul shift pattern is not occurring, there may be a mechanical/hydraulic condition that prevents tow/haul operation. Refer to **Symptoms - Automatic Transmission**.
3. After performing the above steps, verify that the DTC does not reset by operating the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions you observe from the Freeze Frame/Failure Records data. If the vehicle passes the Circuit/System Verification procedure, then STOP. Do not perform Circuit/System Testing or Component Testing as this may result in an unnecessary part replacement. Refer to **Testing for Intermittent Conditions and Poor Connections**.

Circuit/System Testing

1. Ignition OFF, transmission in Park, disconnect the I/P Multifunction Switch connector.
2. Install a 3 amp fused jumper between the Tow/Haul Switch signal circuit harness connector terminal 11 and ground. Verify the scan tool parameter changes between Active and Inactive each time the signal circuit is grounded.
 - If not the specified value, test the signal circuit for a short to voltage, short to ground or an open/high resistance. If the circuit tests normal, replace the BCM.
3. If all circuits test normal, replace the Tow/Haul switch.

Repair Instructions

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

Control Module References for BCM replacement, setup and programming.

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 Circuit Intermittent

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Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
8.6 V Reference	P0722, P0723	P0722, P0723	-	P0723
Signal	P0722, P0723	P0722, P0723	P0722, P0723	P0723

Typical Scan Tool Data**Transmission OSS**

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Engine running, normal operating temperature			
Parameter Normal Range: 0-7, 000 RPM			
8.6 V Reference	0 RPM	0 RPM	0-7000 RPM
Signal	0 RPM	0 RPM	0 RPM

ISS/OSS Supply Voltage

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Key ON, Engine OFF or Engine running, normal operating temperature			
Parameter Normal Range: OK			
8.6 V	Out of Range	OK	Out of Range
Signal	OK	OK	OK

Circuit/System Description

The automatic transmission output shaft speed (OSS) sensor is a hall-effect type sensor. The sensor faces the front differential transfer drive gear. The sensor receives 8.3-9.3 volts on the OSS sensor supply voltage circuit from the transmission control module (TCM). As the output shaft rotates, the sensor produces a signal frequency based on the machined surface of the output shaft. This signal is transmitted through the OSS sensor signal circuit to the TCM. The TCM uses the OSS sensor signal to calculate output shaft speed to determine commanded line pressure, transmission shift patterns, torque converter clutch (TCC) slip speed and gear ratio.

Conditions for Running the DTC**P0722**

- DTC P0101, P0102, P0103, P0121, P0122, P0123, P0716, P0717 or P0723 is not set.
- Selected range is not PARK or NEUTRAL.
- Transmission input speed is 1, 000 RPM or greater.
- Engine speed is 3, 200 RPM or greater.
- Throttle position is 5% or greater.
- Throttle position signal is valid.
- Engine torque is 35 N.m (26 lb ft) or greater.

- Engine torque signal is valid.
- Transmission fluid temperature is -40°C (-40°F) or greater.
- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is greater than 8.5 V.

P0723

- DTC P0101, P0102, P0103, P0121, P0122, P0123, P0973, P0974, P0976 or P0977 is not set.
- Greater than 5 s since last transmission upshift or downshift.
- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is greater than 8.5 V.

Conditions for Setting the DTC**P0722**

Transmission output speed is 35 RPM or less for 4.0 s.

P0723

- Transmission output speed is 105 RPM or greater for 0.2 s.
- TCM detects the transmission output shaft speed dropped greater than 650 RPM for 1.5 s.

Action Taken When the DTC Sets

- DTCs P0722 and P0723 are Type A DTCs.
- TCM freezes transmission adaptive functions.
- TCM turns the high side driver OFF.
- TCM commands maximum line pressure.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM limits the transmission to Reverse and 3rd or 5th gear operation.

Conditions for Clearing the DTC

DTCs P0722 and P0723 are Type A DTCs.

Diagnostic Aids

- Damage or misalignment of the front differential transfer drive gear teeth surface or metallic debris on the face of the sensor may cause a speed sensor malfunction.
- Proper torque of the OSS mounting bolt is critical to proper OSS operation.
- If the scan tool ISS/OSS Supply Voltage indicates out of range, the fault could also be caused by the

transmission input shaft speed sensor.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

Description and Operation

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

Electrical Information Reference

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- **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.
2. Verify the scan tool ISS/OSS Supply Voltage parameter displays OK.
 - **If OK is not displayed**

Refer to **Circuit/System Testing**.

- **If OK is displayed**
3. Verify the scan tool Transmission OSS parameter changes with vehicle speed or does not drop out while

operating the vehicle at 16-32 km/h (10-20 mph).

- **If the Transmission OSS does not vary with vehicle speed or drops out**

Refer to Circuit/System Testing.

- **If the Transmission OSS varies with vehicle speed and does not drop out**

4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
5. Verify the DTC does not set
 - **If the DTC sets**

Refer to Circuit/System Testing.

- **If the DTC does not set**

6. All OK.

Circuit/System Testing

1. Ignition OFF, remove the control valve body cover.

NOTE: You must perform Circuit/System Verification first.

2. Connect the vehicle wire harness electrical connector to the Q8 Control Solenoid Valve Assembly electrical connector.
3. Disconnect the B14A Transmission Output Shaft Speed Sensor wiring harness connector from the Q8 Control Solenoid Valve Assembly.
4. Ignition ON.
5. Test for 8.3-9.3 V between the OSS sensor supply voltage circuit terminal A at the Q8 Control Solenoid Valve Assembly and ground at the transmission case.
 - **If not between 8.3-9.3 V**
 1. Ignition OFF, disconnect the B14C Transmission Input Shaft Speed Sensor wiring harness connector from the Q8 Control Solenoid Valve Assembly. Ignition ON.
 2. Test for 8.3-9.3 V between the OSS sensor supply voltage circuit terminal A X4 electrical connector at the Q8 Control Solenoid Valve Assembly and ground at the transmission case.
 - If not between 8.3-9.3 V, replace the Q8 Control Solenoid Valve Assembly.
 - If between 8.3-9.3 V, replace the B14C Transmission Input Shaft Speed Sensor.
 - **If between 8.3-9.3 V**
6. Verify the scan tool Transmission OSS parameter is between 256-266 RPM when performing the output shaft speed test. Refer to Control Solenoid Valve and Transmission Control Module Assembly Input Shaft Speed/Output Shaft Speed Input Test.
 - **If not between 256-266 RPM**

Replace the Q8 Control Solenoid Valve Assembly.

- **If between 256-266 RPM**

7. Verify there is no damage to the front differential transfer drive gear teeth surface or misalignment with the B14A Transmission Output Shaft Speed Sensor.

- **If the front differential transfer drive gear is damaged or is misaligned**

Repair or replace as necessary.

- **If the front differential transfer drive gear is not damaged or misaligned.**

8. Replace the B14A Transmission Output Shaft Speed Sensor.

Repair Instructions

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

- Perform the **Reset Transmission Adapts** following all transmission repairs.
- **Control Valve Body Cover Replacement** .
- **Output Speed Sensor Replacement**
- **Input Speed Sensor Replacement**
- **Control Module References** for Control Solenoid Valve Assembly replacement, programming and setup

DTC P0741 OR P0742

Diagnostic Instructions

- Perform **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: The DTCs listed below set due to a transmission hydraulic/mechanical condition. Perform **Circuit/System Verification** and **Circuit/System Testing** to identify the cause.

DTC P0741

Torque Converter Clutch (TCC) System Stuck Off - Transmission Hydraulic/Mechanical Performance

DTC P0742

Torque Converter Clutch (TCC) System Stuck On - Transmission Hydraulic/Mechanical Performance

Circuit/System Description

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

Conditions for Running the DTC**P0741**

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0401, P042E, P0716, P0717, P0722, P0723, P0742, P2763 or P2764 is not set.
- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is greater than 8.5 V.
- Transmission fluid temperature is between -6.7 to +130°C (20-266°F).
- Throttle position is 8.5% or greater.
- Engine torque is 50 N.m (36 lb ft) or greater.
- Engine torque signal is valid.
- Throttle position signal is valid.
- TCM detects the transmission gear ratios listed below for the commanded gear when TCC is commanded ON:
 - 2nd gear ratio is between 2.67-3.07.
 - 3rd gear ratio is between 1.71-1.97.
 - 4th gear ratio is between 1.32-1.51.
 - 5th gear is between 0.93-1.07.
 - 6th gear is between 0.69-0.79.

P0742

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0401, P042E, P0716, P0717, P0722, P0723, P0741, P2763 or P2764 is not set.
- Commanded range is 2nd gear or higher.

- Ignition voltage is 8.5 V or greater.
- Transmission fluid temperature is between 18-130°C (64-266°F).
- Throttle position is 5% or greater.
- Engine torque is 80 N.m (59 lb ft) or greater.
- Engine speed is 400-7, 500 RPM for 5 s.
- Vehicle speed is 1 km/h (0.6 mph) or greater.
- Engine speed is 500 RPM or greater
- Engine torque signal is valid.
- Throttle position signal is valid.
- TCC is commanded OFF.

Conditions for Setting the DTC**P0741**

- TCC Pressure command is 800 kPa (116 psi) or greater for 2 s.
- TCM detects TCC slip of 50 RPM or greater for 5 s.
- The above conditions must occur 3 times.

P0742

TCM detects the TCC slip between -50 and +13 RPM for 2.5 s when the TCC is commanded OFF. This condition must occur 6 times.

Action Taken When the DTC Sets**P0741**

- DTC P0741 is a Type B DTC.
- TCM inhibits 6th gear.
- TCM commands TCC OFF.
- TCM forces hot mode shift pattern.

P0742

- DTC P0742 is a Type A DTC.
- TCM freezes transmission adaptive functions.
- TCM forces hot mode shift pattern.
- TCM commands the TCC ON.

Conditions for Clearing the DTC

P0741

DTC P0741 is a Type B DTC.

P0742

DTC P0742 is a Type A DTC.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

Description and Operation

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

Electrical Information Reference

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- **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

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

1. Engine idling, transmission in the Park, parking brake applied and drive wheels chocked.

2. Verify the transmission fluid level and condition is correct. Refer to **Transmission Fluid Level and Condition Check**.

- **If the transmission fluid level and condition is not correct**

Repair as necessary.

- **If the transmission fluid level and condition is correct**

3. Ignition ON, clear the TCM DTCs with a scan tool.
4. Verify DTC P0741 or P0742 does not set while performing a road test. Refer to **Road Test**.

- **If DTC P0741 or P0742 sets**

Refer to **Circuit/System Testing**.

- **If DTC P0741 or P0742 did not set**

5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

6. Verify the DTC does not set.

- **If the DTC sets**

Refer to **Circuit/System Testing**.

- **If the DTC does not set**

7. All OK.

Circuit/System Testing

1. Engine idling at the normal operating temperature.
2. Verify the transmission line pressures are within the specified range. Refer to **Line Pressure Check** and **Solenoid Valve Pressure**.

- **If the pressures are not within range**

Refer to **Fluid Pressure High or Low**.

- **If the pressures are within range**

3. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.
4. Verify the pressure changes for all solenoids when performing the solenoid test. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test**.

- **If the pressure does not change**

Replace the Q8 Control Solenoid Valve Assembly.

- **If the pressure changes**

5. Verify the mechanical conditions listed below do not exist. Repair or replace as necessary.

P0741 - Upper Valve Body

Release exhaust port/orifice plugged or blocked.

P0741 or P0742 - Upper Valve Body

Torque converter clutch regulator valve stuck/sticking - debris, binding, damaged valve or scored bore.

P0741 - Channel Plate and Spacer Plate

Oil channels or orifices blocked by debris.

P0741 - Torque Converter

- Torque converter clutch delamination or material worn off.
- Converter bolts too long damaging the clutch apply surface.
- Damaged seal.

P0741 - Support

Damaged seal.

P0741 or P0742 - Transmission Case Cover

- Pressure release blow-off not seating/sealing.
- Damaged spring.

P0741 - Turbine Shaft

O-ring seal cut or damaged

P0741 or P0742 Q8 Control Solenoid Valve Assembly

- Torque converter clutch pressure control solenoid stuck OFF or leaking.
- Torque converter clutch pressure control solenoid stuck ON.
- Control signal fluid supply leak due to valve body filter plate assembly cracked or damaged gasket seal.

Repair Instructions

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

- Perform **Reset Transmission Adapts** following all transmission repairs.
- **Torque Converter Removal**
- **Torque Converter and Differential Housing, Front Differential Transfer Drive Gear and Front Differential Carrier Removal and Torque Converter and Differential Housing Installation**

- **Torque Converter Installation**
- **Control Valve Lower Body and Upper Body Replacement**
- **Control Module References** for Control Solenoid Valve Assembly replacement, programming and setup.

DTC P0751 OR P0752**Diagnostic Instructions**

- Perform **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

NOTE: The DTCs listed below set due to a transmission hydraulic/mechanical condition. Perform **Circuit/System Verification** and **Circuit/System Testing** to identify the cause.

DTC P0751

Shift Solenoid Valve 1 Performance - Stuck Off - Transmission Hydraulic/Mechanical Performance

DTC P0752

Shift Solenoid Valve 1 Performance - Stuck On - Transmission Hydraulic/Mechanical Performance

Circuit/System Description

Shift solenoid valve 1 is part of the control solenoid valve assembly, which has no serviceable components. The solenoid operates by the transmission control module (TCM) turning the low side driver ON or OFF. When the shift solenoid valve 1 is commanded OFF, the plunger forces the metering ball against the actuator feed limit seat, blocking the flow and any existing pressure is exhausted through the exhaust port. When the shift solenoid valve 1 is commanded ON, the internal plunger moves, allowing the metering valve to move away from the actuator feed limit seat and against the exhaust seat, creating signal fluid pressure. The signal fluid pressure acts against the clutch select valve 2 to overcome the valve spring force, moving the valve to the apply position. Fluid pressure from the R1/4-5-6 regulator valve flows through clutch select valve 2 and is directed to either the low and reverse clutch or the 4-5-6 clutch, depending on the position of clutch select valve 2.

Conditions for Running the DTC

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0401, P042E, P0716, P0717, P0722, P0723 or P182E is not set.
- Ignition voltage is greater than 8.5 V.

- Engine speed is 400-7, 500 RPM for 5 s.
- Throttle position signal is valid.
- Engine torque signal is valid.
- High side driver is enabled.
- Output shaft speed is 36 RPM or greater or the throttle position is 0.5% or greater.
- Transmission fluid temperature is -6.6°C (20°F) or greater.

Conditions for Setting the DTC**P0751**

- Commanded gear is 1st.
- TCM detects gear ratio 1.34-1.48.
- Gear slip is 400 RPM or greater for 2 s.
- Above conditions have to occur 8 times.

P0752

- Commanded gear is 3rd
- Transmission has achieved 1st or 2nd.
- Gear slip is 400 RPM or greater for 3 s.
- TCM commands 4th gear if above conditions exist and detects a gear ratio of 4.26-4.71 for 3 s.
- The conditions listed above have to occur 5 times.

Action Taken When the DTC Sets**P0751**

- DTC P0751 is a Type B DTC.
- TCM inhibits 1st gear.
- TCM inhibits neutral idle.

P0752

- DTC P0752 is a Type A DTC.
- TCM freezes transmission adaptive functions.
- TCM commands maximum line pressure.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM commands second gear if output speed is less than 1, 350 RPM or neutral if output speed is 1, 350 RPM or greater.

- TCM inhibits neutral idle.

Conditions for Clearing the DTC

- DTC P0751 is a Type B DTC.
- DTC P0752 is a Type A DTC.

Diagnostic Aids

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

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**
- **Electronic Component Description**
- **Drive Range, First Gear**
- **Drive Range, Third Gear**

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. Engine idling at the normal operating temperature, gear selector in the Park position, parking brake applied and drive wheels chocked.

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

2. Verify the transmission fluid level and condition is correct. Refer to **Transmission Fluid Level and Condition Check**.

- o If the transmission fluid level and condition is not correct

Repair as necessary

- o If the transmission fluid level and condition is correct

3. From a stop, accelerate to 72 km/h (45 mph) with the scan tool Calculated Throttle Position greater than 15%. Perform this test 8 times.
4. Verify DTC P0751 or P0752 did not set.

- o If DTC P0751 or P0752 set

Refer to **Circuit/System Testing**.

- o If DTC P0751 or P0752 did not set

5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
6. Verify the DTC does not set.

- o If the DTC sets

Refer to **Circuit/System Testing**.

- o If the DTC does not set

7. All OK.

Circuit/System Testing

1. Engine idling at the normal operating temperature.
2. Verify the transmission line pressures are within the specified range. Refer to **Line Pressure Check** and **Solenoid Valve Pressure**.

- o If the pressures are not within range

Refer to **Fluid Pressure High or Low**.

- o If the pressures are within range

3. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.
4. Verify the pressure changes for all solenoids when performing the solenoid test. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test**.

- **If the pressure does not change**

Replace the Q8 Control Solenoid Valve Assembly.

- **If the pressure changes**

5. Verify the mechanical conditions listed below do not exist. Repair or replace as necessary.

P0751 - Upper Control Valve Body

- Clutch select valve 2 bore plug undersized causing a leak - plug should be a valve fit in the bore.
- Check ball #2 - missing, damaged or malformed or damage to the seat causing leakage.

P0751 or P0752 - Upper Control Valve Body

Clutch select valve 2 stuck from debris, sediment, binding or a scored bore.

P0751 or P0752 - Channel Plate and Spacer Plate

Oil channels or orifices blocked by debris.

P0751 - Lower Control Valve Body

- Shift solenoid 1 - not pressurizing, stuck OFF or leaking.
- Shift solenoid 1 - not exhausting, stuck ON.

P0751 or P0752 - Q8 Control Solenoid Valve Assembly

- Shift solenoid valve 1 stuck OFF or leaking.
- Shift solenoid valve 1 stuck ON.
- Valve body filter plate assembly cracked, blocked or damaged gasket seal.
- Pressure control solenoid valve 3 stuck ON, stuck OFF or leaking. Low and Reverse and 4-5-6 regulator valve stuck or sticking from debris, sediment, binding or scored bore.

Repair Instructions

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

- Perform **Reset Transmission Adapts** following all transmission repairs.
- **Control Module References** for control solenoid valve assembly replacement, programming and setup.

DTC P0756

Diagnostic Instructions

- Perform **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

NOTE: The DTC listed below set due to a transmission hydraulic/mechanical condition. Perform **Circuit/System Verification** and **Circuit/System Testing** to identify the cause.

DTC P0756

Shift Solenoid Valve 2 Performance - Stuck Off - Transmission Hydraulic/Mechanical Performance

Circuit/System Description

Shift solenoid valve 2 is part of the control solenoid valve assembly, which has no serviceable components. Shift solenoid valve 2 is a normally closed solenoid valve and controls fluid to the clutch select valve 3. The transmission control module (TCM) operates the solenoid by turning the low side driver ON or OFF. When the shift solenoid valve 2 is commanded OFF, the plunger forces the metering ball against the actuator feed limit seat, blocking the flow and any existing pressure is exhausted through the exhaust port. When shift solenoid valve 2 is commanded ON, the internal plunger moves and allows the metering ball to move away from the feed seat and against the exhaust seat, creating signal fluid pressure. The signal fluid acts against the clutch select valve 3 to overcome the valve spring force, moving it to the apply position. Shift solenoid valve 2 is commanded OFF in Reverse and commanded ON in Park, Neutral, Drive 1 Engine Braking and Drive 1-6 gear ranges.

Conditions for Running the DTC

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0401, P042E, P0716, P0717, P0722, P0723 or P182E is not set.
- Engine speed is 400-7, 500 RPM for 5 s.
- High side driver is enabled.
- Ignition voltage is greater than 8.5 V.
- Throttle position signal is valid.
- Transmission fluid temperature is -6.6°C (20°F) or greater.
- Output shaft speed is 36 RPM or greater or the throttle position is 0.5% or greater

Conditions for Setting the DTC

- Commanded Gear is 1st locked.
- Gearbox Slip is 400 RPM or greater for 3 s.

- If above conditions exist, the TCM commands second gear. If the gear ratio is between 2.72-3.01 for 1 s, the counter will increment. DTC will set after 3 occurrences.

Action Taken When the DTC Sets

- DTC P0756 is a Type A DTC.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM commands second gear if output speed is less than 1, 350 RPM or neutral if output speed is 1, 350 RPM or greater.

Conditions for Clearing the DTC

DTC P0756 is a Type A DTC.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**
- **Electronic Component Description**
- **Drive Range, First Gear Engine Braking**

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. Engine idling, transmission in Park, with parking brake applied and drive wheels chocked.

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

2. Verify the transmission fluid level and condition is correct. Refer to **Transmission Fluid Level and Condition Check**.
 - o If the transmission fluid level and condition is not correct
Repair as necessary.
 - o If the transmission fluid level and condition is correct
3. Ignition ON, clear the TCM DTCs with a scan tool.
4. Engine running, brakes applied, transmission gear shift selector in Reverse. Shift to Drive and accelerate to 56 km/h (35 mph) with the scan tool Calculated Throttle Position greater than 15%. Perform this test 5 consecutive times.
5. Verify DTC P0756 did not set.
 - o If DTC P0756 sets
Refer to **Circuit/System Testing**.
 - o If DTC P0756 did not set
6. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
7. Verify the DTC does not set.
 - o If the DTC sets
Refer to **Circuit/System Testing**.
 - o If the DTC does not set
8. All OK.

Circuit/System Testing

1. Engine idling at the normal operating temperature.
2. Verify the transmission line pressures are within the specified range. Refer to **Line Pressure Check** and **Solenoid Valve Pressure**.

- **If the pressures are not within range**

Refer to **Fluid Pressure High or Low**.

- **If the pressures are within range**

3. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.
4. Verify the pressure changes for all solenoids when performing the solenoid test. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test**.

- **If the pressure does not change**

Replace the Q8 Control Solenoid Valve Assembly.

- **If the pressure changes**

5. Verify the mechanical conditions listed below do not exist. Repair or replace as necessary.

Upper Control Valve Body

- Clutch select valve 3 stuck from debris, sediment, binding or scored bore
- Clutch select valve 3 bore plug undersized causing a leak - plug should be a valve fit in the bore.
- Check ball #3 - missing, damaged or malformed or damage to the seat causing leakage.
- Check ball #1 - missing, damaged or malformed or damage to the seat causing leakage.

Channel Plate and Spacer Plate

Oil channels or orifices blocked by debris.

Mechanical Diode

Broken or not capable of holding torque.

Pump Assembly

Fluid pump vanes or fluid pump rotor broken

Pump Seal

Seal is torn or cut, causing a small leak that is overcome with enough speed and pump capacity.

Q8 Control Solenoid Valve Assembly

- Shift solenoid 2 not pressurizing - stuck OFF or leaking.
- Valve body filter plate assembly cracked, blocked or damaged gasket seal.

