

2021 TRANSMISSION

Automatic Transmission - 6L50 (MYB) - Diagnostic Information and Procedures - Canyon, Colorado

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC P0601-P0604 OR P062F

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

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

The internal fault detection is handled inside the control module. No external circuit diagnosis is involved.

Conditions for Running the DTC

DTC P0601, P0602, P0603, P0604, P062F = Not set

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P0601

Calibration Read Only Memory = Checksum Invalid

P0602

Transmission Control Module = Control Module Not Programmed - During control module power up

P0603

Transmission Control Module = Checksum Invalid - During control module power up

P0604

Transmission Control Module = Memory Malfunction

P062F

Control Module Non-Volatile Random Access Memory = Incorrect - During control module power up

Actions Taken When the DTC Sets

DTC P0601-P0604 = Type A DTC - Additional actions taken:

- Engine Torque = Reduced
- High Side Driver = Off
- Line Pressure = Maximum
- Neutral Idle Mode = Disabled
- Tap Up/Tap Down = Disabled
- Torque Converter Clutch = Disabled
- Tow/Haul Mode = Disabled

DTC P062F = Type B DTC - No additional actions taken

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type A DTC - Exceptions listed below

DTC P062F = Type B DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or **Inline Harness Connector End Views - Index** or **Component Connector End Views - Index**

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

Special Tools

EL-38522 Variable Signal Generator Equivalent regional tools:

Equivalent regional tools: [Special Tools](#)

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Verify DTC P0601-P0604, P062F is not set.
 - **If the DTC is set**
 1. Perform all necessary programming and setup procedures for the control module: K71 Transmission Control Module
 2. Verify the DTC does not set.
 - If the DTC sets - Replace the component: K71 Transmission Control Module
 - Go to next step: If the DTC is not set
 3. All OK.
 - **Go to next step: If the DTC is not set**
3. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0634

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0634

Control Module Overtemperature

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Component	Description
Control Module Temperature Sensor	The temperature sensor is a negative temperature coefficient thermistor, a resistor which changes based on temperature. The component is part of the control module.
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly

No external circuit diagnosis is involved.

Conditions for Running the DTC

- Ignition Voltage = Greater than 11 V
- TCM Temperature = 0 to 170B°C (32 to 338B°F)

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 1 s

Conditions for Setting the DTC

Condition 1

TCM Temperature = Warmer than 142B°C (288B°F) - For greater than 5 s

Condition 2

TCM Temperature = Warmer than 50B°C (122B°F) - For greater than 2 s

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type A DTC

- Grade braking = Disabled
- Manual Shift Control = Disabled
- Mode Switch Control = Disabled
- Neutral Idle Mode = Disabled
- Powertrain braking = Disabled
- Torque Management = Active
- Transmission gear allowed = Reverse Gear & 4th Gear

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type A DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or Inline Harness Connector End Views - Index or Component Connector End Views - Index

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

Special Tools

EL-38522 Variable Signal Generator Equivalent regional tools:

Equivalent regional tools: [Special Tools](#)

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