Repair Instructions

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

- Perform **Reset Transmission Adapts** following all transmission repairs.
- **Control Valve Upper Body Assembly Cleaning and Inspection**
- **Control Module References** for control solenoid valve assembly replacement, programming and setup.

DTC P0776 OR P0777

Diagnostic Instructions

- Perform **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: The DTCs listed below set due to a transmission hydraulic/mechanical condition. Perform **Circuit/System Verification** and **Circuit/System Testing** to identify the cause.

DTC P0776

Pressure Control Solenoid Valve 2 Stuck Off - Transmission Hydraulic/Mechanical Performance

DTC P0777

Pressure Control Solenoid Valve 2 Stuck On - Transmission Hydraulic/Mechanical Performance

Circuit/System Description

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

Conditions for Running the DTC

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0401, P042E, P0716, P0717, P0722, P0723 or P182E is not set.
- Ignition voltage is greater than 8.5 V.
- Engine speed is 400-7, 500 RPM for 5 s.
- Transmission fluid temperature is -6.7°C (20°F) or greater.

- Transmission output speed is 36 RPM or greater or the accelerator pedal position is 0.5% or greater.
- Throttle position signal is valid.
- High side driver is enabled.
- Engine torque is 20 N.m (15 lb ft) or greater - DTC P0777 only.

Conditions for Setting the DTC**P0776**

TCM has detected an incorrect gear ratio or neutral condition when the 3-5-Reverse clutch is commanded ON. This condition must occur 3 times.

P0777

TCM has detected an incorrect gear ratio change when the 3-5-Reverse clutch is commanded OFF during a shift or when 3rd gear ratio is detected in 1st gear. This condition must occur 3 times.

Action Taken When the DTC Sets**P0776**

- DTC P0776 is a Type A DTC.
- TCM commands maximum line pressure.
- TCM inhibits Tap Up/Down function.
- TCM freezes transmission adaptive functions.
- TCM inhibits manual shifting of forward gears.
- TCM limits the transmission to Reverse, 2nd and 4th gear operation.
- TCM inhibits auto grade braking.
- TCM inhibits neutral idle.

P0777

- DTC P0777 is a Type A DTC.
- TCM commands maximum line pressure.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM freezes transmission adaptive functions.
- TCM limits the transmission to 3rd gear and Reverse operation.
- TCM inhibits auto grade braking.
- TCM inhibits neutral idle.

Conditions for Clearing the DTC

DTCs P0776 and P0777 are Type A DTCs.

Diagnostic Aids

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

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

Description and Operation

- **Transmission General Description**
- **Reverse**
- **Drive Range, Third Gear**
- **Drive Range, Fifth Gear**

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. Engine idling, transmission in Park, parking brake applied and drive wheels chocked.

WARNING: Refer to Parking Brake and Drive Wheels Warning .

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

2. Verify the transmission fluid level and condition is correct. Refer to Transmission Fluid Level and Condition Check.

- If the transmission fluid level and condition is not correct

Repair as necessary.

- If the transmission fluid level and condition is correct

3. Ignition ON, clear the TCM DTCs with a scan tool.
4. Verify DTC P0776 or P0777 does not set while performing a road test. Refer to Road Test.

- If DTC P0776 or P0777 sets

Refer to Circuit/System Testing.

- If DTC P0776 or P0777 does not set

5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
 6. Verify the DTC does not set.
- If the DTC sets

Refer to Circuit/System Testing.

- If the DTC does not set

7. All OK.

Circuit/System Testing

1. Engine idling at the normal operating temperature

NOTE: You must perform Circuit/System Verification first.

2. Verify the transmission line pressures are within the specified range. Refer to Line Pressure Check and Solenoid Valve Pressure .

- If the pressures are not within range

Refer to Fluid Pressure High or Low.

- If the pressures are within range

3. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.

4. Verify the pressure changes for all solenoids when performing the solenoid test. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test**.

- **If the pressure does not change**

Replace the Q8 Control Solenoid Valve Assembly.

- **If the pressure changes**

5. Verify the mechanical conditions listed below do not exist. Repair or replace as necessary.

DTC P0776 or P0777 - Upper Control Valve Body Assembly

3-5-R regulator valve stuck/sticking - debris, binding, damaged valve or scored bore.

DTC P0776 or P0777 - Lower Control Valve Body Assembly

- Actuator feed limit circuit supply fluid to solenoid restricted from debris, a stuck limit valve or sediment blockage.
- 3-5-R clutch boost valve - binding or scored bore - can cause harsh shifts.

DTC P0776 or P0777 - Q8 Control Solenoid Valve Assembly

- Clutch pressure control solenoid 2 stuck ON or stuck OFF.
- Control solenoid valve filter plate assembly, blocked or damaged gasket seal.

DTC P0776 - Channel Plate and Spacer Plate

Oil channels or orifices blocked by debris.

DTC P0776 or P0777 - Transmission Fluid Pump

- Fluid pump housing vanes/rotor/slide damaged/scored.
- Transmission pump fluid outlet seal assembly damaged/leaking.

DTC P0776 - Transmission Cooling/Lubrication

- Oil filter or filter seal loose, plugged or damaged.
- Restriction/leak in oil to air cooler/radiator.
- Restricted/leaking/kinked/damaged transmission oil cooler lines.
- Restriction/leak in transmission fluid pump assembly.

DTC P0776 - Torque Converter Assembly

Torque converter overstressed due to high temperature, fluid boiled out.

DTC P0776 - 4-5-6 and 3-5-R Clutch Housing Assembly

- 3-5-R clutch backing plate retaining ring not seated or wave plate broken.
- 3-5-R piston seal torn, cut or rolled.
- 4-5-6 and 3-5-R clutch housing assembly inner/outer seal damaged or dam pressure too high.

DTC P0776 or P0777 - Automatic Transmission Case Cover

Blow off regulator ball stuck.

DTC P0776 or P0777

3-5-R and 4-5-6 clutch fluid seal rings damaged, worn or leaking.

Repair Instructions

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

- Perform **Reset Transmission Adapts** following all transmission repairs.
- **Control Module References** for control solenoid valve assembly replacement, programming and setup.

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

NOTE: The DTCs listed below set due to a transmission hydraulic/mechanical condition. Perform **Circuit/System Verification** and **Circuit/System Testing** to identify the cause.

DTC P0796

Pressure Control Solenoid Valve 3 Stuck Off - Transmission Hydraulic/Mechanical Performance

DTC P0797

Pressure Control Solenoid Valve 3 Stuck On - Transmission Hydraulic/Mechanical Performance

Circuit/System Description

Clutch pressure control solenoid 3 is part of the control solenoid valve assembly, which has no serviceable components. Pressure Control solenoid 3 regulates transmission fluid pressure to the R1/4-5-6 clutch regulator valve which controls pressure to the low and reverse clutch and the 4-5-6 clutch. The transmission control module (TCM) calculates gear ratio based on the speed signals from the input speed shaft (ISS) sensor and the output shaft speed (OSS) sensor. The TCM compares the expected transmission gear ratio to the calculated gear ratio for each commanded gear.

Conditions for Running the DTC

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0401, P042E, P0716, P0717, P0722, P0723 or P182E is not set.
- Ignition voltage is greater than 8.5 V.
- Engine speed is 400-7, 500 RPM for 5 s.
- Output speed is 36 RPM or greater or the accelerator pedal position is 0.5% or greater.
- Throttle position signal is valid.
- High side driver is enabled.
- Transmission fluid temperature is -6.7°C (20°F) or greater.
- Engine torque is 20 N.m (15 lb ft) or greater when 1st gear is commanded - DTC P0797 only.

Conditions for Setting the DTC**P0796**

The TCM has detected an incorrect gear ratio or neutral condition when the low and reverse clutch or the 4-5-6 clutch is commanded ON. This condition must occur 3 times.

P0797

The TCM has detected an incorrect gear ratio change when the low and reverse clutch or the 4-5-6 clutch is commanded OFF during a shift or when 4th gear ratio is detected in 1st gear. This condition must occur 3 times.

Action Taken When the DTC Sets**P0796**

- DTC P0796 is a Type A DTC.
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM limits the transmission to Reverse, 1st and 3rd gear operation.
- TCM inhibits auto grade braking.

- TCM inhibits neutral idle.

P0797

- DTC P0797 is a Type A DTC.
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM limits the transmission to Reverse and 4th gear operation.
- TCM inhibits neutral idle.
- TCM requests a reduced engine torque based on input speed.
- TCM inhibits auto grade braking.

Conditions for Clearing the DTC

DTCs P0796 and P0797 are Type A DTCs.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**
- **Electronic Component Description**
- **Reverse**
- **Drive Range, First Gear Engine Braking**
- **Drive Range - Fourth Gear**
- **Drive Range, Fifth Gear**
- **Drive Range, Sixth Gear**

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. Engine idling, transmission in Park, parking brake applied and drive wheels chocked.

WARNING: Refer to Parking Brake and Drive Wheels Warning .

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

2. Verify the transmission fluid level and condition is correct. Refer to Transmission Fluid Level and Condition Check.
 - If the transmission fluid level and condition is not correct
Repair as necessary.
 - If the transmission fluid level is condition is correct
3. Ignition ON, clear the TCM DTCs with a scan tool.
4. Verify DTC P0796 or P0797 does not set while performing a road test. Refer to Road Test.
 - If DTC P0796 or P0797 sets
Refer to Circuit/System Testing.
 - If DTC P0796 or P0797 does not set
5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
6. Verify the DTC does not set.
 - If the DTC sets
Refer to Circuit/System Testing.

- If the DTC does not set

7. All OK.

Circuit/System Testing

1. Engine idling at the normal operating temperature.

NOTE: You must perform Circuit/System Verification first.

2. Verify the transmission line pressures are within the specified range. Refer to Line Pressure Check and Solenoid Valve Pressure.

- If the pressures are not within range

Refer to Fluid Pressure High or Low.

- If the pressures are within range

3. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.
4. Verify the pressure changes for all solenoids when performing the solenoid test. Refer to Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test.

- If the pressure does not change

Replace the Q8 Control Solenoid Valve Assembly.

- If the pressure changes

5. Verify the mechanical conditions listed below do not exist. Repair or replace as necessary.

P0796 or P0797 - Control Valve Upper Body Assembly

4-5-6 regulator valve stuck/sticking from debris, binding, damaged valve or scored bore.

P0796 - Channel Plate and Spacer Plate

Channel Plate and spacer plate oil channels or orifices blocked by debris.

P0796 - Lower Control Valve Body Assembly

- Actuator feed limit circuit supply fluid to solenoid restricted or not available from debris, stuck limit valve or sediment blockage.
- 4-5-6 clutch boost valve binding or a scored bore which can also cause harsh shifts.
- 4-5-6 clutch accumulator piston leaking, cracked or broken.

P0796 or P0797 - Input Shaft Support

Input shaft support 3-5-R and 4-5-6 clutch fluid seal rings damaged, worn or leaking.

P0796 or P0797 - Q8 Control Solenoid Valve Assembly

- Clutch pressure control solenoid valve 3 stuck ON or stuck OFF.
- Control solenoid filter plate assembly cracked, blocked or damaged gasket seal.

P0796 - 4-5-6 Clutch Housing Assembly

- 4-5-6 clutch piston assembly damaged or leaking.
- 4-5-6 clutch inner/outer seal damaged.
- Dam pressure too high

P0796 - Automatic Transmission Case Cover

Blow off regulator ball stuck.

P0796 - Transmission Cooling/Lubrication

- Restriction/leak in oil to air cooler/radiator.
- Restricted/leaking/kinked/damaged transmission oil cooler lines.
- Restriction/leak in transmission fluid pump assembly.

P0796 - Torque Converter Assembly

Fluid pump or torque converter overstressed due to high temperature of fluid boiled out.

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 - Automatic Transmission Fluid Pump

Pump fluid outlet seal assembly damaged/leaking.

Repair Instructions

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

- Perform the **Reset Transmission Adapts** following all transmission repairs.
- **Control Module References** for control solenoid valve assembly replacement, programming and setup.

DTC P0815, P0816 OR P0826

2014 GMC Acadia Denali

2014 TRANSMISSION Automatic Transmission - 6T75 (M7V M7X) - Diagnostic Information and Procedures - Acadia, Enclave And Traverse

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	P0826	P0826	P0826	-
Ground	-	-	-	-

Typical Scan Tool Data

Driver Shift Request

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Signal	Inactive	Inactive	Inactive
Ground	-	-	-

Circuit/System Description

When the shift lever is placed in the M position, electronic range select or manual mode, which allows for the selection of the range of gears available, is activated. This is also known as the tap shift function. Manual mode allows the vehicle operator to increase the highest transmission gear available by pressing the plus (+) button or decrease the highest gear available by pressing the minus (-) button. The body control module (BCM) supplies a signal circuit to the shift controller. The shift controller has switches connected to a resistor array. 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 (TCM) to increase or decrease the available gear ranges. The TCM will not allow a downshift if the engine would be compromised by overspeeding.

Conditions for Running the DTC**P0815 or P0816**

- DTC P0826, P1761, P182E, P1876, P1877 or P1915 is not set.
- Time since the range change is 1 s or greater.
- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is 8.6-32 V.

P0826

- DTC P1761 is not set.
- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is 8.6-32 V.

Conditions for Setting the DTC**P0815 - Condition 1**

TCM detects an upshift request for 1 s in Park or Neutral.

P0815 - Condition 2

TCM detects an upshift request for 10 min in any forward range.

P0816 - Condition 1

TCM detects a downshift request for 1 s in Park or Neutral.

P0816 - Condition 2

TCM detects a downshift request for 10 min in any forward range.

P0826

TCM detects an invalid voltage on the Tap up/Tap down signal circuit for 1 min.

Action Taken When the DTC Sets

- DTCs P0815, P0816 and P0826 are Type C DTCs.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.

Conditions for Clearing the DTC

DTCs P0815, P0816 and P0826 are Type C DTCs.

Diagnostic Aids

A high resistance in the signal circuit may not set a DTC. Symptoms could include an inoperative manual mode Tap Up/Down or a Tap Down shift when the Tap/Up button is pressed.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

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

Electrical Information Reference

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- **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, Transmission Shift Lever in the M or manual mode position.

WARNING: Refer to **Parking Brake and Drive Wheels Warning** .

2. Verify the scan tool Up and Down Shift Switch or Driver Shift Request parameter displays Upshift when pressing the plus (+) switch, Downshift when pressing the minus (-) switch and Inactive when neither switch is pressed.

- **If the parameter does not display the correct value**

Refer to Circuit/System Testing

- **If the parameter displays the correct value**

3. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
4. Verify the DTC does not set.
 - **If the DTC sets**

Refer to Circuit/System Testing.

- **If the DTC does not set.**

5. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S3 Transmission Shift Lever. It may take up to 2 min for all vehicle systems to power down.

NOTE: You must perform Circuit/System Verification first.

2. Test for less than 10 ohms between the ground circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If greater than 2 ohms, repair the Open/High resistance in the circuit
 - If less than 2 ohms, repair the ground connection
 - **If less than 10 ohms**
3. Ignition ON.
4. Test for 11-13 V between the signal circuit terminal 3 and ground.
 - **If not between 11-13 V**
 1. Ignition OFF, disconnect the connector at the BCM.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground in the circuit
 - If infinite resistance
 1. Test for less than 2 ohms in the signal circuit end to end.

- If 2 ohms or greater, repair the open/high resistance in the circuit.
- If less than 2 ohms, replace the BCM.
- **If between 11-13 V**
- 5. Ignition OFF, connect the harness connector at the S3 Transmission Shift Lever, Ignition ON, transmission shift lever in the M or manual mode position.
- 6. Test for voltage between the S3 Transmission Shift Lever connector signal circuit terminal 3 and ground, by back probing the connector, for the conditions listed below:
 - 2.0-4.6 V - Plus button pressed
 - 5.1-7.3 V - Minus button pressed
 - 8.0-10.6 V - Neither button pressed
 - **If voltage values are not correct**

Replace the S3 Transmission Shift Lever

- **If voltage valued are correct**
- 7. Replace the K9 Body Control Module.

Repair Instructions

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

- Perform the **Reset Transmission Adapts** following all transmission repairs.
- **Transmission Control Lever Knob Replacement (Acadia)** , **Transmission Control Lever Knob Replacement (Enclave)** , **Transmission Control Lever Knob Replacement (Traverse)**
- **Control Module References** for BCM or control solenoid valve assembly replacement, programming and setup.

DTC P0851

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 P0851

Park/Neutral Position Switch Circuit Low Voltage

Diagnostic Fault Information

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2014 GMC Acadia Denali

2014 TRANSMISSION Automatic Transmission - 6T75 (M7V M7X) - Diagnostic Information and Procedures - Acadia, Enclave And Traverse

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	P0851	-	-	-
Ground	-	-	-	-

Typical Scan Tool Data**Park/Neutral Position 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			
Signal	Park/Neutral	In-Gear	In-Gear
Ground	-	In-Gear	-

Circuit/System Description

The transmission manual shift shaft switch assembly, also known as the transmission internal mode switch, is a sliding contact switch attached to the manual shift shaft inside the transmission case. The park/neutral position switch is integrated into the transmission internal mode switch 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

- DTC P182E is not set.
- Ignition voltage is 8-32 V.
- Engine speed is running. Vehicle speed is 10 km/h (6 mph) or greater.
- Throttle position is 8% or greater.

Conditions for Setting the DTC

ECM detects the park/neutral switch signal equals 0 V for 4 s.

Action Taken When the DTC Sets

- DTC P0851 is a Type C DTC.
- ECM uses the indicated transmission range from the TCM to prevent engine start-up with the transmission in reverse or a forward range.

Conditions for Clearing the DTC

DTC P0851 is a Type C DTC.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

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- **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-47825-20 Adapter Harness

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

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC P182E or P1915 is not set.
 - **If any of the DTCs are set**

Refer to **DTC P182E or P1915**.

- **If none of the DTCs are set**

3. Verify the gear shift lever position matches the scan tool TCM Internal Mode Switch parameter while slowly moving the gear shift lever from Park through all ranges.

- **If the gear shift lever position does not match the Internal Mode Switch parameter**

Adjust or replace the range selector lever cable as necessary.

- **If the gear shift lever position matches the Internal Mode Switch parameter**

4. Verify the scan tool engine control module Park/Neutral Position Switch parameter displays Park/Neutral when in Park or Neutral and In-Gear when in Reverse or Drive.

- **If the Park/Neutral Position Switch parameter is not as specified**

Refer to **Circuit/System Testing**.

- **If the Park/Neutral Position Switch parameter is as specified**

5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
6. Verify the DTC does not set.

- **If the DTC sets**

Refer to **Circuit/System Testing**.

- **If the DTC does not set**

7. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the X1 harness connector at the Q8 Control Solenoid Valve Assembly harness connector at the automatic transmission.

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

2. Install the **DT-47825-20** Adapter Harness to the vehicle harness connector.
3. Test for less than 5 ohms between the ground circuit terminal 18 and ground.

NOTE: All testing in steps 3 through 5 will be performed at the **DT-47825-20 Adapter Harness** connector.

- **If 5 ohms or greater**

1. Ignition OFF.
2. Test for less than 2 ohms in the ground circuit end to end.

- If 2 ohms or greater, repair the open/high resistance in the circuit.
- If less than 2 ohms, repair the open/high resistance in the ground connection.
- **If less than 5 ohms**
- 4. Ignition ON.
- 5. Test for 11-13 V between signal circuit terminal 20 and ground.
 - **If not between 11-13 V**
 1. Ignition OFF, remove the harness connector at the K20 Engine Control Module.
 2. Test for infinite resistance between signal circuit terminal 20 and ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - If infinite resistance.
 1. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K20 Engine Control Module.
 - **If between 11-13 V**
- 6. Ignition OFF, transmission in Park, disconnect **DT-47825-20** Adapter Harness from the vehicle wire harness.
- 7. Connect the **DT-47825-20** Adapter Harness to the Q8 Control Solenoid Valve Assembly X1 connector.
- 8. Test for less than 10 ohms between the Park/Neutral signal circuit terminal 20 and ground circuit terminal 18 with the transmission in Park and Neutral.

NOTE: The ignition will need to be ON momentarily to shift from Park.

- **If 10 ohms or greater**
 1. Disconnect the **DT-47825-20** Adapter Harness and remove the transmission control valve body cover.
 2. Install the **DT-47825-20** Adapter Harness to the Q8 Control Solenoid Valve Assembly X1 connector.
 3. Disconnect the B15 Transmission Internal Mode Switch electrical connector from the Q8 Control Solenoid Valve Assembly.
 4. Test for less than 10 ohms between Park/Neutral signal circuit terminal 20 and terminal A at the Q8 Control Solenoid Valve Assembly X2 connector.
 - If 10 ohms or greater, replace the Q8 Control Solenoid Valve Assembly.
 - If less than 10 ohms, replace the B15 Transmission Internal Mode Switch.
 - **If less than 10 ohms**
9. Test for infinite resistance between the Park/Neutral signal circuit terminal 20 and ground circuit terminal 18 with the transmission in Reverse and Drive.
 - **If less than infinite resistance**
 1. Disconnect the **DT-47825-20** Adapter Harness and remove the transmission control valve body cover.

2. Install the **DT-47825-20** Adapter Harness to the Q8 Control Solenoid Valve Assembly X1 connector.
3. Disconnect the B15 Transmission Internal Mode Switch electrical connector from the Q8 Control Solenoid Valve Assembly.
4. Test for infinite resistance between the Park/Neutral signal circuit terminal 20 and ground circuit terminal 18.
 - If less than infinite resistance, replace the Q8 Control Solenoid Valve Assembly.
 - If infinite resistance, replace the B15 Transmission Internal Mode Switch.
 - **If infinite resistance**
10. Replace the K20 Engine Control Module.

Repair Instructions

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

- Perform **Reset Transmission Adapts** following all transmission repairs.
- **Manual Shift Detent Lever with Shaft Position Switch Assembly Replacement**
- **Range Selector Lever Cable Adjustment**
- **Control Valve Body Cover Replacement**
- **Control Module References** for ECM or control solenoid valve assembly replacement, programming or setup.

DTC P0961-P0963

Diagnostic Instructions

- Perform **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 Performance

DTC P0962

Line Pressure Control Solenoid Valve Control Circuit Low Voltage

DTC P0963

Line Pressure Control Solenoid Valve Control Circuit High Voltage

Circuit/System Description

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

Conditions for Running the DTC

- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is 8.6-32 V.

Conditions for Setting the DTC**P0961**

TCM detects an internal electrical malfunction of the line pressure control solenoid where the measured line pressure control solenoid current does not equal the commanded line pressure control solenoid current for 5 s.

P0962

TCM detects a short to ground on the line pressure control solenoid control circuit for 2 s.

P0963

TCM detects an open or a short to voltage on the line pressure control solenoid control circuit for 5 s.

Action Taken When the DTC Sets**P0961 or P0963**

- DTCs P0961 and P0963 are Type B DTCs.
- TCM freezes transmission adaptive functions.
- TCM commands maximum line pressure.

P0962

- DTC P0962 is a Type A DTC.
- TCM limits the transmission to Reverse and 3rd or 5th gear operation.

- TCM inhibits the torque converter clutch (TCC).
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM turns the high side driver OFF.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM enables torque management.

Conditions for Clearing the DTC

- DTCs P0961 and P0963 are Type B DTCs.
- DTC P0962 is a Type A DTC.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

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DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

DT-47825-20 Adapter HarnessFor equivalent regional tools, refer to **Special Tools** .**Circuit/System Verification**

1. Engine running, transmission in Park. Move the gear shift lever into each gear position and back into Park position.

WARNING: Refer to Parking Brake and Drive Wheels Warning .

2. Verify the scan tool parameters listed below do not display Malfunction:
 - Line Pressure Control Solenoid Valve Performance Test Status
 - Line Pressure Control Solenoid Valve Control Circuit Low Voltage Test Status
 - Line Pressure Control Solenoid Valve Control Circuit High Voltage Test Status
 - **If Malfunction is displayed**

Refer to **Circuit/System Testing**.

- **If Malfunction is not displayed**
3. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
 4. Verify the DTC does not set.
 - **If the DTC sets**

Refer to **Circuit/System Testing**.

- **If the DTC does not set**
5. All OK.

Circuit/System Testing

1. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.

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

2. Verify the Q8 Control Solenoid Valve Assembly is not contaminated with any debris and clean as necessary. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Inspection**.

- **If contaminated**

Repair as necessary.

- **If not contaminated**

3. Verify the resistance of each solenoid is within the specified range for listed in the **Control Solenoid Valve and Transmission Control Module Assembly Inspection**.

- **If the resistance is not within range**

Replace the Q8 Control Solenoid Valve Assembly.

- **If the resistance is within range**

4. Place the Q8 Control Solenoid Valve Assembly on a clean work surface near the transmission assembly.
5. Connect the **DT-47825-20** adapter harness between the vehicle harness connector and the Q8 Control Solenoid Valve Assembly connector. Ignition ON.
6. Verify the scan tool parameters listed below do not display Malfunction:
 - Line Pressure Control Solenoid Valve Performance Test Status
 - Line Pressure Control Solenoid Valve Control Circuit Low Voltage Test Status
 - Line Pressure Control Solenoid Valve Control Circuit High Voltage Test Status
- **If Malfunction is displayed**

Replace the Q8 Control Solenoid Valve Assembly.

- **If Malfunction is not displayed**

7. All OK.

Repair Instructions

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

- Perform **Reset Transmission Adapts** following all transmission repairs.
- **Control Module References** for control solenoid valve assembly replacement, programming and setup.

DTC P0965-P0967

Diagnostic Instructions

- Perform **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 Performance

DTC P0966

Pressure Control Solenoid Valve 2 Control Circuit Low Voltage

DTC P0967

Pressure Control Solenoid Valve 2 Control Circuit High Voltage

Circuit/System Description

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

Conditions for Running the DTC

- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is 8.6-32 V.

Conditions for Setting the DTC**P0965**

TCM detects an internal electrical performance malfunction of the pressure control solenoid 2 control circuit where the measured pressure control solenoid 2 current does not equal the commanded pressure control solenoid 2 current for 5 s.

P0966

TCM detects a short to ground on the pressure control solenoid 2 control circuit for 1 s.

P0967

TCM detects an open or short to voltage on the pressure control solenoid 2 control circuit for 1 s.

Action Taken When the DTC Sets**P0965**

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

P0966

- DTC P0966 is a Type A DTC.
- TCM limits the transmission to Reverse and 3rd or 5th gear operation.
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM turns the high side driver OFF.
- TCM forces the torque converter clutch (TCC) OFF.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM enables torque management.

P0967

- DTC P0967 is a Type A DTC.
- TCM limits the transmission to Reverse and 3rd gear operation.
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM inhibits Tap Up/Down function.
- 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

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DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

DT-47825-20 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 s.
2. Operate the vehicle in Drive range. Allow the transmission to shift through all forward gear ranges.
3. Verify the scan tool parameters listed below do not display Malfunction:
 - Pressure Control Solenoid Valve 2 Performance Test Status
 - Pressure Control Solenoid Valve 2 Control Circuit Low Voltage Test Status
 - Pressure Control Solenoid Valve 2 Control Circuit High Voltage Test Status
 - **If Malfunction is displayed**

Refer to **Circuit/System Testing**.

- **If Malfunction is not displayed**
4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

5. Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing.

- **If the DTC does not set**

6. All OK.

Circuit/System Testing

1. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.

NOTE: You must perform Circuit/System Verification first.

2. Verify the Q8 Control Solenoid Valve Assembly is not contaminated with any debris and clean as necessary. Refer to Control Solenoid Valve and Transmission Control Module Assembly Inspection.

- **If contaminated**

Repair as necessary.

- **If not contaminated**

3. Verify the resistance is within the specified range for each solenoid listed in Control Solenoid Valve and Transmission Control Module Assembly Inspection.

- **If the resistance is not within range**

Replace the Q8 Control Solenoid Valve Assembly.

- **If the resistance is within range**

4. Place the Q8 Control Solenoid Valve Assembly on a clean work surface near the transmission assembly.

5. Connect the **DT-47825-20** adapter harness between the vehicle harness connector and the Q8 Control Solenoid Valve Assembly connector. Ignition ON.

6. Verify the scan tool parameters listed below do not display Malfunction:

- Pressure Control Solenoid Valve 2 Performance Test Status
- Pressure Control Solenoid Valve 2 Control Circuit Low Voltage Test Status
- Pressure Control Solenoid Valve 2 Control Circuit High Voltage Test Status

- **If Malfunction is displayed**

Replace the Q8 Control Solenoid Valve Assembly.

- **If Malfunction is not displayed**

7. All OK.

Repair Instructions

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

- Perform **Reset Transmission Adapts** following all transmission repairs.
- **Control Module References** for Control Solenoid Valve Assembly replacement, programming and setup.

DTC P0969-P0971

Diagnostic Instructions

- Perform **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

Circuit/System Description

Pressure control solenoid 3 is part of the control solenoid valve assembly which has no serviceable components. The normally high pressure control solenoid 3 regulates and directs oil pressure to the R1/4-5-6 regulator valve. Increasing pressure control solenoid 3 pressure increases pressure to the low and reverse clutch or 4-5-6 clutch, depending on the position of the clutch select valve 2. The transmission control module (TCM) varies current to pressure control Solenoid 3 by controlling the time the low side driver is ON and OFF. Decreasing the current to pressure control solenoid 3 increases oil pressure by closing off the solenoid exhaust port. Increasing the current to the pressure control solenoid 3 decreases oil pressure by opening the exhaust port. Power is supplied to the pressure control solenoid 3 by the TCM through a high side driver. The high side driver protects the circuit and components from excessive current flow. If excessive current flow is detected, the high side driver will turn OFF. When the fault is corrected, the high side driver will reset.

Conditions for Running the DTC

- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is 8.6-32 V.

Conditions for Setting the DTC**P0969**

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

P0970

TCM detects a short to ground on the clutch pressure control solenoid 3 control circuit for 1 s.

P0971

TCM detects an open or short to voltage on the clutch pressure control solenoid 3 control circuit for 1 s.

Action Taken When the DTC Sets**P0969**

- DTC P0969 is a Type C DTC.
- TCM freezes transmission adaptive functions to the low and reverse clutch and 4-5-6 clutch.

P0970 or P0971

- DTCs P0970 and P0971 are Type A DTCs.
- TCM limits the transmission to Reverse and 3rd or 5th gear operation.
- TCM inhibits the torque converter clutch (TCC).
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM turns the high side driver OFF.
- TCM enables torque management.
- TCM inhibits Tap Up/Down function.
- 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

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- **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-47825-20 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 with transmission in Park for 5 s.
2. Operate the vehicle in Drive range. Allow the transmission to shift through all forward gear ranges.
3. Verify the scan tool parameters listed below do not display Malfunction:
 - Pressure Control Solenoid Valve 3 Performance Test Status
 - Pressure Control Solenoid Valve 3 Control Circuit Low Voltage Test Status
 - Pressure Control Solenoid Valve 3 Control Circuit High Voltage Test Status

- **If Malfunction is displayed**

Refer to Circuit/System Testing.

- **If Malfunction is not displayed**

4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
5. Verify the DTC does not set.
 - **If the DTC sets**

Refer to Circuit/System Testing.

- **If the DTC does not set**

6. All OK.

Circuit/System Testing

1. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.

NOTE: You must perform Circuit/System Verification first.

2. Verify the Q8 Control Solenoid Valve Assembly is not contaminated with any debris and clean as necessary. Refer to Control Solenoid Valve and Transmission Control Module Assembly Inspection.

- **If contaminated**

Repair as necessary.

- **If not contaminated**

3. Verify the resistance is within the specified range for each solenoid listed in Control Solenoid Valve and Transmission Control Module Assembly Inspection.

- **If the resistance is not within range**

Replace the Q8 Control Solenoid Valve Assembly.

- **If the resistance is within range**

4. Place the Q8 Control Solenoid Valve Assembly on a clean work surface near the transmission assembly.
5. Connect the **DT-47825-20** adapter harness between the vehicle harness connector and the Q8 Control Solenoid Valve Assembly connector. Ignition ON.
6. Verify the scan tool parameters listed below do not display Malfunction:
 - Pressure Control Solenoid Valve 3 Performance Test Status
 - Pressure Control Solenoid Valve 3 Control Circuit Low Voltage Test Status
 - Pressure Control Solenoid Valve 3 Control Circuit High Voltage Test Status

○ **If Malfunction is displayed**

Replace the Q8 Control Solenoid Valve Assembly.

○ **If Malfunction is not displayed**

7. All OK.

Repair Instructions

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

- Perform the **Reset Transmission Adapts** following all transmission repairs.
- **Control Module References** for control solenoid valve assembly replacement, programming and setup.

DTC P0973 OR P0974

Diagnostic Instructions

- Perform **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

Circuit/System Description

Shift solenoid 1 is part of the control solenoid valve assembly, which has no serviceable components. Shift Solenoid 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 shift solenoid 1 is energized (ON), shift solenoid 1 fluid pressure is directed to the clutch select valve 2, which allows the valve to overcome the spring pressure and move to the applied position. Power to the shift solenoid 1 is supplied by the TCM through a high side driver. The high side driver protects the circuit and components from excessive current flow. If excessive current flow is detected, the high side driver will turn OFF. When the fault is corrected, the high side driver will reset.

Conditions for Running the DTC

- Engine speed is 400-7, 500 RPM for 5 s.

- Ignition voltage is 8.6-32 V.

Conditions for Setting the DTC**P0973**

TCM detects a short to ground on the shift solenoid 1 control circuit for 2 s.

P0974

TCM detects an open or a short to power on the shift solenoid 1 control circuit for 2 s.

Action Taken When the DTC Sets**P0973**

- DTC P0973 is a Type A DTC.
- TCM limits the transmission to Reverse and 3rd gear operation.
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM inhibits auto grade braking

P0974

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

Conditions for Clearing the 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 - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

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-47825-20 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 s.
2. Place the gear selector in Reverse for 5 s and then idle the engine with the gear selector in Park for 5 s.
3. Verify the scan tool parameters listed below do not display Malfunction.
 - Shift Solenoid Valve 1 Control Circuit Low Voltage Test Status
 - Shift Solenoid Valve 1 Control Circuit Open Test Status
 - Shift Solenoid Valve 1 Control Circuit High Voltage Test Status
 - **If Malfunction is displayed**

Refer to [Circuit/System Testing](#).

- **If Malfunction is not displayed**
4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

5. Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing.

- **If the DTC does not set**

6. All OK.

Circuit/System Testing

1. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.

NOTE: You must perform Circuit/System Verification first.

2. Verify the Q8 Control Solenoid Valve Assembly is not contaminated with any debris and clean as necessary. Refer to Control Solenoid Valve and Transmission Control Module Assembly Inspection.

- **If contaminated**

Repair as necessary.

- **If not contaminated**

3. Verify the resistance is within the specified range for each solenoid listed in the Control Solenoid Valve and Transmission Control Module Assembly Inspection.

- **If the resistance is not within range**

Replace the Q8 Control Solenoid Valve Assembly.

- **If the resistance is within range**

4. Place the Q8 Control Solenoid Valve Assembly on a clean work surface near the transmission assembly.

5. Connect the **DT-47825-20** adapter harness between the vehicle harness connector and the Q8 Control Solenoid Valve Assembly connector. Ignition ON.

6. Verify the scan tool parameters listed below do not display Malfunction:

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

- **If Malfunction is displayed**

Replace the Q8 Control Solenoid Valve Assembly.

- **If Malfunction is not displayed**

7. All OK.

Repair Instructions

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

- Perform the **Reset Transmission Adapts** following all transmission repairs.
- **Control Module References** for control solenoid valve assembly replacement, programming and setup.

DTC P0976 OR P0977

Diagnostic Instructions

- Perform **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 P0976

Shift Solenoid Valve 2 Control Circuit Low Voltage

DTC P0977

Shift Solenoid Valve 2 Control Circuit High Voltage

Circuit/System Description

Shift solenoid 2 is part of the control solenoid valve assembly, which has no serviceable components. Shift solenoid 2 is a normally closed ON/OFF solenoid and is controlled by the transmission control module (TCM) through a low side driver. When the shift solenoid 2 is energized, fluid pressure is directed to the clutch select valve 3, which allows the valve to overcome the spring pressure and move to the applied position. Power to the shift solenoid 2 is supplied by the TCM through a high side driver. The high side driver protects the circuit and components from excessive current flow. If excessive current flow is detected, the high side driver will turn OFF. When the fault is corrected, the high side driver will reset.

Conditions For Running the DTC

- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is 8.6-32 V.

Conditions for Setting the DTC

P0976

TCM detects a short to ground on the shift solenoid 2 control circuit for 2 s.

P0977

TCM detects an open or short to power on the shift solenoid 2 control circuit for 2 s.

Action Taken When the DTC Sets**P0976**

- DTC P0976 is a Type C DTC.
- TCM freezes transmission adaptive functions.

P0977

- DTC P0977 is a Type A DTC.
- TCM limits the transmission to Reverse and 3rd gear operation.
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM inhibits Tap Up/Down function
- TCM inhibits manual shifting of forward gears

Conditions for Clearing the DTC

- DTC P0976 is a Type C DTC.
- DTC P0977 is a Type A DTC.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

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-47825-20 Adapter Harness

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

Circuit/System Verification

1. Operate the vehicle in 3rd 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 s and then idle the engine with the gear selector in Park for 5 s.
3. Verify the scan tool parameters listed below do not display Malfunction:
 - Shift Solenoid Valve 2 Control Circuit Low Voltage Test Status
 - Shift Solenoid Valve 2 Control Circuit Open Test Status
 - Shift Solenoid Valve 2 Control Circuit High Voltage Test Status
 - **If Malfunction is displayed**

Refer to **Circuit/System Testing**.

- **If Malfunction is not displayed**
4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
 5. Verify the DTC does not set.
 - **If the DTC sets**

Refer to **Circuit/System Testing**.

- **If the DTC does not set**
6. All OK.

Circuit/System Testing

1. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.

NOTE: You must perform Circuit/System Verification first.

2. Verify the Q8 Control Solenoid Valve Assembly is not contaminated with any debris and clean as necessary. Refer to Control Solenoid Valve and Transmission Control Module Assembly Inspection.
 - **If contaminated**
Repair as necessary.
 - **If not contaminated**
3. Verify the resistance is within the specified range for each solenoid listed in Control Solenoid Valve and Transmission Control Module Assembly Inspection.
 - **If the resistance is not within range**
Replace the Q8 Control Solenoid valve Assembly.
 - **If the resistance is within range**
4. Place the Q8 Control Solenoid Valve Assembly on a clean work surface near the transmission assembly.
5. Connect the **DT-47825-20** adapter harness between the vehicle harness connector and the Q8 Control Solenoid Valve Assembly connector. Ignition ON.
6. Verify the scan tool parameters listed below do not display Malfunction:
 - Shift Solenoid Valve 2 Control Circuit Low Voltage Test Status
 - Shift Solenoid Valve 2 Control Circuit Open Test Status
 - Shift Solenoid Valve 2 Control Circuit High Voltage Test Status
 - **If Malfunction is displayed**
Replace the Q8 Control Solenoid Valve Assembly.
 - **If Malfunction is not displayed**
7. All OK.

Repair Instructions

Perform Diagnostic Repair Verification after completing the repairs.

- Perform Reset Transmission Adapts following all transmission repairs.
- Control Module References for control solenoid valve assembly replacement, programming and setup.

DTC P1761

Diagnostic Instructions

- Perform 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 P1761**

Up and Down Shift Switch Signal Message Counter Incorrect

Circuit/System Description

When the shift lever is placed in the M position, electronic range select or manual mode, which allows for the selection of the range of gears available, is activated. This is also known as the tap shift function. The manual mode allows the vehicle operator to increase the highest range attainable by pressing the plus (+) button or decrease the highest attainable range by pressing the minus (-) button. The body control module (BCM) supplies a signal circuit to the shift controller. The shift controller has switches connected to a resistor array. 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 (TCM) to increase or decrease the available gear ranges. The BCM internal counter increments each time the tap shift signal status is sent and the BCM sends the rolling count with the tap shift signal status. The TCM counter increments each time the tap shift signal status is received. The DTC will set if the rolling count value of the TCM does not match the rolling count sent from the BCM.

Conditions for Running the DTC

- TCM receives the Tap Up and Tap Down message from the BCM.
- Engine speed is 400-7, 500 RPM for 5 s.

Conditions for Setting the DTC

TCM detects an error in the rolling count value that does not match with the BCM count, 3 times within 10 s.

Action Taken When the DTC Sets

- DTC P1761 is a Type C DTC.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.

Conditions for Clearing the DTC

DTC P1761 is a Type C DTC.

Reference Information**Schematic Reference**

- **Body Control System Schematics**
- **Automatic Transmission Controls Schematics**
- **Data Communication Schematics**

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

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

Circuit/System Verification

1. Verify there are no other body control module or communication DTCs set.

NOTE:

- **DTC P1761 is an informational DTC.**
- **Diagnose all other body control module DTCs prior to DTC P1761.**

- **If a DTC is set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If a DTC is not set**

2. Complete the diagnosis by looking for a CAN circuit fault. Refer to **Scan Tool Does Not Communicate with High Speed GMLAN Device** .

- If a CAN circuit fault is found

Repair as necessary.

- If a CAN circuit fault is not found

3. All OK.

Repair Instructions

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

- Perform **Reset Transmission Adapts** following all transmission repairs.
- **Control Module References** for Control Solenoid Valve Assembly replacement, programming and setup

DTC P1762

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 P1762

Transmission Mode Switch Signal Message Counter Incorrect

Circuit/System Description

A signal circuit is provided by the body control module (BCM) to the Tow/Haul switch. When tow/haul mode is pressed, the tow/haul switch input signal to the BCM is momentarily toggled to zero volts. The BCM is constantly sending the transmission control module (TCM) serial data messages with information regarding the status of the Tow/Haul switch. This signals the transmission control module (TCM) to change the shift points, the application of TCC and transmission line pressure. The TCM sets this DTC when it detects a discrepancy in the structure of this message causing its integrity to be questioned.

Conditions for Running the DTC

- The TCM rolling counter diagnostic is enabled.
- The Tow/Haul message health is received from the BCM.
- The ignition voltage is 8.6 volts or greater.
- The engine speed is 400 RPM or greater for 5 seconds.

Conditions for Setting the DTC

The TCM detects an error in the rolling count value that does not match with the BCM count, 3 times within 10 seconds.

Action Taken When the DTC Sets

DTC P1762 is a type C DTC.

Conditions for Clearing the DTC

DTC P1762 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**
- **Data Communication Schematics**
- **Body Control System Schematics**

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

Electrical Information Reference

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

Description and Operation

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. DTC P1762 is an informational DTC. Diagnose all other body control module DTCs prior to DTC P1762. Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .
2. If there are no other body control DTCs, diagnosis is accomplished by looking for an intermittent CAN circuit fault. Refer to **Scan Tool Does Not Communicate with High Speed GMLAN Device** .
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 Instructions

- Perform **Reset Transmission Adapts** following all transmission related repairs.
- Perform **Diagnostic Repair Verification** after completing the diagnostic procedure.

DTC P182E OR P1915

Diagnostic Instructions

- Perform **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 P182E

Internal Mode Switch Indicates Invalid Range

DTC P1915

Internal Mode Switch Does Not Indicate Park/Neutral During Start

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal A	P182E	P1915	P1915	P182E, P1915
Signal B	P1915	P182E	P182E	P182E, P1915
Signal C	P1915	P182E	P182E	P182E, P1915
Signal P	P182E	P1915	P1915	P182E, P1915
Ground	-	P182E	P182E	P182E, P1915

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Typical Scan Tool Data

Internal Mode Switch A/B/C/P

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Ignition ON, range selector in Park			
Parameter Normal Range: Low High High Low			
Signal A	Low	High	High
Signal B	Low	High	High
Signal C	Low	High	High
Signal P	Low	High	High

Circuit/System Description

The manual shift detent lever with shaft position switch assembly or internal mode switch assembly, is a sliding contact switch attached to the manual shift detent lever within the transmission. The 4 inputs to the transmission control module (TCM), from the switch, indicate the position selected by the transmission manual shaft. The input voltage at the TCM is high when the switch is open and low when the switch is closed to ground. The state of each input is displayed on the scan tool as the internal mode switch A/B/C/P parameter. The internal mode switch input parameters represented are transmission range Signal A, Signal B, Signal C and Signal P.

The park/neutral position switch is integrated into the transmission internal mode switch. 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

P182E

- 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 or P0723 is not set.
- Engine speed is 400-7500 RPM for 5 s.
- Ignition voltage is 8.6-32 V.
- Engine torque signal is valid.

P1915

- DTC P0722, P0723 or P1915 is not set.
- Transmission output shaft speed is 90 RPM or less.
- Ignition voltage was 5 V or greater and has not dropped below 2 V.

Conditions for Setting the DTC

P182E

Internal mode switch does not indicate a valid Park, Reverse, Neutral or Drive Range gear position for 7 s.

P1915

Internal mode switch does not indicate Park or Neutral during the following sequence:

- Engine speed is 50 RPM or less for 0.25 s or greater.
- Engine speed is 50-480 RPM for 0.07 s or greater.
- Engine speed is 525 RPM or greater and the transmission input speed is 200 RPM or greater for 1.25 s.

Action Taken When the DTC Sets

- DTCs P182E and P1915 are Type A DTCs.
- TCM commands maximum line pressure.
- TCM forces the torque converter clutch (TCC) OFF.
- TCM turns all the solenoids OFF.
- TCM freezes transmission adaptive functions.
- TCM limits the transmission to Reverse and 5th gear operation.
- Torque management is enabled.
- TCM turns the high side driver OFF.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.

Conditions for Clearing the DTC

DTCs P182E and P1915 are Type A DTCs.

Diagnostic Aids

Under certain driving conditions, DTC P182E could set due to an intermittent low voltage fault on the park/neutral signal circuit, before conditions for setting DTC P0851 are met. Reference Information

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

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-47825-20 Adapter Harness

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

Circuit/System Verification

1. Verify the range selector lever cable is adjusted correctly. Refer to **Range Selector Lever Cable Adjustment** .
 - **If cable adjustment is not correct**

Repair as necessary.
 - **If cable adjustment is correct**
2. Ignition ON.
3. Verify the scan tool transmission control module Internal Mode Switch A/B/C/P parameter matches the **Transmission Internal Mode Switch Logic** table for each gear shift lever position.
 - **If the parameter does not match**

Refer to **Circuit/System Testing**.
 - **If the parameter matches**

4. Verify the scan tool engine control module Park/Neutral Position Switch parameter displays Park/Neutral with the gear shift lever in Park or Neutral and In Gear when in Reverser or Drive.

- **If Park/Neutral or In Gear is not displayed**

Refer to Circuit/System Testing.

- **If Park/Neutral and In Gear is displayed**

5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

6. Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing.

- **If the DTC does not set**

7. All OK.

Circuit/System Testing

1. Ignition OFF, remove the control valve body cover.

NOTE:

- **You must perform Circuit/System Verification first.**

2. Connect the vehicle harness connector to the Q8 Control Solenoid Valve Assembly.
3. Disconnect the B15 Transmission Internal Mode Switch connector at the Q8 Control Solenoid Valve Assembly.
4. Ignition ON.
5. Verify the scan tool transmission control module Internal Mode Switch A/B/C/P parameter displays High High High High.

- **If High High High High is not displayed**

Replace the Q8 control solenoid valve assembly.

- **If High High High High is displayed**

6. Verify the scan tool engine control module Park/Neutral Position Switch parameter displays In Gear.

- **If In Gear is not displayed**

1. Ignition OFF, disconnect the harness connector at the K20 Engine Control Module.

2. Test for infinite resistance between the neutral start signal circuit and ground at the vehicle harness K20 Engine Control Module connector.

- If less than infinite resistance, repair the short to ground on the circuit

- If infinite resistance, replace the K20 Engine Control Module

- **If In Gear is displayed**

7. Install a 3 A fused jumper wire between the low reference circuit terminal A and each signal circuit listed below one at a time at the Q8 Control Solenoid Valve Assembly.
 - Signal A - terminal E
 - Signal B - terminal D
 - Signal C - terminal C
 - Signal P - terminal B
8. Verify the scan tool TCM A/B/C/P displays 1 Low and 3 High when a signal circuit is grounded.
 - **If 1 Low and 3 High is not displayed**
 Replace the Q8 control solenoid valve assembly.
 - **If 1 Low and 3 High is displayed**
9. Connect a 3 A fused jumper wire between park/neutral switch signal circuit terminal F and low reference circuit terminal A at the Q8 Control Solenoid Valve Assembly.
10. Verify the scan tool engine control module Park/Neutral Position Switch parameter displays Park/Neutral.
 - **If Park/Neutral is not displayed**
 1. Ignition OFF, disconnect the connector at the K20 Engine Control Module.
 2. Test for less than 2 ohms in the signal circuit end to end
 - If 2 ohms or greater, repair the open/high resistance in the circuit
 - If less than 2 ohms, replace the K20 Engine Control Module
 - **If Park/Neutral is displayed**
11. Replace the B15 Transmission Internal Mode Switch.

Repair Instructions

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

- Perform the **Reset Transmission Adapts** following all transmission repairs.
- **Control Valve Body Cover Replacement**
- **Control Solenoid Valve and Transmission Control Module Assembly Replacement**
- **Manual Shift Detent Lever with Shaft Position Switch Assembly Replacement**
- **Range Selector Lever Cable Adjustment**
- **Control Module References** for ECM or control solenoid valve assembly replacement, programming and setup.

DTC P1876

Diagnostic Instructions

- Perform **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 P1876**

Up and Down Shift Enable Switch Circuit Low Voltage

Circuit/System Description

The TAP Shift system allows the driver to manually shift gears by using the TAP shift switches located on the automatic transmission shifter. Pushing the Up switch will command an upshift and pushing the Down switch will command a downshift. The TAP shift system is activated when the gear selector is in the L (M) position and is deactivated in all other positions.

If the transmission control module (TCM) detects TAP enable switch Active and the IMS switch does not indicate L (M), DTC P1876 sets. DTC P1876 is a type C DTC.

Conditions for Running the DTC

- DTC P0815, P0816 or P0826, P1825, P1915 or U0100 is not set.
- Engine speed is 400 RPM or greater for 5 seconds.
- Ignition voltage is 8.6 volts or greater.

Conditions for Setting the DTC

The Tap Up/Tap Down switch signal is Active when the IMS does not indicate L (M) for 2 seconds or greater 3 times during the same ignition cycle.

Action Taken When the DTC Sets

- DTC P1876 is a Type C DTC.
- TCM disables Tap shift functions.

Conditions for Clearing the DIC/DTC

DTC P1876 is a Type C DTC.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

- **Transmission General 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. Verify there no transmission internal mode switch (IMS) DTCs set.

WARNING: Refer to Parking Brake and Drive Wheels Warning .

- **If IMS DTCs were set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If IMS DTCs were not set**

2. Ignition ON.
3. Verify the gear shift lever position matches the scan tool TCM Internal Mode Switch parameter while slowly moving the gear shift lever from Park through all ranges.
 - **If the displayed values are not correct**

Refer to **Range Selector Lever Cable Adjustment**

- **If the displayed values are correct**

4. Verify the scan tool Driver Shift Control Mode parameter displays Inactive with the transmission shift lever the Park, Reverse, Neutral and Drive and active in the M manual mode position.

- If the Driver Shift Mode parameter does not display the correct values

Refer to Circuit/System Testing.

- If the Driver Shift Mode parameter displays the correct values

5. 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.

- If the Driver Shift Request parameter does not display the correct values

Refer to Circuit/System Testing.

- If the Driver Shift Request parameter displays the correct values

6. After performing the above steps, verify that the DTC does not reset by operating the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions you observe from the Freeze Frame/Failure Records data. If the vehicle passes the Circuit/System Verification procedure, then STOP. Do not perform the Circuit/System Testing or Component Testing as this may result in an unnecessary part replacement. Refer to Testing for Intermittent Conditions and Poor Connections.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector from the S3 transmission shift lever.

NOTE: You must perform Circuit/System Verification first.

2. Test for less than 10 ohms between the S3 transmission shift lever harness connector terminal 2 and ground.

- If greater than the specified range, repair the ground circuit.

3. Ignition ON.

4. Verify the scan tool Driver Shift Control parameter displays inactive.

- If Driver Shift Control Parameter does not display Inactive

Test signal circuit for a short to power or ground.

- If signal circuit has a short to voltage or ground, repair the circuit.

- If signal circuit does not have a short to voltage or ground, replace the K9 body control module.

- If Driver Shift Control Parameter displays Inactive

5. Verify a test lamp illuminates between the S3 transmission shift lever harness connector ignition circuit terminal 1 and ground circuit terminal 2.

- If the test lamp does not illuminate

1. Ignition OFF.

2. Test for less than 2 ohms in the ignition circuit end to end.

- If 2 ohms or greater, repair the ignition circuit

- If less than 2 ohms, replace the K9 body control module
 - **If the test lamp illuminates**
- 6. Test for 11 volts or greater at the S3 transmission shift lever harness connector between signal circuit terminal 3 and ground.
 - **If less than 11 volts**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the signal circuit wire end to end.
 - If 2 ohms or greater, repair the open/high resistance in the signal circuit wire.
 - If less than 2 ohms, replace the K9 body control module.
 - **If 11 volts or greater**
- 7. Ignition OFF, connect the S3 transmission shift lever harness connector, ignition ON.
- 8. Test for 11 volts or greater between the S3 transmission shift lever connector terminal 3 and ground in the park, reverse, neutral and drive gear select lever positions by back probing the connector.
 - **If less than 11 volts**

Replace the S3 transmission shift lever.
 - **If 11 volts or greater**
- 9. Test for 8.0-10.6 volts between the S3 transmission shift lever connector terminal 3 and ground with the shift lever in the M position.
 - **If not between 8.0-10.6 volts**

Replace the S3 transmission shift lever.
 - **If between 8.0-10.6 volts**
- 10. Test for 5.1-7.3 volts between the S3 transmission shift lever connector terminal 3 and ground with the shift lever in the M position and the tap up button pressed.
 - **If not between 5.1-7.3 volts**

Replace the S3 transmission shift lever.
 - **If between 5.1-7.3 volts**
- 11. Test for 2.0-4.6 volts between the S3 transmission shift lever connector terminal 3 and ground with the shift lever in the M position and the tap down button pressed.
 - **If not between 2.0-4.6 volts**

Replace the S3 transmission shift lever.
 - **If between 2.0-4.6 volts**
- 12. Replace the K9 body control module

Repair Instructions

NOTE:

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

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

- **Transmission Control Replacement (Acadia)** for AT TAP shift switch replacement.
- **Control Module References** for body control module (BCM) or control solenoid valve assembly replacement, setup and programming

DTC P2714 OR P2715**Diagnostic Instructions**

- Perform **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:**

The DTCs listed below set due to a transmission hydraulic/mechanical condition. Perform **Circuit/System Verification** and **Circuit/System Testing** to identify the cause.

DTC P2714

Pressure Control Solenoid Valve 4 Stuck Off - Transmission Hydraulic/Mechanical Performance

DTC P2715

Pressure Control Solenoid Valve 4 Stuck On - Transmission Hydraulic/Mechanical Performance

Circuit/System Description

Pressure control solenoid 4 is part of the control solenoid valve assembly which has no serviceable components. Pressure control solenoid 4 regulates transmission fluid pressure to the 2-6 clutch regulator valve which controls pressure to the 2-6 clutch. The transmission control module (TCM) calculates gear ratio based on the speed signals from the input shaft speed (ISS) sensor and the output shaft speed (OSS) sensor. The TCM compares the expected transmission gear ratio to the calculated gear ratio for each commanded gear.

Conditions for Running the DTC**P2714**

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0401, P042E, P0716, P0717, P0722, P0723 or P182E is not set.
- Ignition voltage is between 8.6-32 V.
- Output speed is 36 RPM or greater or accelerator pedal position is 0.5% or greater.
- Throttle position signal is valid.
- Engine speed is 400-7, 500 RPM for 5 s.
- Transmission fluid temperature is -6.7°C (20°F) or greater.
- High side driver is enabled.

P2715

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0401, P042E, P0716, P0717, P0722, P0723 or P182E is not set.
- Ignition voltage is 8.6-32.0 V.
- High side driver is enabled.
- Transmission fluid temperature is -6.7°C (20°F) or greater.
- Engine speed is 400-7, 500 RPM for 5 s.
- Transmission output shaft speed is 36 RPM or greater or the accelerator pedal position is 0.5% or greater.
- Commanded and attained range is not 1st gear.

Conditions for Setting the DTC**P2714**

TCM has detected an incorrect gear ratio or neutral condition when the 2-6 clutch is commanded ON. This condition must occur 3 times.

P2715

TCM has detected an incorrect gear ratio change when the 2-6 clutch is commanded OFF during a shift or, when 2nd gear ratio is detected in 1st gear. This condition must occur 3 times.

Action Taken When the DTC Sets

- DTCs P2714 and P2715 are Type A DTCs.
- TCM commands maximum line pressure.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM freezes transmission adaptive functions.
- TCM limits the transmission to Reverse and 3rd gear operation - P2714 only.

- TCM inhibits auto grade braking.
- TCM inhibits neutral idle.
- TCM limits the transmission to Reverse and 2nd gear operation - P2715 only.

Conditions for Clearing the DTC

DTCs P2714 and P2715 are Type A DTCs.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**
- **Electronic Component Description**
- **Drive Range, First Gear**
- **Drive Range, Sixth Gear**

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. Engine idling with transmission in Park, with parking brake applied and drive wheels chocked.

WARNING: Refer to Parking Brake and Drive Wheels Warning .

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

2. Verify the transmission fluid level and condition is correct. Refer to Transmission Fluid Level and Condition Check.

- o If the transmission fluid level and condition is not correct

Repair as necessary.

- o If the transmission fluid level and condition is correct

3. Ignition ON, clear the TCM DTCs with a scan tool.
4. Verify DTC P2714 or P2715 does not set while performing a road test. Refer to Road Test.

- o If DTC P2714 or P2715 sets

Refer to Circuit/System Testing.

- o If DTC P2714 or P2715 does not set

5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

6. Verify the DTC does not set.

- o If the DTC sets

Refer to Circuit/System Testing.

- o If DTC does not set

7. All OK.

Circuit/System Testing

1. Verify the transmission line pressures are within the specified range. Refer to Line Pressure Check and Solenoid Valve Pressure .

NOTE: You must perform Circuit/System Verification first.

- o If the pressures are not within range

Refer to Fluid Pressure High or Low.

- o If the pressures are within range

2. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.
3. Verify the pressure changes for all solenoids when performing the solenoid test. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test**.

- **If the pressure does not change**

Replace the Q8 Control Solenoid Valve Assembly.

- **If the pressure changes**

4. Verify the conditions listed below do not exist. Repair or replace as necessary.

P2714 or P2715 Control Valve Upper Body Assembly

2-6 clutch regulator valve stuck/sticking - debris, binding, damaged valve or scored bore.

P2714

Actuator feed limit circuit supply fluid to solenoid restricted or not available - debris or sediment blockage.

P2714 or P2715 Channel Plate and Spacer Plate

Oil channels or orifices blocked by debris.

P2714 or P2715 Control Solenoid Valve Assembly

- Clutch pressure control solenoid 4 stuck ON or stuck OFF.
- Control signal fluid supply leak - valve body filter plate assembly cracked or damaged gasket seal.
- Clutch pressure control solenoid 2 stuck OFF.

P2714 or P2715 Automatic Transmission Case Cover

- 2-6 clutch return spring retaining ring not seated in groove.
- 2-6 clutch piston assembly seal damaged or leaking.
- 2-6 clutch plates worn or damaged.

P2714 1-2-3-4 Clutch Plate Assembly

- 1-2-3-4 clutch backing plate retaining ring not seated/oriented correctly.
- 1-2-3-4 clutch piston seals damaged or leaking.
- 1-2-3-4 clutch piston cracked or damaged.

P2714 Automatic Transmission Fluid Pump Assembly

- Fluid pump housing/vanes/rotor/slide damaged/scored.

- A/Trans pump fluid outlet seal assembly damaged/leaking.

P2714 Automatic Transmission Fluid Filter Assembly

Oil filter or filter seal loose or damaged.

Repair Instructions

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

- Perform **Reset Transmission Adapts** following all transmission repairs.
- **Control Valve Lower Body and Upper Body Replacement**
- **Low and Reverse Clutch and 1-2-3-4 Clutch Plate Removal**
- **Control Module References** for control solenoid valve assembly replacement, programming and setup.

DTC P2719-P2721**Diagnostic Instructions**

- Perform **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 P2719**

Pressure Control Solenoid Valve 4 Performance

DTC P2720

Pressure Control Solenoid Valve 4 Control Circuit Low Voltage

DTC P2721

Pressure Control Solenoid Valve 4 Control Circuit High Voltage

Circuit/System Description

Pressure control solenoid 4 is part of the control solenoid valve assembly which has no serviceable components. The normally low pressure control solenoid 4 regulates and directs oil pressure to the 2-6 clutch regulator valve. Increasing pressure control solenoid 4 pressure increases pressure to the 2-6 clutch. The transmission control module (TCM) varies current to the pressure control solenoid 4 by controlling the amount of time the low side driver is ON and OFF. Increasing the ON time increases current to the clutch pressure control solenoid 4. Increasing current to pressure control solenoid 4 increases oil pressure by closing off the solenoid exhaust port.

Decreasing the current to the pressure control solenoid 4 decreases oil pressure by opening the exhaust port. Pressure control solenoid 4 power is supplied by the TCM through a high side driver. The high side driver protects the circuit and components from excessive current flow. If excessive current flow is detected, the high side driver will turn OFF. When the fault is corrected, the high side driver will reset.

Conditions for Running the DTC

- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is 8.6-32 V.

Conditions for Setting the DTC**P2719**

TCM detects an internal electrical performance malfunction on the clutch pressure control 4 control circuit where the measured pressure control solenoid 4 current does not equal the commanded clutch pressure control solenoid 4 current for 5 s.

P2720

TCM detects a short to ground on the clutch pressure control solenoid 4 control circuit for 1 s.

P2721

TCM detects an open or short to voltage on the clutch pressure control solenoid 4 control circuit for 1 s.

Action Taken When the DTC Sets**P2719**

- DTC P2719 is a Type C DTC.
- TCM freezes transmission adaptive functions on the 2-6 clutch.

P2720

- DTC P2720 is a Type A DTC.
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM commands 2nd gear if the transmission is in a forward gear and the output speed is less than 1, 350 RPM or neutral if the output speed is 1, 350 RPM or greater.

P2721

- DTC P2721 is a Type A DTC.
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM limits the transmission to Reverse and 3rd gear operation.

Conditions for Clearing the DTC

- DTC P2719 is a Type C DTC.
- DTCs P2720 and P2721 are Type A DTCs.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

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-47825-20 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 s.
2. Operate the vehicle in Drive range. Allow the transmission to shift through all forward gear ranges.
3. Verify the scan tool parameters listed below do not display Malfunction:
 - Pressure Control Solenoid Valve 4 Performance Test Status
 - Pressure Control Solenoid Valve 4 Control Circuit Low Voltage Test Status
 - Pressure Control Solenoid Valve 4 Control Circuit High Voltage Test Status
 - **If Malfunction is displayed**

Refer to **Circuit/System Testing**.

- **If Malfunction is displayed**
4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
 5. Verify the DTC does not set.
 - **If the DTC sets**

Refer to **Circuit/System Testing**

- **If the DTC does not set**
6. All OK.

Circuit/System Testing

1. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.

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

2. Verify the Q8 Control Solenoid Valve Assembly is not contaminated with any debris and clean as necessary. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Inspection**.
 - **If contaminated**

Repair as necessary.
 - **If not contaminated**

3. Verify the resistance is within the specified range for each solenoid listed in the **Control Solenoid Valve and Transmission Control Module Assembly Inspection**.

- **If the resistance is not within range**

Replace the Q8 Control Solenoid Valve Assembly

- **If the resistance is within range.**

4. Place the Q8 Control Solenoid Valve Assembly on a clean work surface near the transmission assembly.

5. Connect the **DT-47825-20** adapter harness between the vehicle harness connector and the Q8 Control Solenoid Valve Assembly connector. Ignition ON.

6. Verify the scan tool parameters listed below do not display Malfunction:

- Pressure Control Solenoid Valve 4 Performance Test Status
- Pressure Control Solenoid Valve 4 Control Circuit Low Voltage Test Status
- Pressure Control Solenoid Valve 4 Control Circuit High Voltage Test Status

- **If Malfunction is displayed**

Replace the Q8 Control Solenoid Valve Assembly.

- **If Malfunction is not displayed**

7. All OK.

Repair Instructions

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

- Perform the **Reset Transmission Adapts** following all transmission repairs.
- **Control Module References** for control solenoid valve assembly replacement, programming and setup.

DTC P2723 OR P2724

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: The DTCs listed below set due to a transmission hydraulic/mechanical condition. Perform **Circuit/System Verification** and **Circuit/System Testing** to identify the cause.

DTC P2723

Pressure Control Solenoid Valve 5 Stuck Off - Transmission Hydraulic/Mechanical Performance

DTC P2724

Pressure Control Solenoid Valve 5 Stuck On - Transmission Hydraulic/Mechanical Performance

Circuit/System Description

Pressure control solenoid 5 is part of the control solenoid valve assembly which has no serviceable components. Pressure control solenoid 5 regulates the transmission fluid pressure to the 1-2-3-4 clutch regulator valve, which controls pressure to the 1-2-3-4 clutch. The transmission control module (TCM) calculates gear ratio based on the speed signals from the input shaft speed (ISS) sensor and the output shaft speed (OSS) sensor. The TCM compares the expected transmission gear ratio to the calculated gear ratio for each commanded gear.

Conditions for Running the DTC

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0401, P042E, P0716, P0717, P0722, P0723 or P182E is not set.
- Ignition voltage is between 8.6-32 V.
- High side driver is enabled.
- Output speed is 36 RPM or greater or the accelerator pedal position is 0.5% or greater.
- Throttle position signal is valid.
- Engine speed is 400-7, 500 RPM for 5 s.
- Transmission fluid temperature is -6.7°C (20°F) or greater.

Conditions for Setting the DTC**P2723**

TCM has detected an incorrect gear ratio or neutral condition when the 1-2-3-4 clutch is commanded ON. This condition must occur 3 times.

P2724

TCM has detected an incorrect gear ratio change when the 1-2-3-4 clutch is commanded OFF during a shift. This condition must occur 3 times.

Action Taken When the DTC Sets**P2723**

- DTC P2723 is a Type A DTC.
- TCM freezes transmission adaptive functions.
- TCM commands maximum line pressure.

- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- Torque management is enabled.
- TCM inhibits auto grade braking.
- TCM limits the transmission to Reverse and fifth gear operation.

P2724

- DTC P2724 is a Type A DTC.
- TCM freezes transmission adaptive functions.
- TCM commands maximum line pressure.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM inhibits auto grade braking.
- TCM limits the transmission to Reverse, first or third gear operation.

Conditions for Clearing the DTC

DTCs P2723 and P2724 are Type A DTCs.

Diagnostic Aids

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

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

Description and Operation

- **Transmission General Description**
 - **Transmission Component and System Description**
 - **Electronic Component Description**
 - **Drive Range, First Gear Engine Braking**
 - **Drive Range, Second Gear**
-

- **Drive Range, Third Gear**
- **Drive Range - Fourth Gear**

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. Engine idling, transmission in Park, with parking brake applied and drive wheels chocked.

WARNING: Refer to **Parking Brake and Drive Wheels Warning** .

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

2. Verify the transmission fluid level and condition is correct. Refer to **Transmission Fluid Level and Condition Check**.

- If the transmission fluid level and condition is not correct

Repair as necessary.

- If the transmission fluid level and condition is correct

3. Ignition ON, clear the TCM DTCs with a scan tool.
4. Verify DTC P2723 or P2724 does not set while performing a road test. Refer to **Road Test**.

- If DTC P2723 or P2724 sets

Refer to **Circuit/System Testing**.

- If DTC P2723 or P2724 does not set

5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame//Failure Records data.

6. Verify the does not set.

- **If the DTC sets**

Refer to Circuit/System Testing.

- **If the DTC does not set**

7. All OK.

Circuit/System Testing

1. Engine idling at the normal operating temperature.
2. Verify the transmission line pressures are within the specified range. Refer to Line Pressure Check and Solenoid Valve Pressure.

- **If the pressures are not within range**

Refer to Fluid Pressure High or Low.

- **If the pressures are within range**

3. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.
4. Verify the pressure changes for all solenoids when performing the solenoid test. Refer to Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test.

- **If the pressure change does not occur**

Replace the Q8 Control Solenoid Valve Assembly.

- **If the pressure changes**

5. Verify the conditions listed below do not exist. Repair or replace as necessary.

DTC P2723 Control Valve Upper Body Assembly

Manual shift detent (w/shaft position switch) lever assembly not engaged with manual shaft.

DTC P2723 Control Valve Upper Body Assembly

Clutch select valve 3 stuck OFF from debris, binding, damaged valve or scored bore.

DTC P2723 or P2724 Lower Control Valve Body Assembly

- Actuator feed limit circuit supply fluid to solenoid restricted or not available from debris or sediment blockage.
- 1-2-3-4 clutch boost valve binding or scored bore which can also cause harsh shifts.
- 1-2-3-4 clutch regulator valve stuck/sticking from debris, binding, damaged valve or scored bore.

DTC P2723 or P2724 Control Solenoid Valve Assembly

- Clutch pressure control solenoid 5 stuck ON or stuck OFF.
- Clutch pressure control solenoid 2 stuck OFF.
- Control solenoid filter plate assembly blocked or damaged gasket seal.

DTC P2723 Channel Plate and Spacer Plate

Channel plate and spacer plate oil channels or orifices blocked by debris.

DTC P2723 1-2-3-4 Clutch Assembly

- 1-2-3-4 clutch piston cracked/damaged/leaking.
- 1-2-3-4 clutch backing plate retaining ring not seated/oriented, causing clutch pack/piston over travel.

DTC P2723 Low and Reverse Clutch Assembly

- Low and reverse clutch assembly will not hold torque.
- Low and reverse clutch assembly friction plate support face cracked/damaged.

DTC P2723 Automatic Transmission Case

Transmission case 1-2-3-4 clutch fluid passage seal damaged/leaking.

DTC P2723 Automatic Transmission Fluid Pump

- Fluid pump housing vanes/rotor/slide damaged/scored.
- Fluid pump outlet seal assembly damaged/leaking.

DTC P2723 Torque Converter Assembly

Fluid pump or torque converter overstressed due to high temperatures.

DTC P2723 Automatic Transmission Fluid Filter Assembly

Oil filter or filter seal loose or damaged.

DTC P2723 Reaction Sun Gear Assembly

- Reaction sun gear broke away from shell.
- Input sun gear missing or broken.

Repair Instructions

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

- Perform the **Reset Transmission Adapts** following all transmission repairs.
- **Control Valve Lower Body and Upper Body Replacement**
- **Low and Reverse Clutch and 1-2-3-4 Clutch Plate Removal**
- **Control Module References** for control solenoid valve assembly replacement, programming and setup.

DTC P2728-P2730**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 P2728**

Pressure Control Solenoid Valve 5 Performance

DTC P2729

Pressure Control Solenoid Valve 5 Control Circuit Low Voltage

DTC P2730

Pressure Control Solenoid Valve 5 Control Circuit High Voltage

Circuit/System Description

Pressure solenoid 5 is part of the control solenoid valve assembly which has no serviceable components. The normally low pressure control solenoid 5 regulates and directs oil pressure to the 1-2-3-4 clutch regulator valve. Increasing pressure control solenoid 5 pressure increases pressure to the 1-2-3-4 clutch. The transmission control module (TCM) varies the current to the pressure control solenoid 5 by controlling the amount of time the low side driver is ON and OFF. Decreasing the current to pressure control solenoid 5 decreases pressure control solenoid 5 oil pressure by opening the solenoid exhaust port. Increasing the current to pressure control solenoid 5 increases pressure control solenoid 5 oil pressure by closing OFF the solenoid exhaust port. Pressure control solenoid 5 power is supplied by the TCM through a high side driver. The high side driver protects the circuit and components from excessive current flow. If excessive current flow is detected, the high side driver will turn OFF. When the fault is corrected, the high side driver will reset.

Conditions for Running the DTC

- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is 8.6-32 V.

Conditions for Setting the DTC**P2728**

TCM detects an internal electrical performance malfunction of the pressure control solenoid 5 control circuit where the measured pressure control solenoid 5 current does not equal the commanded pressure control solenoid 5 current for 5 s.

P2729

TCM detects a short to ground on the pressure control solenoid 5 control circuit for 1 s.

P2730

TCM detects an open or short to voltage on the pressure control solenoid 5 control circuit for 1 s.

Action Taken When the DTC Sets**P2728**

- DTC P2728 is a Type C DTC.
- TCM freezes transmission adaptive functions on the 1-2-3-4 clutch.

P2729

- DTC P2729 is a Type A DTC.
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM limits the transmission to Reverse, 1st and 3rd gear operation.

P2730

- DTC P2730 is a Type A DTC.
- TCM inhibits the TCC.
- TCM forces the high side driver OFF.
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- Torque management in enabled.
- TCM limits the transmission to Reverse and 3rd or 5th gear operation.

Conditions for Clearing the DTC

- DTC P2728 is a Type C DTC.
- DTCs P2729 and P2730 are Type A DTCs.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

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-47825-20 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.
2. Operate the vehicle in Drive range. Allow the transmission to shift through all forward gear ranges.
3. Verify the scan tool parameters listed below do not display Malfunction:
 - Pressure Control Solenoid Valve 5 Performance Test Status
 - Pressure Control Solenoid Valve 5 Control Circuit Low Voltage Test Status
 - Pressure Control Solenoid Valve 5 Control Circuit High Voltage Test Status
 - **If Malfunction is displayed**
 Refer to Circuit/System Testing.
 - **If Malfunction is not displayed**
4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
5. Verify the DTC does not set.
 - **If the DTC sets**
 Refer to Circuit/System Testing.
 - **If the DTC does not set**
6. All OK.

Circuit/System Testing

1. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.

NOTE: You must perform Circuit/System Verification first.

2. Verify the Q8 Control Solenoid Valve Assembly is not contaminated with any debris and clean as necessary. Refer to Control Solenoid Valve and Transmission Control Module Assembly Inspection.
 - **If contaminated**
 Repair as necessary.
 - **If not contaminated**
3. Verify the resistance is within the specified range for each solenoid listed in the Control Solenoid Valve and Transmission Control Module Assembly Inspection.
 - **If the resistance is not within range**
 Replace the Q8 Control Solenoid Valve Assembly.
 - **If the resistance is within range**
4. Place the Q8 Control Solenoid Valve Assembly on a clean work surface near the transmission assembly.

5. Connect the **DT-47825-20** adapter harness between the vehicle harness connector and the Q8 Control Solenoid Valve Assembly connector. Ignition ON.
6. Verify the scan tool parameters listed below do not display Malfunction:
 - Pressure Control Solenoid Valve 5 Performance Test Status
 - Pressure Control Solenoid Valve 5 Control Circuit High Voltage Test Status
 - Pressure Control Solenoid Valve 5 Control Circuit Low Voltage Test Status
 - **If Malfunction is displayed**

Replace the Q8 Control Solenoid Valve Assembly.
 - **If Malfunction is not displayed**
7. All OK.

Repair Instructions

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

- Perform **Reset Transmission Adapts** following all transmission repairs.
- **Control Module References** for control solenoid valve assembly replacement, programming and setup.

DTC P2762, P2763 OR P2764

Diagnostic Instructions

- Perform **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 P2762

Torque Converter Clutch (TCC) Pressure Control Solenoid Valve Performance

DTC P2763

Torque Converter Clutch (TCC) Pressure Control Solenoid Valve Control Circuit High Voltage

DTC P2764

Torque Converter Clutch (TCC) Pressure Control Solenoid Valve Control Circuit Low Voltage

Circuit/System Description

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

Conditions for Running the DTC**P2762**

- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is 8.6-32 V.

P2763 and P2764

- DTC P0658 or P0659 is not set.
- Engine speed is 400-7, 500 RPM for 5 s.
- Ignition voltage is 8.6-32 V.
- High side driver is enabled.

Conditions for Setting the DTC**P2762**

TCM detects an internal electrical performance malfunction of the TCC pressure control solenoid control circuit where the measured TCC pressure control solenoid current does not equal the commanded TCC pressure control solenoid for 5 s.

P2763

TCM detects an open/high resistance or short to voltage on the TCC pressure control solenoid control circuit for 5 s.

P2764

TCM detects a short to ground on the TCC pressure control solenoid control circuit for 5 s.

Action Taken When the DTC Sets**P2762**

DTC P2762 is a Type C DTC.

P2763

- DTC P2763 is a Type B DTC.
- TCM inhibits 6th gear.
- TCM forces TCC OFF.
- TCM commands the hot mode shift pattern.

P2764

- DTC P2764 is a Type A DTC.
- TCM inhibits TCC.
- TCM freezes transmission adaptive functions.
- TCM commands maximum line pressure.
- TCM inhibits Tap Up/Down function.
- TCM inhibits manual shifting of forward gears.
- TCM limits the transmission to Reverse and 5th gear operation.
- Torque management is enabled.
- TCM commands the high side driver OFF.

Conditions for Clearing the DTC

- DTC P2762 is a Type C DTC.
- DTC P2763 is a Type B DTC.
- DTC P2764 is a Type A DTC.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Connector End View Reference

- **COMPONENT CONNECTOR END VIEWS - INDEX**
- **INLINE HARNESS CONNECTOR END VIEWS - INDEX**

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-47825-20 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.
2. Operate the vehicle in Drive range and ensure TCC is commanded ON for 1 min.
3. Verify the scan tool parameters listed below do not display Malfunction:
 - TCC Pressure Control Solenoid Valve Control Circuit Status
 - TCC Pressure Control Solenoid Valve Control Circuit Low Voltage Test Status
 - TCC Pressure Control Solenoid Valve Control Circuit High Voltage Test Status
 - **If Malfunction is displayed**

Refer to **Circuit/System Testing**.

- **If Malfunction is not displayed**
4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
 5. Verify the DTC does not set.
 - **If the DTC sets**

Refer to **Circuit/System Testing**.

- If the DTC does not set

6. All OK.

Circuit/System Testing

1. Ignition OFF, remove the Q8 Control Solenoid Valve Assembly.

NOTE: You must perform Circuit/System Verification first.

2. Verify the Q8 Control Solenoid Valve Assembly is not contaminated with any debris and clean as necessary. Refer to Control Solenoid Valve and Transmission Control Module Assembly Inspection.

- If contaminated

Repair as necessary.

- If not contaminated.

3. Verify the resistance is within the specified range for each solenoid listed in the Control Solenoid Valve and Transmission Control Module Assembly Inspection.

- If the resistance is not within range

Replace the Q8 Control Solenoid Valve Assembly.

- If the resistance is within range

4. Place the Q8 Control Solenoid Valve Assembly on a clean work surface near the transmission assembly.
5. Connect the **DT-47825-20** adapter harness between the vehicle harness connector and the Q8 Control Solenoid Valve Assembly connector. Ignition ON.

6. Verify the scan tool parameters listed below do not display Malfunction:

- TCC Pressure Control Solenoid Valve Control Circuit Status
- TCC Pressure Control Solenoid Valve Control Circuit Low Voltage Test Status
- TCC Pressure Control Solenoid Valve Control Circuit High Voltage Test Status
- If Malfunction is displayed

Replace the Q8 Control Solenoid Valve Assembly.

- If Malfunction is not displayed

7. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repairs.

- Perform Reset Transmission Adapts following all transmission repairs.
- Control Module References for control solenoid valve assembly replacement, programming and setup.

SYMPTOMS - AUTOMATIC TRANSMISSION

NOTE: Use the symptom tables only if the following conditions are met:

- Refer to Diagnostic Starting Point - Vehicle .
- There are no DTCs set.
- The control modules can communicate via the serial data link.
- Review the system operation in order to familiarize yourself with the system functions. Refer to Transmission General Description and Transmission Component and System Description .

Visual/Physical Inspection

Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to Testing for Intermittent Conditions and Poor Connections .

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- Fluid Diagnosis
 - Transmission Fluid Level and Condition Check
 - Fluid Pressure High or Low
 - Automatic Transmission Fluid Leaks
 - Fluid Leak Diagnosis
- Noise and Vibration Diagnosis
 - Whine/Growl Noise
 - Noise and Vibration Analysis
 - Torque Converter Diagnosis
- Range Performance Diagnosis
 - No Park
 - No Drive in All Ranges
 - No Reverse Gear
- Shift Quality Feel Diagnosis
 - Harsh Garage Shift
 - Harsh or Late First, Second, Third and Fourth Shift
 - Harsh First and Reverse Shift

- Harsh or Late Second and Sixth Shift
- Harsh or Late Third, Fifth and Reverse Shift
- Harsh Fourth, Fifth and Sixth Shift
- Shift Pattern
 - No First and Reverse Gears
 - No First, Second, Third and Fourth Gear
 - No Second and Sixth Gear
 - No Fourth, Fifth and Sixth Gear
 - No Third, Fifth and Reverse Gear
- Torque Converter Diagnosis
 - Torque Converter Diagnosis
 - No Torque Converter Clutch Apply
 - No Torque Converter Clutch Release
- Symptom Not Found or No Symptom Detected
 - Transmission Fluid Level and Condition Check
 - Road Test
 - Line Pressure Check

CONTROL SOLENOID VALVE AND TRANSMISSION CONTROL MODULE ASSEMBLY INSPECTION

R	P	M	A	A	V	G							G	'	S
1	8	0	0										1	.	32
3	6	0											0	.	25
1	2	0	0										0	.	09

YES	NO	↑	↓	STROBE
0 RPM/HZ	1	2	3	RECORD
4 A/B	5	6	7	PLAY BACK
8 AVG	9	ENTER	EXIT	FREEZE

Fig. 1: Identifying Control Solenoid Valve & Transmission Control Module Assembly
Courtesy of GENERAL MOTORS COMPANY

- Inspect the control solenoid valve assembly connectors and pins (1, 2, 11, 13) for the following conditions:
 - Damage
 - Bent pins
 - Debris
 - Broken retaining tab
 - Contamination
- Ensure no metallic debris is inside the connectors near the terminal pins.
- Inspect the control solenoid valve assembly solenoid leads (3) for contamination or metallic debris.
- Inspect the 4 control solenoid valve assembly filter plate retaining tabs (12) for cracks and ensure proper tension when filter plate is attached.

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Control Solenoid Valve and Transmission Control Module Assembly Inspection

Solenoid Name	Illustration Number of Solenoid Lead	Expected Resistance (Ohms)
Line Pressure Control Solenoid	3	4.5-5.2 ohms
Pressure Control Solenoid 2 (PCS2)	5	4.5-5.2 ohms
Pressure Control Solenoid 3 (PCS3)	9	4.5-5.2 ohms
Pressure Control Solenoid 4 (PCS4)	4	4.5-5.2 ohms
Pressure Control Solenoid 5 (PCS5)	8	4.5-5.2 ohms
Shift Solenoid 1 (SS1)	10	22-25 ohms
Shift Solenoid 2 (SS2)	6	22-25 ohms
Torque Converter Clutch (TCC) Pressure Control Solenoid	7	4.5-5.2 ohms

CONTROL SOLENOID VALVE AND TRANSMISSION CONTROL MODULE ASSEMBLY INPUT SHAFT SPEED/OUTPUT SHAFT SPEED INPUT TEST**Special Tools**

- **EL 35616** GM-Approved Terminal Test Kit
- **EL 38522** Variable Signal Generator

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



Fig. 2: Identifying Special Tools - J 38522 And J 35616

Courtesy of GENERAL MOTORS COMPANY

The purpose of this test is to provide a simulated input/output speed sensor (ISS/OSS) signal to the control solenoid valve assembly ISS/OSS input circuits.

Transmission Input Speed Sensor

1. Ignition OFF, disconnect the ISS wiring harness connector X3 (1) from the control solenoid valve assembly.
2. Ignition ON, test for 8.3-9.3 volts at terminal A.
 - If not within the specified range, replace the control solenoid valve assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
3. Ignition OFF, using the **EL 35616** terminal test kit, connect the **EL38522** variable signal generator red lead to the ISS signal circuit terminal B on the TCM.
4. Connect the black lead from the **EL 38522** variable signal generator to ground.
5. Set the **EL 38522** variable signal generator to 5 volts, the frequency to 300 Hz and the percent duty cycle to 50 or the normal position.
6. Ignition ON, verify with a scan tool the Transmission ISS parameter is between 495-505 RPM.
 - If not within the specified range, replace the control solenoid valve assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .

Transmission Output Speed Sensor

1. Ignition OFF, disconnect the OSS wiring harness connector X4 (2) from the control solenoid valve assembly.
2. Ignition ON, test for 8.3-9.3 volts at terminal A.
 - If not within the specified range, replace the control solenoid valve assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .
3. Ignition OFF, using the **EL 35616** terminal test kit, connect the **EL 38522** variable signal generator red lead to the OSS signal circuit terminal B on the TCM.
4. Connect the black lead from the **EL 38522** variable signal generator to ground.
5. Set the **EL 38522** variable signal generator to 5 volts, the frequency to 300 Hz and the percent duty cycle to 50 or the normal position.
6. Ignition ON, verify with a scan tool the Transmission OSS parameter is between 256-266 RPM.
 - If not within the specified range, replace the control solenoid valve assembly. Refer to **Control Solenoid Valve and Transmission Control Module Assembly Replacement** .

**CONTROL SOLENOID VALVE AND TRANSMISSION CONTROL MODULE ASSEMBLY
SOLENOID PERFORMANCE TEST****Special Tools**

- **DT-47825-100** Solenoid Test Plate
- **DT-47825-20** Adapter Harness

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

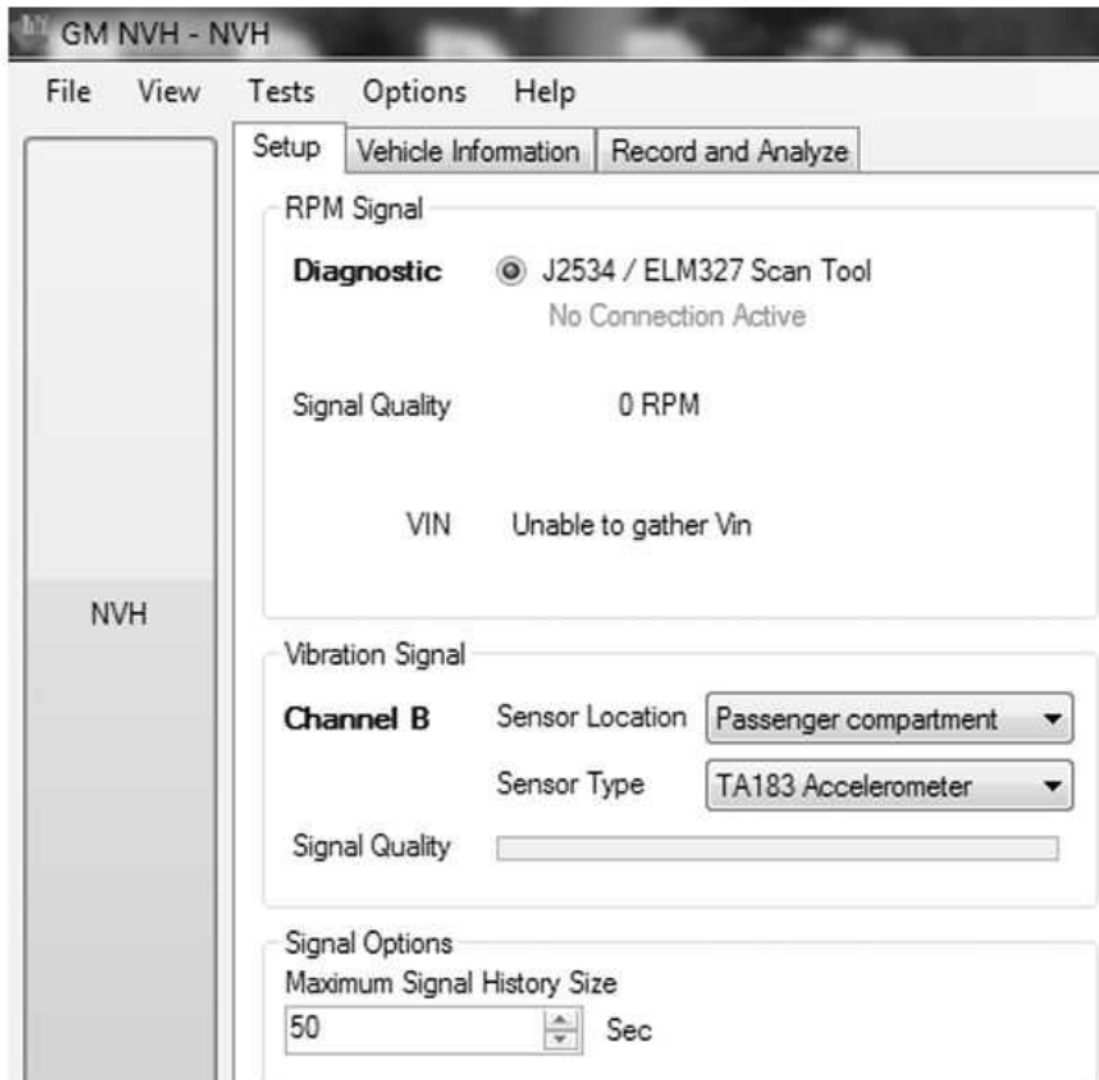


Fig. 3: Control Solenoid Valve Assembly Solenoids
 Courtesy of GENERAL MOTORS COMPANY

The purpose of this procedure is to test the functionality of the control solenoid valve assembly solenoids for a gross stuck open or stuck closed condition. The **DT-47825-100** test plate is bolted to the control solenoid valve assembly on the valve body mounting surface. Pressurized air is passed into the aluminum test plate, through the control solenoid valve assembly solenoid passage and back to a pressure gauge on the test plate. The pressure gauge indicates open if air pressure is passed through the solenoid or closed if the solenoid is unable to pass air through. A scan tool is used to command the solenoids ON and OFF. While watching the pressure gauge, one can determine the valve functionality. The recommended shop air pressure for this test is 90-100 psi.

1. Remove the control solenoid valve assembly from the transmission.
2. Bolt the **DT-47825-100** test plate to the control solenoid valve assembly on the valve body mounting surface. Use the bolts and washers supplied with the tool to attach the test plate. Tighten the bolts to 5 N.m (44 lb in) using a center out alternating torque sequence.
3. Install the pressure gauge to the affected solenoid air port. Reference component to air port table.

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4. Connect the shop air pressure line to the **DT-47825-100** test plate test plate air psi inlet port.
5. Connect the **DT-47825-20** harness to the vehicle and control solenoid valve assembly.
6. Ignition ON, with a scan tool command the solenoid in question ON and OFF. Watch the air pressure gauge and look for the change in pressure as you command the valve ON and OFF. The valve should allow air pressure to flow through the valve port to the gauge with a result of pressure reading on the gauge. If the valve is stuck closed, no pressure change will occur. Command the solenoid valve ON and OFF several times to determine the state of the solenoid valve in question. Release the air pressure in the gauge between pressurization tests.

CAUTION: Do not energize the solenoids for more than two minutes or the solenoids could be damaged.

Control Solenoid Valve Assembly Solenoid Performance Test Plate to Component Identification

Component	Port On Test Plate	Commanded State	
		ON	OFF
PC Solenoid 2, 35R	C	Full pressure to gauge	No pressure to gauge
PC Solenoid 3, R1/456	G	Full pressure to gauge	No pressure to gauge
PC Solenoid 4, 2-6	B	Full pressure to gauge	No pressure to gauge
PC Solenoid 5, 1234	F	Full pressure to gauge	No pressure to gauge
Shift Solenoid 1	H	Full pressure to gauge	No pressure to gauge
Shift Solenoid 2	D	Full pressure to gauge	No pressure to gauge
Line Pressure Control Solenoid	A	Command to highest setting, full pressure to gauge	Command to lowest setting, below 620.5 kPa (90 psi) to gauge
TCC PC Solenoid	E	Full pressure to gauge	No pressure to gauge

NOTE: With the key ON, engine OFF (KOEO), the transmission control module (TCM) will normally cycle some of the transmission solenoids On and Off to facilitate keeping the ports and solenoids clean and free of debris. This dither function is a normal activity and will cause the valves to cycle open and closed quickly when the TCM is powered up. This can cause the psi gauge to flicker high and low as the valves open and close. This may cause some air to exit the ports where the psi gauge is not connected as those solenoids cycle on and off.

Drain the TCM of excess transmission fluid before attaching to test plate and use caution when attaching air to test plate air inlet.

RESET TRANSMISSION ADAPTS

The Reset Transmission Adapts is a procedure for automatic transmissions in which the shift pressure learn values of each individual clutch is reset to zero or a base calibrated value, in the transmission control module (TCM).

Once the transmission adapts are set to zero or a calibrated value, the vehicle is then road test under various drive cycle events for the TCM to relearn shift pressure values for the best possible shift feel in all gear ranges.

The Reset Transmission Adapts procedure must be performed when one of the following repairs have been made to the transmission. Failure to perform the procedure after one of the following repairs may result in poor transmission performance, DTCs being set or customer dissatisfaction.

- Transmission internal service, repair or overhaul
 - Valve body repair or replacement
 - Control solenoid valve assembly replacement
 - Any service/repair in response to a shift quality concern
1. Install any components or connectors that have been removed or replaced during diagnosis.
 2. Perform any adjustments, programming or setup procedures that are required when a component or module is removed or replaced.
 3. Clear the DTCs.
 4. Ignition OFF, all vehicle systems OFF, this may take up to 2 minutes.
 5. Ignition ON, engine running, with a scan tool Reset Transmission Adapts.

NOTE: Do not cycle or turn the ignition switch OFF until directed to do so below.

6. Perform the **Road Test**.
7. Ignition OFF for 2 minutes.

TRANSMISSION FLUID LEVEL AND CONDITION CHECK

This procedure checks both the transmission fluid level, as well as the condition of the fluid itself.

CAUTION: Use Dexron® VI transmission fluid only. Failure to use the proper fluid may result in transmission internal damage.

NOTE: Ensure the transmission has enough fluid in it to safely start the vehicle without damaging the transmission. With the vehicle off there must be at least enough fluid to wet the end of the dipstick bullet. This will ensure that there is enough fluid in the sump to fill the components once the vehicle is started.

Level Checking Procedure

1. Park the vehicle on a level surface, apply the parking brake and place the shift lever in PARK (P).
2. Start the engine.
3. Depress the brake pedal and move the shift lever through each gear range, pausing for about 3 seconds in each range. Then move the shift lever back to PARK (P).

4. Allow the engine to idle 500-800 rpm for at least 1 minute. Release the brake pedal.
5. Keep the engine running and observe the transmission fluid temperature (TFT) using the Driver Information Center or a scan tool.
6. If the TFT reading is not within the required temperature ranges, allow the vehicle to cool or operate the vehicle until the appropriate TFT is reached.

NOTE: If the fluid temperature is below the specified range, perform the following procedure to raise the fluid temperature to the specified range.

Drive the vehicle in second gear until the fluid temperature is within the specified range.

7. Remove the dipstick and wipe it with a clean rag or paper towel.

NOTE: Check the transmission fluid level when the TFT is between 180°F and 200°F (82°C and 93°C). The fluid level rises as fluid temperature increases, so it is important to ensure the transmission fluid temperature is within range.

8. Inspect the fluid color. The fluid should be red or dark brown.
 - If the fluid color is very dark or black and has a burnt odor, inspect the fluid for excessive metal particles or other debris. A small amount of "friction" material is a "normal" condition. If large pieces and/or metal particles are noted in the fluid, flush the oil cooler and cooler lines and overhaul the transmission. If there are no signs of transmission internal damage noted, replace the fluid, repair the oil cooler and flush the cooler lines.
 - Fluid that is cloudy or milky or appears to be contaminated with water indicates engine coolant or water contamination. Refer to Engine Coolant/Water in Transmission.
9. Install the dipstick and tighten. Wait three seconds and then remove it again.
10. Check both sides of the dipstick and read the lower level.

NOTE: Always check the fluid level at least twice. Consistent readings are important to maintaining proper fluid level. If inconsistent readings are noted, inspect the transmission vent assembly to ensure it is clean and unclogged.

NOTE: It is not necessary to get the fluid level all the way up to the MAX mark. Anywhere within the crosshatch band is acceptable.

11. Install and remove the dipstick again to verify the reading.
12. If the fluid level is not within the crosshatch band and the transmission temperature is between 180°F and 200°F (82°C and 93°C), add or drain fluid as necessary to bring the level into the crosshatch band. If the fluid level is low, add only enough fluid to bring the level into the crosshatch band.

NOTE: Do not add more than one pint (0.5L) at a time without rechecking the

level. Once the oil is on the dipstick bullet, it will not take much more fluid to raise the fluid level into the crosshatch band. Do not overfill. Also, if the fluid level is low, inspect the transmission for leaks. Refer to [Fluid Leak Diagnosis](#).

13. If the fluid level is in the acceptable range, install the dipstick.
14. If the fluid was changed, reset the transmission oil life monitor if applicable.

Fluid Condition Inspection

- Inspect the fluid color. The fluid should be red in color. The fluid may also turn brown from normal use and does not always indicate contamination.
- If the fluid color is very dark or black and has a burnt odor, inspect the fluid for excessive metal particles or other debris which may indicate transmission damage. Refer to [Road Test](#) to verify transmission operation. Change the transmission fluid if no other conditions are found.

NOTE: Fluid that is very dark or black and has a burnt odor usually indicates contamination or overheating.

- Fluid that is cloudy or milky or appears to be contaminated with water indicates engine coolant or water contamination. Refer to [Engine Coolant/Water in Transmission](#).

LINE PRESSURE CHECK

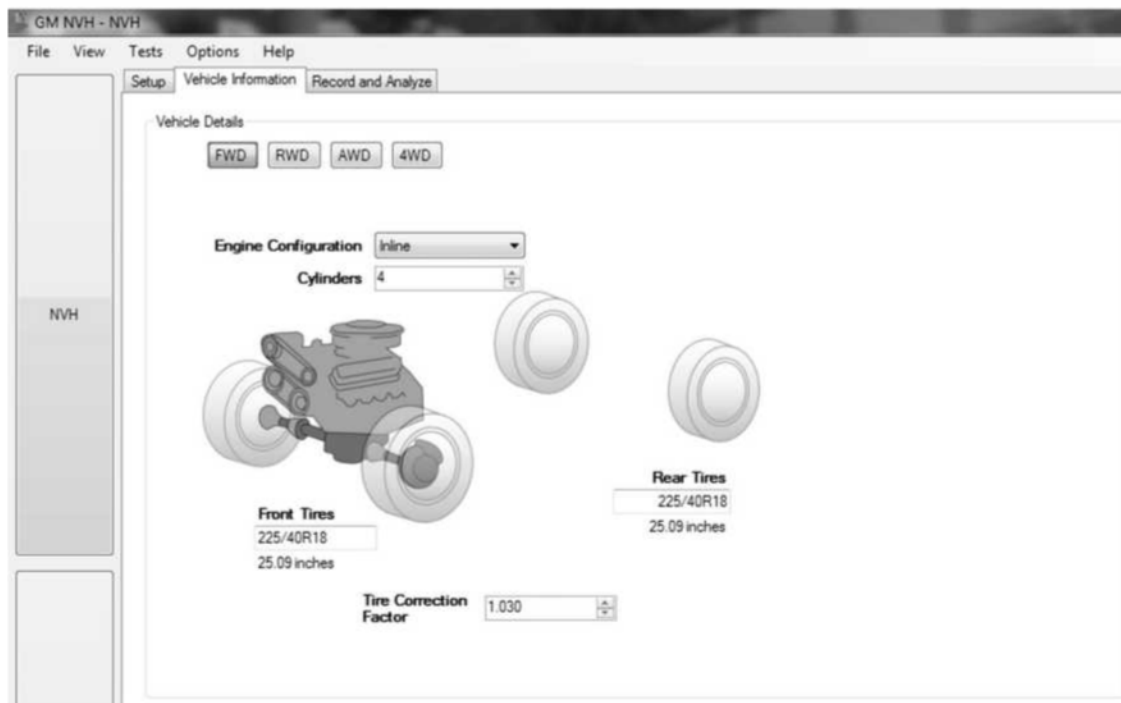


Fig. 4: Identifying Special Tool - J 21867

Courtesy of GENERAL MOTORS COMPANY

Special Tools**DT 21867-A Pressure Gauge**For equivalent regional tools, refer to **Special Tools**.

1. Install a scan tool.

WARNING: Keep the brakes applied at all times in order to prevent unexpected vehicle motion. Personal injury may result if the vehicle moves unexpectedly.

2. Start the engine.
3. Inspect the transmission for the proper fluid level. Refer to **Transmission Fluid Level and Condition Check**.
4. Use the scan tool to inspect for any active or stored diagnostic trouble codes.
5. Inspect the manual linkage at the transmission for proper function.
6. Turn the engine OFF.
7. Remove the line pressure test hole plug.
8. Install the **DT 21867-A** pressure gauge.
9. Access the Scan Tool Transmission Output Controls for the Line PC Solenoid.
10. Start the engine.
11. Use the scan tool to increase and decrease the Line PC Solenoid in increments of approximately 200 KPa (29 psi). The scan tool commands the increment values automatically.

NOTE: In order to achieve accurate line pressure readings, the following procedure must be performed at least 3 times in order to gather uniform pressure readings. The scan tool is only able to control the line PC solenoid in PARK and NEUTRAL with engine speeds below 1500 RPM. This protects the clutches from extreme high or low line pressures.

12. Allow the pressure to stabilize between increments.
13. Compare the pressure readings on the **DT 21867-A** pressure gauge to the actual pressure values in the solenoid valve pressure chart. Refer to **Solenoid Valve Pressure**.
14. If the pressure readings vary greatly, refer to **Fluid Pressure High or Low**.
15. Turn the engine OFF.
16. Remove the **DT 21867-A** pressure gauge.
17. Install the line pressure test hole plug and tighten to 12 N.m (106 lb in).

CAUTION: Refer to Fastener Caution .**ROAD TEST**

The following test provides a method of evaluating the condition of the automatic transmission. The test is structured so that most driving conditions would be achieved. The test is divided into the following parts:

- Electrical Function Check
- Upshift Control and Torque Converter Clutch (TCC) Apply
- Part Throttle Step-In Downshifts
- Manual Downshifts
- Coasting Downshifts
- Manual Gear Range Selection
 - REVERSE
 - Driver Shift Control

NOTE: **Complete the test in the sequence given. Incomplete testing cannot guarantee an accurate evaluation.**

Before the road test, ensure the following:

- The engine is performing properly.
- Transmission fluid level is correct. Refer to Transmission Fluid Level and Condition Check.
- Tire pressure is correct.

During the road test:

- Perform the test only when traffic conditions permit.
- Operate the vehicle in a controlled, safe manner.
- Observe all traffic regulations.
- View the scan tool data while conducting this test.

Take along qualified help in order to operate the vehicle safely.

- Observe any unusual sounds or smells.

After the road test, check the following:

- Inspect for proper transmission fluid level. Refer to Transmission Fluid Level and Condition Check.
- Inspect for any diagnostic trouble codes (DTCs) that may have set during the testing. Refer to the applicable DTC.

- Monitor the scan tool data for any abnormal readings or data.
- Inspect for fluid leaks. Refer to **Fluid Leak Diagnosis**.

Electrical Function Check

Perform this procedure first in order to ensure the electronic transmission components are functioning properly. If these components are not checked, a simple electrical condition could be misdiagnosed.

1. Connect the scan tool.
2. Ensure the gear selector is in PARK and set the parking brake.
3. Start the engine.
4. Verify that the following scan tool data can be obtained and is functioning properly.

Refer to **Control Module References** for typical data values. Data that is questionable may indicate a concern.

- Engine Speed
- Transmission ISS
- Transmission OSS
- Vehicle Speed
- IMS
- Commanded Gear
- Gear Ratio
- Line PC Sol. Pressure Cmd.
- Brake Switch
- ECT, Engine Data List
- Trans. Fluid Temp.
- TCM Temperature
- Calc. Throttle Position
- Ignition Voltage
- TFP Switch 1
- TFP Switch 3
- TFP Switch 4
- TFP Switch 5
- PC Sol. 2 Pressure Cmd.
- PC Sol. 3 Pressure Cmd.
- PC Sol. 4 Pressure Cmd.
- PC Sol. 5 Pressure Cmd.
- Shift Solenoid 1
- Shift Solenoid 2

- TCC PC Sol. Duty Cycle
 - TCC Slip Speed
5. Check the garage shifts.
 1. Apply the brake pedal and ensure the parking brake is set.
 2. Move the gear selector through the following ranges:
 1. PARK to REVERSE
 2. REVERSE to NEUTRAL
 3. NEUTRAL to DRIVE
 4. DRIVE to REVERSE
 5. REVERSE to DRIVE
 3. Pause 2 to 3 seconds in each gear position.
 4. Verify the gear engagements are immediate (less than 2 seconds to complete if trans fluid temperature is above 20°C) and not harsh. Note that these shifts may be almost imperceptible in some applications. Using the scan tool to monitor Transmission ISS achieving 0 RPM can be used to check delay in these cases.
 6. Monitor transmission range on the scan tool, transmission data list.

NOTE: Harsh engagement may be caused by any of the following conditions:

- High engine idle speed - Compare engine idle speed to desired idle speed.
- Incorrect line pressure - Investigate Line PC Sol. Pressure Cmd. kPa (psi), also perform Line Pressure Check.
- A default condition caused by certain DTCs that result in maximum line pressure to prevent clutch slippage.
- Incomplete adapting or incorrect adapting - Repeat maneuver multiple times to see if shift quality improves. If it does not, refer to the service procedures for Harsh Garage Shift and for Harsh First and Reverse Shift.

NOTE: Delayed engagement may be caused by any of the following conditions:

- Low idle speed - Compare engine idle speed to desired idle speed.
- Low fluid level
- Incorrect line pressure - Investigate Line PC Sol. Pressure Cmd. kPa (psi), also perform Line Pressure Check.
- Cold transmission fluid temperature (TFT) - Use the scan tool to determine TFT.
- Selector linkage - Inspect and adjust as necessary.
- Incomplete adapting or incorrect adapting - Repeat maneuver multiple times to see if delay improves. If it does not, refer to the

service procedures for Harsh First and Reverse Shift.

1. Apply the brake pedal and ensure the parking brake is set.
2. Move the gear selector through all ranges.
3. Pause 2 to 3 seconds in each range.
4. Return gear selector to PARK.
5. Verify that all selector positions match the scan tool display.
7. Check throttle position input.
 1. Apply the brake pedal and ensure the parking brake is set.
 2. Ensure the gear selector is in PARK.
 3. Monitor the scan tool Calc. Throttle Position while increasing and decreasing engine speed with the throttle pedal. The scan tool Calc. Throttle Position percentage should increase and decrease with engine speed.

If any of the above checks do not perform properly, record the result for reference after completion of the road test.

Upshift Control and Torque Converter Clutch (TCC) Apply

The TCM calculates the upshift points based primarily on 2 inputs: throttle position and vehicle speed. When the TCM determines that conditions are met for a shift to occur, the TCM commands the shift by varying current to the appropriate PC solenoids to control oncoming and offgoing clutch pressures.

Perform the following steps:

1. Monitor the following scan tool parameters:
 - Calc. Throttle Position
 - Vehicle Speed
 - Engine Speed
 - Transmission ISS
 - Transmission OSS
 - Commanded Gear
 - TCC PC Sol. Pressure Cmd.
 - TCC Slip Speed
 - TFP Switch 1
 - TFP Switch 3
 - TFP Switch 4
 - TFP Switch 5
 - PC Sol. 2 Pressure Cmd.
 - PC Sol. 3 Pressure Cmd.
 - PC Sol. 4 Pressure Cmd.

- PC Sol. 5 Pressure Cmd.
 - Shift Solenoid 1 and 2
2. Place the gear selector in the DRIVE position.
 3. Accelerate the vehicle using a steady throttle position between 15 and 20%. Hold the throttle steady.
 4. As the transmission upshifts, there should be a noticeable shift feel or engine speed change within 1 to 2 seconds of the commanded gear change. The PC solenoid pressure command should change to "YES" for the oncoming clutch and the PC solenoid pressure command should change to "NO" for the offgoing clutch.
 5. Note any harsh, soft or delayed shifts or slipping. Note any noise or vibration.
 6. The TCC feel may not be noticeable. In many applications the TCC will apply after the 1-2 shift and TCC events will not be easily detected using engine speed.
 7. Monitor TCC PC solenoid pressure command while driving and check TCC slip speed when the pressure command indicates that the TCC is commanded to apply:

NOTE: This transmission is equipped with an electronically controlled capacity clutch (ECCC), which allows operation of the clutch without fully locking to the torque converter cover. The clutch maintains a small amount of slippage, approximately 20 RPM, in 2nd, 3rd, 4th, 5th and 6th gears, depending on the vehicle application. ECCC was developed to reduce the possibility of noise, vibration or chugle caused by TCC apply. Full lockup is available at highway speeds on some applications.

When the TCC applies, slip speed should be controlled to below 100 RPM when the transmission is not shifting and the throttle is held steady. If the TCC slip exceeds this value for more than 6 seconds after the TCC PC Sol. Pressure Command indicates that the TCC is commanded ON:

- Check for DTCs.
- Refer to **Torque Converter Diagnosis**.

Part Throttle Step-In Downshifts

1. Place the gear selector in the DRIVE position.
2. Accelerate the vehicle at light throttle (5-15%) until 3rd gear is just achieved.
3. Quickly increase throttle angle until commanded gear indicates that a downshift to 2nd gear is commanded.
4. Verify that the transmission downshifts within 2 seconds of the throttle movement.
5. Repeat steps 2 to 4 at higher speed to achieve 4th gear and then step in to command a 4th gear to 3rd gear downshift.
6. Repeat steps 2 to 4 at higher speed to achieve 5th gear and then step in to command a 5th gear to 4th gear downshift.
7. Repeat steps 2 to 4 at higher speed to achieve 6th gear and then step in to command a 6th gear to 5th gear downshift.
8. Note any harsh, soft or delayed shifts or slipping. Note any noise or vibration.

Manual Downshifts

Manual downshift testing is not required since all vehicles equipped are also equipped with some form of Driver Shift Control (DSC). The TCM will automatically override DSC downshifts to protect the transmission from damage.

Coasting Downshifts

1. Place the gear selector in the DRIVE position.
2. Accelerate the vehicle to 6th gear with the TCC applied.
3. Release the throttle and apply the brakes
4. Verify that the downshifts occur as commanded by monitoring gear ratio, which should change after commanded gear changes.

Manual Gear Range Selection

This application does not utilize manual forward gear ranges.

Reverse

Perform the following test using a 10-15% throttle position.

1. With the vehicle stopped, move the gear selector to REVERSE.
2. Slowly accelerate the vehicle.
3. Verify that there is no noticeable slip, noise or vibration.

Driver Shift Control (DSC)

Refer to the owner's manual for specific instructions on the type of DSC available in this application. Utilize the DSC to ensure that the transmission responds appropriately to driver's commands. The TCM will upshift automatically when maximum engine speed is achieved and will protect from any downshift which may cause excessive engine RPM.

TORQUE CONVERTER DIAGNOSIS**Torque Converter Stator**

The torque converter stator roller clutch can have 2 different malfunctions.

- The stator assembly freewheels in both directions.
- The stator assembly remains locked up in both directions.

Poor Acceleration at Low Speed - Stator Roller Clutch Freewheels at All Times

If the stator is freewheeling at all times, the vehicle tends to have poor acceleration from a standstill and at

speeds below 48-55 km/h (30-34 mph). At speeds above 48-55 km/h (30-34 mph), the vehicle may act normally.

For poor acceleration at low speeds, you should first determine that the exhaust system is not blocked and the transmission is in First gear when starting out. If the engine freely accelerates to high RPM in NEUTRAL, you can assume that the engine and the exhaust system are normal. Check for poor performance in DRIVE and REVERSE to help determine if the stator is freewheeling at all times.

Poor Acceleration at High Speed - Stator Roller Clutch is Locked Up at All Times

If the stator is locked up at all times, performance is normal when accelerating from a standstill. Engine RPM and vehicle speed are limited or restricted at speeds above 48-55 km/h (30-34 mph). Visual examination of the converter may reveal a blue color from overheating.

Torque Converter Bearing Noise

NOTE: Do not confuse this noise with pump whine noise, which is usually noticeable in all gear ranges. Pump whine will vary with line pressure.

Torque converter whine is noticed when the vehicle is stopped and the transmission is in DRIVE or REVERSE. This noise will increase as you increase the engine RPM. The noise will stop when the vehicle is moving or when you apply the torque converter clutch, because there is no slip speed across the bearings.

Perform a stall test to verify that the noise is actually coming from the torque converter:

1. Place your foot on the brake.
2. Put the gear selector in DRIVE.
3. Depress the accelerator to approximately 1, 200 RPM for no more than six seconds.

CAUTION: You may damage the transmission if you depress the accelerator for more than 6 seconds.

A torque converter noise will increase under this load.

Torque Converter Clutch

The torque converter clutch (TCC) is applied by fluid pressure, which is controlled by a TCC pressure control (PC) solenoid. This solenoid is part of the control solenoid valve assembly, which is located inside the automatic transmission assembly. The solenoid is controlled through a combination of computer controlled switches and sensors. Electronically controlled capacity clutch (ECCC) is controlled slip across the TCC.

Torque Converter Clutch Shudder

The key to diagnosing torque converter clutch (TCC) shudder is to note when it happens and under what conditions. TCC shudder should only occur during the apply, release or ECCC conditions of the converter

clutch. Shudder should never occur after the TCC is fully locked (approximately 0 RPM slip).

If Shudder Occurs During TCC Apply, Release and ECCC

If the shudder occurs while the TCC is applying, the problem can be within the transmission or the torque converter. Something is causing one of the following conditions to occur:

- The clutch is not engaging completely.
- The clutch is not releasing completely.
- The clutch is releasing and applying rapidly and continuously.

One of the following conditions may be causing the TCC Shudder to occur:

- Leaking turbine shaft/TCC seals
- A restricted release orifice
- A distorted clutch or converter cover due to long flexplate to converter bolts
- Defective friction material on the TCC plate

If Shudder Occurs After TCC has Locked

Engine problems may go unnoticed under light throttle and load, but they become noticeable after the TCC has locked when going up a hill or accelerating.

Refer to **Symptoms - Engine Controls** in order to avoid misdiagnosis of TCC shudder and the unnecessary disassembly of a transmission or the unnecessary replacement of a torque converter.

Torque Converter Vibration Test

NOTE: **The Noise and Vibration Analysis procedure should be performed prior to performing this test.**

Indexing Torque Converter

To determine and correct a torque converter vibration, the following procedure may have to be performed several times to achieve the best possible torque converter to flexplate balance.

1. Remove the torque converter bolts.
2. Rotate the torque converter one bolt position from the original marked position.
3. Align the torque converter pilot (2) in the engine crankshaft (3). Install the torque converter to flexplate bolts and tighten according to **Fastener Tightening Specifications (Off Vehicle)** , **Fastener Tightening Specifications (On Vehicle)** .

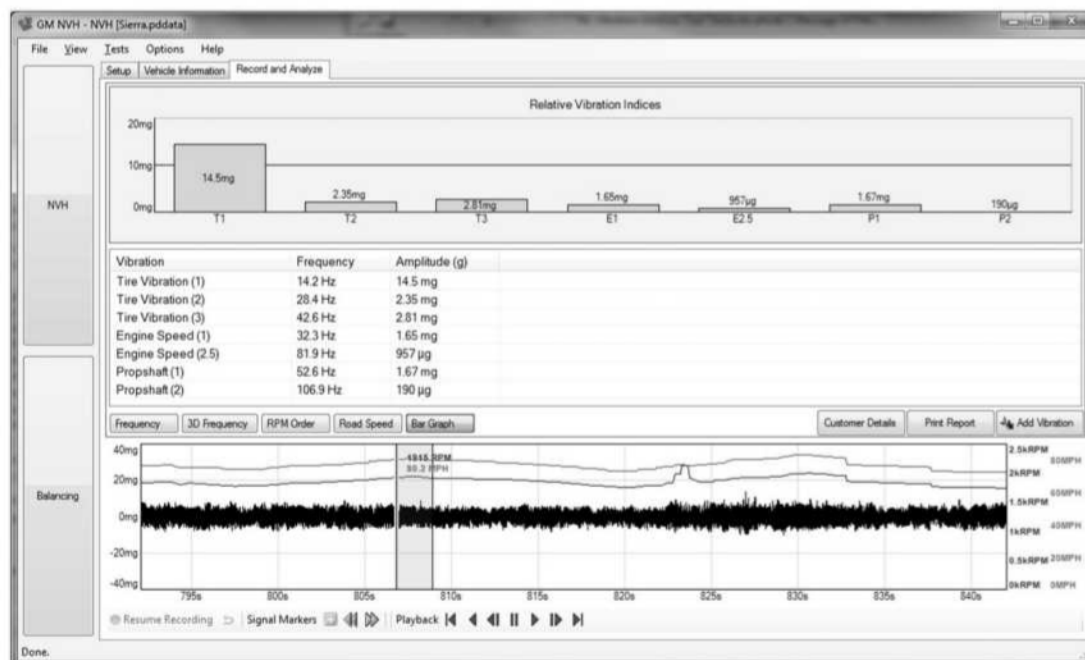


Fig. 5: View Of Torque Converter Hub In Engine Crankshaft
Courtesy of GENERAL MOTORS COMPANY

CAUTION: When installing the torque converter to the flexplate, make sure to use specified bolts. DO NOT use longer bolts. Using longer bolts will result in deformation of the torque converter cover and cause internal damage.

CAUTION: Refer to **Fastener Caution** .

4. Lower the vehicle.
5. With the engine at idle speed and the transmission in PARK or NEUTRAL, observe the vibration.

Repeat this procedure until the best possible balance is obtained.

6. Install the torque converter access cover and bolts (if equipped) and tighten according to **Fastener Tightening Specifications (Off Vehicle)** , **Fastener Tightening Specifications (On Vehicle)** .

Torque Converter Replacement Guide

Condition	Action
- Transmission Fluid Oxidized/Discolored - Clutch Fiber Material	Do not replace the torque converter. Refer to Transmission Fluid Level and Condition

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	<u>Check.</u>
Transmission Fluid Contaminated with Metal Particles	NOTE: Do not replace the torque converter for clutch system or gearset component damage. Fine metallic debris or clutch plate material that is suspended in the fluid will not cause damage to the internal torque converter components nor any internal transmission components.
Harsh Gear Shifts	Do not replace the torque converter. Refer to <u>Symptoms - Automatic Transmission</u> .
Noise-Whine	- Refer to <u>Symptoms - Automatic Transmission</u>. - Do not replace the torque converter if noise is present in Neutral/Park. Refer to <u>Symptoms - Engine Mechanical</u>.
Vibration-Out of Balance	Refer to Torque Converter Vibration Test in this procedure.
No Drive/Slips in Drive	Do not replace the torque converter until completing all engine and transmission diagnostics.
Idle Surge/Rough Idle	Do not replace the torque converter. Refer to <u>Symptoms - Engine Controls</u>
TCC Apply/Release Shudder	Do not replace the torque converter. Refer to Torque Converter Clutch Shudder in this procedure.
TCC Chuggle	Do not replace the torque converter. Refer to <u>Symptoms - Engine Controls</u> .
DTC P0741-TCC Stuck OFF/High Slip-Intermittent Only	Do not replace the torque converter. Refer to <u>DTC P0741 or P0742</u> diagnostic table.
DTC P0741-TCC Stuck OFF/High Slip	Do not replace the torque converter. Refer to <u>DTC P0741 or P0742</u> diagnostic table.
DTC P0742-TCC Stuck ON	Do not replace the torque converter. Refer to <u>DTC P0741 or P0742</u> diagnostic table.
Transmission Fluid Contaminated with Sludge/Metal Particles as a result of: - Engine Coolant/Oil - Pump damage - Drive sprocket support damage - Turbine/stator shaft damage - Internal converter damage with no damage found in the transmission	Replace the torque converter.
Poor Acceleration above 48 km/h (30 mph) - Good Launch	Do not replace the torque converter until completing all engine and transmission diagnostics.

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	• Refer to Torque Converter Stator in this procedure. • Refer to Symptoms - Engine Controls .
Poor Launch - Good Acceleration above 48 km/h (30 mph)	Do not replace the torque converter until completing all engine and transmission diagnostics. • Refer to Torque Converter Stator in this procedure. • Refer to Symptoms - Engine Controls .
Stripped Converter Bolt Holes	• Replace the torque converter. • Inspect flexplate and refer to Lower Engine Noise, Regardless of Engine Speed .
Torque Converter Pilot Damaged	Replace the torque converter.
Torque Converter Hub surface is damaged - scored, raised/transferred metal.	Replace the torque converter.
External Leaks in the weld areas - hub, lug or closure weld.	Replace the torque converter.
Broken/Cracked Flexplate	Replace the torque converter.
Torque Converter Discolored/Overheated	Replace the torque converter.

CLUTCH PLATE DIAGNOSIS

Composition Plates

Dry the plates and inspect the plates for the following conditions:

- Pitting
- Flaking
- Delamination - splitting or separation of bonded clutch material
- Wear
- Glazing
- Cracking
- Charring
- Chips or metal particles embedded in the lining

Replace a composition plate which shows any of these conditions.

Steel Plates

Wipe the plates dry and check the plates for heat discoloration. If the surfaces are smooth, even if color smear is indicated, you can reuse the plate. If the plate is discolored with heat spots or if the surface is scuffed, replace the plate.

Causes of Burned Clutch Plates

The following conditions can result in a burned clutch plate:

- Incorrect usage of clutch or apply plates
- Engine coolant or water in the transmission fluid
- A cracked clutch piston
- Damaged or missing seals
- Low line pressure
- Valve body conditions
 - The valve body face is not flat.
 - Porosity in between channels.
 - The valve train retainers are improperly installed.
 - The checkballs are misplaced.
- The Teflon® seal rings are worn or damaged.

ENGINE COOLANT/WATER IN TRANSMISSION

CAUTION: The antifreeze or water will deteriorate the seals, gaskets and the glue that bonds the clutch material to the pressure plate. Both conditions may cause damage to the transmission.

If anti-freeze or water has entered the transmission, perform the following:

1. Disassemble the transmission.
2. Replace all of the rubber type seals. The coolant will attack the seal material which will cause leakage.
3. Replace the composition-faced clutch plate assemblies. The facing material may separate from the steel center portion.
4. Replace all of the nylon parts - washers.
5. Replace the torque converter.
6. Thoroughly clean and rebuild the transmission, using new gaskets and oil filter.
7. Flush the cooler lines after the transmission cooler has been properly repaired or replaced.
8. Inspect the rubber hose portion of the oil cooler lines for damage, if applicable. Refer to **Transmission Fluid Cooler Flushing and Flow Test**.

FLUID LEAK DIAGNOSIS**General Method**

1. Verify that the leak is transmission fluid.
2. Thoroughly clean the suspected leak area using a rag.

CAUTION: Do not clean using brake cleaner or other reactive solvents as these solvents can damage rubber gaskets, seals and bushings.

3. Operate the vehicle for 15-20 minutes under city driving conditions until normal operating temperatures are reached.

NOTE: Do not idle vehicle, this will not actuate transmission systems and do not drive the vehicle on the freeway as this will splatter oil inhibiting leak diagnosis.

4. Park the vehicle over clean paper or cardboard.
5. Shut OFF the engine.
6. Look for fluid spots on the paper.
7. Make the necessary repairs.

Powder Method

1. Thoroughly clean the suspected leak area using a rag.

CAUTION: Do not clean using brake cleaner or other reactive solvents as these solvents can damage rubber gaskets, seals and bushings.

2. Apply an aerosol type leak tracing powder to the suspected leak area.
3. Operate the vehicle for 15-20 minutes under city driving conditions until normal operating temperatures are reached.

NOTE: Do not idle vehicle, this will not actuate transmission systems and do not drive the vehicle on the freeway as this will splatter oil inhibiting leak diagnosis.

4. Shut OFF the engine.
5. Inspect the suspected leak area.
6. Trace the leak path through the powder in order to find the source of the leak.
7. Make the necessary repairs.

Dye and Black Light Method

A fluid dye and black light kit is available from various tool manufacturers.

1. Follow the manufacturer's instructions in order to determine the amount of dye to use.
2. Operate the vehicle for 24 km (15 mi) or until normal operating temperatures are reached.
3. Detect the leak with the black light.

4. Make the necessary repairs.

Find the Cause of the Leak

Pinpoint the leak and trace the leak back to the source. You must determine the cause of the leak in order to repair the leak properly. For example, if you replace a gasket, but the sealing flange is bent, the new gasket will not repair the leak. You must also repair the bent flange. Before you attempt to repair a leak, check for the following conditions and make repairs as necessary:

Gaskets

- Fluid level/pressure is too high
- Plugged vent or drain-back holes
- Improperly tightened fasteners
- Dirty or damaged threads
- Warped flanges or sealing surface
- Scratches, burrs or other damage to the sealing surface
- Damaged or worn gasket
- Cracking or porosity of the component
- Improper sealant used, where applicable
- Incorrect gasket

Seals

- Fluid level/pressure is too high
- Plugged vent or drain-back holes
- Damaged seal bore
- Damaged or worn seal
- Improper installation
- Cracks in component
- Manual shaft or output shaft surface is scratched, nicked or damaged
- Loose or worn bearing causing excess seal wear

Possible Points of Fluid Leaks**Transmission Case Cover and/or Valve Body Cover**

- Incorrectly tightened bolts
- Improperly installed or damaged gasket/seal
- Damaged mounting face
- Incorrect gasket seal

Case Leak

- Damaged input speed sensor seal
- Damaged manual shaft seal
- Loose or damaged oil cooler lines/seals
- Worn or damaged axle shaft oil seal
- Loose line pressure pipe plug or fluid level pipe plug
- Porous casting
- Warped torque converter housing
- Damaged converter housing to case seal

Leak at the Torque Converter End

- Converter leak in the weld area
- Converter seal lip cut. Check the converter hub for damage
- Converter seal bushing moved forward and damaged
- Converter seal garter spring missing from the seal
- Porous casting of the torque converter housing

Leak at the Vent

- Overfilled system
- Water or coolant in the fluid; The fluid will appear milky
- Transmission case porous
- Incorrect fluid level indicator causing an overfilled system
- Plugged vent

Leak Inspection Points

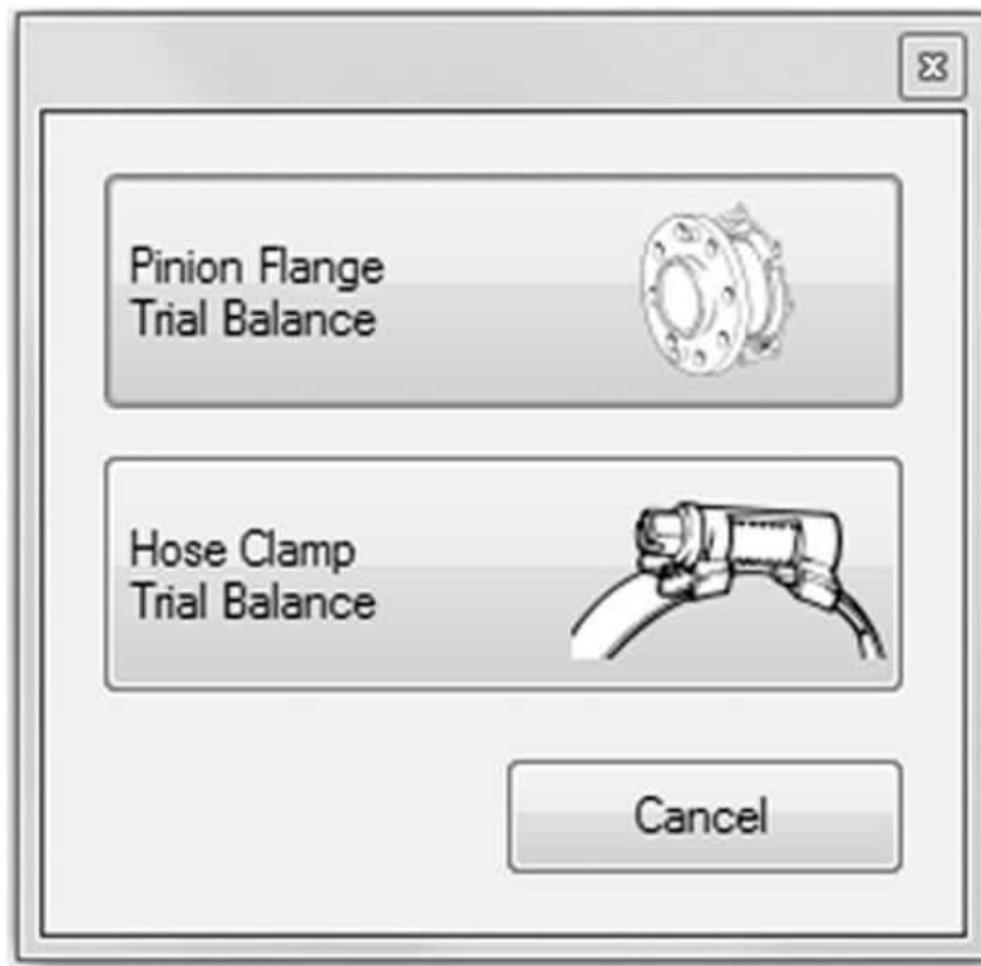


Fig. 6: Identifying Leak Inspection Points
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Manual Shift Shaft Seal
2	Automatic Transmission Vent
3	Control Valve Body Cover Wiring Connector Hole Seal
4	Input Speed Sensor Seal
5	Converter Housing to Case Joint
6	Front Wheel Drive Shaft Oil Seal Assembly - Case
7	Torque Converter Fluid Seal Assembly
8	Torque Converter Assembly
9	Front Wheel Drive Shaft Oil Seal Assembly - Torque Converter Housing
10	Control Valve Body Cover Assembly Gasket
11	Fluid Level Hole Plug

12	Fluid Pressure Hole Plug
13	Case Cover Gasket

CASE POROSITY REPAIR

Some external leaks are caused by case porosity in non-pressurized areas.

1. Thoroughly clean the area to be repaired with a cleaning solvent. Air dry the area.
2. Using instructions from the manufacturer, mix a sufficient amount of an epoxy to make the repair.

WARNING: Epoxy adhesive may cause skin irritations and eye damage. Read and follow all information on the container label as provided by the manufacturer.

3. Apply the epoxy. A clean, dry soldering acid brush can be used to clean the area and also to apply the epoxy cement. Make certain that the area to be repaired is fully covered.
4. Allow the epoxy cement to cure for three hours before assembling the components.
5. Repeat the fluid leak diagnosis procedures.

BUSHING AND MATING SHAFT INSPECTION

NOTE: Proper bushing and corresponding mating shaft inspection should be performed before replacing the bushing, shaft and in some cases, the component which houses the bushing. Thoroughly clean and dry the bushing and shaft surfaces before inspecting for damage.

Any of the following bushing conditions require replacement of the bushing and/or housing:

- Discoloration due to heat distress
- Misalignment or displacement of bushing as a result of spinning in housing
- Medium to heavy scoring that can be easily detected with fingernail. Light scoring is a normal condition.
- Debris embedded into the bushing lining material
- Obvious damage, including excessive and uneven wear
- Excessive polishing. Minor polishing of the bushing is an indication of normal wear and does not require replacement.

Any of the following conditions require replacement of the bushing's mating shaft:

- Discoloration due to heat distress
- Rough surface finish that can be easily detected with finger
- Obvious shaft abnormalities, including warping or uneven surfaces
- Obvious damage or cracking

NOISE AND VIBRATION ANALYSIS

A noise or vibration that is noticeable when the vehicle is in motion MAY NOT be the result of the transmission.

If noise or vibration is noticeable in PARK and NEUTRAL with the engine at idle, but is less noticeable as RPM increases, the vibration may be a result of poor engine performance.

- Vibration may also be caused by a small amount of water inside the converter.
- Inspect the engine and transmission mounts for damage and loose bolts.
- Inspect the transmission case mounting holes for the following conditions:
 - Missing bolts, nuts and studs
 - Stripped threads
 - Cracks
- Inspect the flywheel for the following conditions:
 - Missing or loose bolts
 - Cracks
 - Imbalance
- Inspect the torque converter for the following conditions:
 - Missing or loose bolts or lugs
 - Missing or loose balance weights
 - Imbalance caused by heat distortion or fluid contamination
- If the noise or vibration is noticeable in PARK and NEUTRAL with the engine at idle, but is more noticeable as RPM increases, the vibration may be an engine imbalance or a transmission imbalance. Refer to **Torque Converter Diagnosis**.

WHINE/GROWL NOISE

Whine/Growl Noise

Checks	Causes
Front Differential Drive Pinion Gear Assembly (23)	• Inspect for worn wheel bearings or axles. • Inspect for proper Taper Roller Bearing Pre-load • Inspect for loose or worn transfer Driven Gear
Differential Assembly (486)	• Inspect for worn wheel bearings or axles. • Inspect for proper Taper Roller Bearing Pre-load • Inspect for worn or damaged Side Gear Thrust Washer (492) or Pinion Gear Thrust Washer (488) • Inspect for loose or worn Side Gear Axle Splines
	• Inspect for worn or damaged Pinion Gear Thrust Washers and Bushings

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Input Carrier Assembly (470)	• Inspect for worn or damaged Pinion Gears, Pins or Needle Bearings • Inspect for loose Hub and Ring Gear
Output Carrier Assembly (474)	• Inspect for worn or damaged Pinion Gear Thrust Washers and Bushings • Inspect for worn or damaged Pinion Gears, Pins or Needle Bearings • Inspect for loose Hub and Ring Gear
Reaction Carrier Assembly (467)	• Inspect for worn or damaged Pinion Gear Thrust Washers and Bushings • Inspect for worn or damaged Pinion Gears, Pins or Needle Bearings • Inspect for loose hub and Ring Gear
Fluid Pump Assembly (203)	• Inspect for proper fluid level • Inspect for loose or worn Drive Link Assembly (218) • Inspect for worn Driven Sprocket Thrust Washer (214) or Drive Sprocket Thrust Washers (219, 220) • Inspect for leaking Transfer Drive Gear Support Seal (213), Pump Fluid Outlet Seal Assembly (57) or Filter Seal (202) • Inspect for worn or damaged Fluid Pump Shaft Splines
3-5-Reverse Clutch Assembly	• Inspect for inadequate Clutch Plate Clearance • Inspect for loose or worn Clutch Plate Splines (423-425) • Inspect for loose or worn Clutch Spring Retainer (427) • Inspect for loose Speed Sensor Reluctor Wheel (416) or Retainer (415)
4-5-6 Clutch Assembly	• Inspect for inadequate Clutch Plate Clearance • Inspect for loose or worn Clutch Plate Splines (449, 440) • Inspect for loose or worn Clutch Spring Retainer (442) • Inspect for loose or worn 3-5-Reverse/4-5-6 Clutch Housing Bushing
1-2-3-4 Clutch Assembly	• Inspect for inadequate Clutch Plate Clearance • Inspect for loose or worn Clutch Plate Splines (456-458) • Inspect for loose or worn Clutch Spring Retainer (459)
Low and Reverse Clutch Assembly (OWC) (455)	• Inspect for loose or worn Splines (455) • Inspect for loose or worn Retainer (454)
Low and Reverse Clutch	• Inspect for inadequate Clutch Plate Clearance • Inspect for loose or worn Clutch Plate Splines (449-452) • Inspect for loose or worn Clutch Spring Retainer (410)

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2-6 Clutch Assembly	• Inspect for inadequate Clutch Plate Clearance • Inspect for loose or worn Clutch Plate Splines (445-447) • Inspect for loose or worn Clutch Spring Retainer (407)
Case Assembly (51)	• Inspect for loose or broken Transmission Mount Bolts • Inspect for loose Torque Converter and Differential Housing Bolts (26) • Inspect for loose or broken Fluid Trough Bolts (56)

AUTOMATIC TRANSMISSION FLUID LEAKS**Automatic Transmission Fluid Leaks**

Checks	Causes
Torque Converter (27)	Inspect for damage.
Case Assembly (21)	• Inspect for porosity or damage on the sealing surfaces • Inspect for loose Oil Cooler Line Bolts or damaged Oil Cooler Line Seals • Inspect for damaged Manual Shift Shaft Seal (58) • Inspect for damaged or worn Axle Seal (61) or Axle Seal Slinger on the axle shafts • Inspect for loose Pressure Test Plug (62) and Fluid Level Plug (63)
Torque Converter Housing Assembly (221)	• Inspect for damaged Torque Converter Housing Assembly (25) • Inspect for porosity or damage on the sealing surfaces • Inspect for damaged Torque Converter Housing Seal (22) • Inspect for damaged or worn Torque Converter Fluid Seal (225) • Inspect for loose Torque Converter and Differential Housing Bolts (26) • Inspect for damaged or worn Axle Seal (226) or Axle Seal Slings on the axle shafts
Case Cover assembly (34)	• Inspect for porosity or damage on the sealing surface • Inspect for damaged Case Cover Gasket (33) • Inspect for loose Case Cover Assembly Bolts (35) • Inspect for loose Input Speed Sensor (ISS) Bolt (401) • Inspect for damaged Input Speed Sensor (ISS) Seal (402) • Inspect for loose, damaged or leaking Case Cover Assembly bore plugs
	• Inspect for damaged or warped Valve Body Cover Assembly

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Valve Body Cover Assembly (1)	(1) • Inspect for damaged Valve Body Cover Gasket (5) • Inspect for loose Valve Body Cover Bolts (7) and Valve Body Cover Studs (6) • Inspect for damaged or improperly installed Wire Connector Hole Seal (10) • Inspect for damaged or worn Fluid Level Indicator Seal • Inspect for plugged vent holes in the Fluid Level Indicator (2)
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SHIFT INDICATOR INDICATES WRONG GEAR SELECTION**Shift Indicator Indicates Wrong Gear Selection**

Checks	Causes
Shift Cable	• Inspect for damage. • Verify proper attachment to shifter. • Verify cable is locked into shifter bracket. • Verify cable is properly attached to the transmission. • Verify that the cable is locked into the transmission bracket.
Manual Shaft	• Verify shift lever is properly attached to the manual shaft. • Verify manual shaft is not twisted or damaged.
Manual Shift Detent Lever with Shaft Position Switch Assembly, IMS	Verify proper operation. Refer to <u>Transmission Internal Mode Switch Logic</u> .

NO PARK**No Park**

Checks	Causes
Front Differential Drive Pinion (w/Transfer Gear) Gear Assembly (481)	• Inspect for broken or stripped Park Gear splines • Inspect for broken or worn Park Gear
Front Differential Carrier Assembly (486)	Inspect for damaged, broken or loose Front Differential Ring Gear
Output Carrier Transfer Drive Gear Hub Assembly (477)	• Inspect for worn, stripped or broken splines • Inspect for disengaged hub to Transfer Drive Gear
Reaction Carrier Assembly (467)	• Inspect for worn, stripped or broken splines • Inspect for disengaged to the Output Sun Gear (475)
	• Inspect for broken or damaged Case • Inspect for loose or stripped Park Pawl Actuator Bracket Bolts (500)

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Case Assembly (507)	• Inspect for broken or bent Park Pawl Actuator Bracket (501) • Inspect for broken or missing Park Pawl Actuator Guide Pin (505) or Manual Shaft Pin (510) • Inspect for broken, loose or misaligned Park Pawl Guide (506) • Inspect for binding or broken Park Pawl (503) or Actuator Assembly (509)
Manual Shift Detent Lever Assembly (511)	Inspect for broken or disengaged Manual Valve Link Pin

HARSH GARAGE SHIFT

Harsh Garage Shift

Checks	Causes
Input Carrier Assembly (470)	Inspect for worn or stripped ring gear splines
Case Assembly (51)	• Check the engine for diagnostic codes. If the engine controller signals the transmission that engine torque is inaccurate, the transmission will command high line pressure. • Check line pressure at idle is below 800 kPa. • Inspect for stuck valves in the lower valve body, particularly the boost valves. • Inspect for damaged or fatigued 1-2-3-4 clutch wave plate (458) and low and reverse clutch wave plate (450). • Inspect for stripped or worn splines on 1-2-3-4 clutch plate (456). • Inspect for improperly positioned or plugged low reverse piston (408) air bleed. • Inspect for correct fluid level.
Low and Reverse Clutch Assembly (OWC) (455)	Inspect for stripped or sheared internal and external splines on the low and reverse clutch assembly (455).

NO DRIVE IN ALL RANGES

No Drive in All Ranges

Checks	Causes
For an explanation of which clutches are applied during the transmission gear ranges, refer to Range Reference .	
Case Assembly (51)	• Inspect for cracked or broken Case (51) • Inspect for stripped or sheared splines • Inspect for binding Manual Shift Detent Lever Assembly (511)

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	• Inspect for missing Manual Shift Shaft Pin (510) • Inspect for interference or binding Park Pawl Actuator Assembly (509) • Inspect for disengaged or broken 1-2-3-4 Clutch Piston Spring Retainer (459) • Inspect for loose or damaged case bushing. • Inspect for missing Lube Orifice Plug
Torque Converter (29)	• Inspect for stripped or sheared splines on Turbine Shaft • Inspect for missing Torque Converter to Flywheel bolts.
Torque Converter Housing (221)	• Inspect for loose, missing or broken Torque Converter and Differential Housing bolts (26). • Inspect for loose, missing or broken Fluid Pump bolts (204).
35R/456 Housing Assembly (422)	• Inspect for damaged or broken Input Shaft Thrust Bearing Assembly (32) • Inspect for stripped, sheared or loose splines on the Input Shaft to the 3-5 Reverse/4-5-6 Clutch Housing (422)
Oil Pump Assembly (203)	• Inspect for fluid leaks/improper fluid level • Inspect for disengaged, worn, binding or failed Drive Sprocket (216), Driven Sprocket (215) or Drive Link (217) • Inspect for leaking Fluid Outlet Seal Assembly (57) • Inspect for damaged or worn Drive (219, 220) and Driven Sprocket Thrust Washers (214) • Inspect for loose or missing Oil Pump Bolts (204) • Inspect for stripped or sheared splines on the Oil Pump Shaft or Driven Sprocket (215) • Inspect for damaged, clogged or improperly installed Oil Filter Assembly (201) • Inspect for damaged or leaking Oil Filter Neck Seal (202)
Low & Reverse Clutch Assembly (455)	Inspect for stripped or sheared splines to the Reaction Carrier (467)
Input Carrier Assembly (470)	• Inspect for stripped or sheared splines to ring gear • Inspect for improperly installed carrier pinion gear pins • Inspect for damaged or broken Pinion Gears. • Inspect for stripped or sheared splines on the Input Sun Gear (471). • Inspect for damaged or broken Output Internal Gear. • Inspect for broken or disengaged Output Internal Gear Retainer Ring. • Inspect for damaged or broken Input Carrier Thrust Bearing

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	Assembly (468) and Output Carrier Thrust Bearing Assembly (473). Inspect for damaged or broken Input Carrier Thrust Bearings (469, 472).
Reaction Carrier Assembly (467)	- Inspect for stripped or sheared Reaction Carrier Assembly (467) splines. - Inspect for damaged or broken Input Carrier Thrust Bearings (468). - Inspect for damaged or broken Pinion Gear teeth. - Inspect for damaged or broken Reaction Internal Gear teeth. - Inspect for disengaged or broken Reaction Internal Gear retainer ring.
Reaction Sun Gear Assembly (466)	- Inspect for damaged or broken weld at Sun Gear. - Inspect for loose or worn Reaction Sun Gear Assembly bushing.
Output Carrier Assembly (474)	- Inspect for stripped or sheared splines to reaction internal ring gear. - Inspect for damaged or broken Input Sun Gear Thrust Bearings (472). - Inspect for damaged or broken Pinion Gear teeth. - Inspect for damaged or broken Input Carrier Thrust Bearings (473). - Inspect for broken or damaged Output Internal Gear.
Output Sun Gear Assembly (475)	- Inspect for stripped or sheared Output Sun Gear Assembly (475) splines. - Inspect for broken Output Sun Gear Assembly (4755) hub or weld.
Low and Reverse Clutch Assembly (455)	Inspect for disengaged or broken Low and Reverse Clutch Assembly (455).
Differential Carrier Assembly (486)	- Inspect for stripped or sheared splines on Differential Side Gear. - Inspect for stripped or sheared splines Differential Carrier to PTU (AWD only). - Inspect for damaged or broken Pinion Gear teeth. - Inspect for broken, worn or damaged Final Drive Inner and Outer Thrust Washers (492).
Control Solenoid (w/Body and TCM) Valve Assembly	- Check that the Manual Valve (348) is engaged with Manual Shift Detent Lever Assembly (511). - Inspect the Control Solenoid (w/Body and TCM) Valve Assembly (15) and verify that it is functioning properly.

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

NO FIRST AND REVERSE GEARS**No First and Reverse Gears**

Checks	Causes
Low and Reverse Clutch Assembly (455)	- Inspect for disengaged or broken low and reverse clutch retainer (454). - Inspect for stripped or sheared splines on low and reverse clutch (455).
Low and Reverse Clutch	- Inspect for stripped or sheared splines on low and reverse clutch plates (449-453). - Inspect for damaged, deformed or improper surface finish on the low and reverse clutch plates (449-453).
Case Cover Assembly (403)	- Inspect for disengaged or broken low and reverse clutch piston spring retainer (410). - Inspect for worn, damaged or debonding low and reverse clutch piston seals (408). - Inspect for broken or deformed low and reverse clutch piston (408). - Inspect for improperly position or too large bleed hole in low and reverse piston (408). - Inspect for porosity or improper finish on the case cover. - Inspect for broken or fatigued low and reverse clutch piston return spring (409).

NO FIRST, SECOND, THIRD AND FOURTH GEAR**No First, Second, Third and Fourth Gear**

Checks	Causes
1-2-3-4 Clutch Assembly	- Inspect for damaged or worn 1-2-3-4 clutch plates (456-458). - Inspect for damaged or broken 1-2-3-4 clutch piston (461) and piston seals damaged, worn or delaminating. - Inspect for broken or binding 1-2-3-4 clutch piston return spring (460). - Inspect for broken or disengaged 1-2-3-4 clutch piston return spring retainer (459). - Inspect for broken or fatigued 1-2-3-4 clutch wave plate (458).
Output Sun Gear Assembly (457)	Inspect for stripped or sheared splines on the output sun gear shell.

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Reaction Carrier Assembly (467)	- Inspect for stripped or sheared splines on the input ring gear. - Inspect for disengaged or broken input ring gear retainer.
Output Carrier Assembly (474)	- Low/reverse clutch assembly (OWC) (455) splines sheared or broken. - Inspect for disengaged or broken reaction ring gear retainer.
Case Assembly (51)	Inspect for worn or damaged case splines or retainer ring grooves.

NO SECOND AND SIXTH GEAR**No Second and Sixth Gear**

Checks	Causes
2-6 Clutch Assembly	- Inspect for damaged or worn 2-6 clutch plates (445-447). - Inspect for damaged, worn, broken, improper surface finish or sheared splines on the 2-6 clutch backing plate (448).
Reaction Carrier Assembly (467)	- Inspect for stripped or sheared splines on the input ring gear. - Inspect for disengaged or broken input ring gear retainer.
Case Cover Assembly (403)	- Inspect for damaged or broken 2-6 clutch piston (405) and piston seals damaged, worn or delaminating. - Inspect for broken or binding 2-6 clutch piston return spring (406). - Inspect for broken or disengaged 2-6 clutch piston return spring retainer (407). - Inspect for damaged, worn or improper surface finish in the piston bore (403).
Case Assembly (51)	Inspect for stripped or sheared splines (51).

HARSH OR LATE FIRST, SECOND, THIRD AND FOURTH SHIFT**Harsh or Late First, Second, Third and Fourth Shift**

Checks	Causes
1-2-3-4 Clutch Assembly	- Inspect for damaged or broken 1-2-3-4 clutch piston (461) and piston seals damaged, worn or leaking. - Inspect for fatigued or binding 1-2-3-4 clutch piston return spring (460). - Inspect for improper surface finish on 1-2-3-4 clutch plates (456-458). - Inspect for broken or fatigued 1-2-3-4 clutch waved plate (458).
Case	Inspect for leaking or damaged 1-2-3-4 clutch fluid passage seal (65).

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HARSH FIRST AND REVERSE SHIFT**Harsh First and Reverse Shift**

Checks	Causes
Case Cover Assembly (403)	Inspect for plugged or improperly positioned low and reverse piston (408) air bleed.
Low and Reverse Clutch	• Inspect for improper surface finish on low and reverse clutch plates (449-453). • Inspect for damaged or worn low and reverse clutch plates (452). • Inspect for damaged low and reverse clutch backing plate (453). • Inspect for worn splines on backing plate (453). • Inspect for damaged low and reverse clutch piston assembly (408), spring (409), and spring retaining ring (410). • Inspect for fatigued or binding low and reverse clutch piston return spring (409). • Inspect for broken low and reverse clutch wave plate (449).
Lower Valve Body	Inspect for stuck 4-5-6 clutch boost valve.

NO THIRD, FIFTH AND REVERSE GEAR**No Third, Fifth and Reverse Gear**

Checks	Causes
3-5-Reverse Clutch Assembly	• Inspect for damaged, worn or stripped splines on 3-5-reverse clutch plates (423-426), backing plate (426). • Inspect for sheared or stripped splines on 3-5-rev/4-5-6 housing to turbine shaft (422). • Inspect for damage, improper surface finish, porosity, deformed or unbalanced 3-5-rev/4-5-6 housing (422). • Inspect for damaged, worn, loose or seized hub bushing in the 3-5-rev/4-5-6 housing. • Inspect for broken, porous or improper surface finish or plugged oil passages of the 3-5-rev/4-5-6 housing (422). • Inspect for failure of the Input shaft thrust bearing (32). • Inspect for disengaged or broken 3-5-reverse clutch backing plate retainer (427). • Inspect for disengaged or broken 3-5-reverse backing plate (426). • Inspect for damaged, worn or leaking 3-5-reverse clutch piston seals (419-421).

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	• Inspect for damaged or broken 3-5-rev/4-5-6 clutch housing (422). • Inspect for warped, damaged, improper surface finish or debonding 3-5-reverse clutch piston (417). • Inspect for broken or fatigued 3-5-reverse clutch spring (418). • Inspect for disengaged or broken speed sensor reluctor retainer (415). • Inspect for broken speed sensor reluctor wheel (416). • Inspect for seized input shaft thrust bearing (32).
Reaction Carrier (467)	• Inspect for broken or disengaged input internal gear retainer. • Inspect for stripped or sheared splines on the input internal gear.
Output Carrier (474)	Inspect for stripped or sheared splines for the reaction internal ring gear.
4-5-6 Clutch Assembly	• Inspect for plugged or missing 4-5-6 piston dam oil feed hole. • Inspect for leaking 4-5-6 piston dam.

HARSH OR LATE SECOND AND SIXTH SHIFT**Harsh or Late Second and Sixth Shift**

Checks	Causes
2-6 Clutch Assembly	• Inspect for worn or improper surface finish on the 2-6 Clutch Plates (446, 447) and Backing Plate (448) • Inspect for fatigued 2-6 Clutch Piston Cushion Spring (445)
Case Cover Assembly (403)	• Inspect for damaged or broken 2-6 Clutch Piston (405) and piston seals damaged, worn or delaminating • Inspect for fatigued 2-6 Clutch Piston Return Spring (406)

NO FOURTH, FIFTH AND SIXTH GEAR**No Fourth, Fifth and Sixth Gear**

Checks	Causes
4-5-6 Clutch Assembly	• Inspect for damaged or broken 4-5-6 clutch piston (433) and piston seals (430-432). • Inspect for broken or disengaged 4-5-6 backing plate retainer (442). • Inspect for damaged or broken 4-5-6 clutch dam piston (435) and piston seals damaged, worn or delaminating. • Inspect for broken or disengaged 4-5-6 clutch dam retainer

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	(436). • Inspect for sheared or stripped splines on the reaction carrier hub (438). • Inspect for sheared or stripped splines on 3-5-rev/4-5-6 housing to turbine shaft (422). • Inspect for loose, worn or damaged 3-5-rev/4-5-6 housing bushing. • Inspect for broken, porous or improper surface finish or plugged oil passages of the 3-5-rev/4-5-6 housing (422). • Inspect for failure of the input shaft thrust bearing (32). • Inspect for damaged, stripped or sheared splines on 4-5-6 clutch plates (439-441). • Inspect for broken or fatigued 4-5-6 clutch piston return spring (434).
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HARSH OR LATE THIRD, FIFTH AND REVERSE SHIFT**Harsh or Late Third, Fifth and Reverse Shift**

Checks	Causes
3-5-Reverse Clutch Assembly	• Inspect for improper surface finish on 3-5-Reverse Clutch Plates (423-426), Backing Plate (426) • Inspect for plugged or restricted oil passages and air bleed of the 3-5-Rev/4-5-6 Housing (422) • Inspect for damaged, worn or leaking 3-5-Reverse Clutch Piston Seals (419-421) • Inspect for warped 3-5-Rev/4-5-6 Clutch Housing (422) • Inspect for fatigued 3-5-Reverse Clutch Waved Plate (423)

HARSH FOURTH, FIFTH AND SIXTH SHIFT**Harsh Fourth, Fifth and Sixth Shift**

Checks	Causes
4-5-6 Clutch Assembly	• Inspect for leaking 4-5-6 clutch piston (433) and piston seals (430-432). • Inspect for plugged or restricted 4-5-6 piston dam air bleed. • Inspect for fatigued 4-5-6 clutch piston spring (434). • Inspect for leaking 4-5-6 clutch dam seals (435). • Inspect for improper surface finish on 4-5-6 clutch plates (439-441). • Inspect for porous, improper surface finish, seal groove damage or plugged or restricted oil passages of the 3-5-rev/4-

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5-6 housing (422).

- Inspect for leaking or damaged 4-5-6 piston dam (435).

NO TORQUE CONVERTER CLUTCH APPLY**No Torque Converter Clutch Apply**

Checks	Causes
Torque Converter Assembly (27)	• Inspect for damaged Torque Converter Clutch Seal (inside converter assembly). • Diagnose Torque Converter Assembly for possible internal damage. Refer to Torque Converter Diagnosis.
Upper Valve Body Assembly (349)	Inspect for worn, damaged or sticking TCC Regulator Apply (330) and TCC Regulator Apply Shuttle (331) Valves.
Transfer Drive Gear Support Assembly (208)	Inspect for worn or damaged Transfer Drive Gear Support Seal (213).
Torque Converter Housing Assembly (221)	Inspect for leaking or damaged Torque Converter Fluid Seal Assembly (225).

NO TORQUE CONVERTER CLUTCH RELEASE**No Torque Converter Clutch Release**

Checks	Causes
Torque Converter Assembly (27)	Diagnose Torque Converter Assembly for possible internal damage. Refer to Torque Converter Diagnosis .
Upper Valve Body Assembly (349)	Inspect for worn, damaged or sticking TCC Regulator Apply (330) and TCC Regulator Apply Shuttle (331) Valves.

HARSH TORQUE CONVERTER CLUTCH APPLY OR INOPERATIVE OR NO ELECTRONICALLY CONTROLLED CAPACITY CLUTCH CONTROL**Harsh Torque Converter Clutch Apply or Inoperative or No Electronically Controlled Capacity Clutch Control**

Checks	Causes
Torque Converter Assembly (27)	• Inspect for leaking or damaged Torque Converter Clutch Hub Seal. • Diagnose Torque Converter Assembly for possible internal damage. Refer to Torque Converter Diagnosis.
Drive Gear Support Assembly (208)	Inspect for leaking Drive Gear Support Seal (213).

NO REVERSE GEAR**No Reverse Gear**

Checks	Causes
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Low and Reverse Clutch Assembly (455)	• Inspect for disengaged or broken low and reverse clutch retainer (454). • Inspect for stripped or sheared splines on low and reverse clutch (455).
Low and Reverse Clutch	• Inspect for stripped or sheared splines on low and reverse clutch plates (449-453). • Inspect for damaged, deformed or improper surface finish on the low and reverse clutch plates (449-453).
3-5-Reverse Clutch Assembly	• Inspect for damaged, worn or stripped splines on 3-5-Reverse Clutch Plates (423-426), Backing Plate (426) • Inspect for sheared or stripped splines on 3-5-Rev/4-5-6 Housing to Turbine Shaft (422) • Inspect for damage, improper surface finish, porosity, deformed or unbalanced 3-5-Rev/4-5-6 Housing (422) • Inspect for damaged, worn, loose or seized hub bushing in the 3-5-Rev/4-5-6 Housing • Inspect for broken, porous or improper surface finish or plugged oil passages of the 3-5-Rev/4-5-6 Housing (422) • Inspect for failure of the Input Shaft Thrust Bearing (32) • Inspect for disengaged or broken 3-5-Reverse Clutch Backing Plate Retainer (427) • Inspect for damaged, worn or leaking 3-5-Reverse Clutch Piston Seals (419-421) • Inspect for damaged or broken 3-5-Rev/4-5-6 Clutch Housing (422) • Inspect for warped, damaged, improper surface finish or debonding 3-5-Reverse Clutch Piston (417) • Inspect for broken or fatigued 3-5-Reverse Clutch Spring (418) • Inspect for disengaged or broken Speed Sensor Reluctor Retainer (415) • Inspect for broken Speed Sensor Reluctor Wheel (416) • Inspect for seized Input Shaft Thrust Bearing (32)

FLUID PRESSURE HIGH OR LOW

Fluid Pressure High or Low

Checks	Causes
Fluid Pump Assembly (203)	• Inspect for loose fluid pump bolts (204). • Inspect for leaking or damaged fluid pump outlet seals (57) and oil filter seal (202).

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	• Inspect for improperly installed or damaged oil filter (201). • Inspect for sticking line pressure blow off valve.
Front Differential Drive Gear Support Assembly (208)	• Inspect for leaking or damaged drive gear support torque converter seal assembly (206) or fluid passage tube gasket (212). • Inspect for leaking or damaged drive gear support fluid passage tube assembly (209).
Upper Valve Body Assembly (312)	• Inspect for leaking or damaged upper valve body assembly (309) gasket. • Inspect for worn, sticking or damaged pressure regulator valve (337) or pressure regulator valve spring (338).
Lower Valve Body Assembly (313)	Inspect for leaking or damaged lower valve body assembly (313) gasket.
Control Valve (w/ Body and TCM) Valve Assembly (15)	• Inspect for leaking or damaged filter plate assembly seals (16). • Verify VBS operation in not stuck high or low.
Filter Assembly	Inspect for damaged, restricted or mis-installed fluid filter assembly.
Case Assembly (51)	Inspect for missing lube oil circuit orifice or baffle (229).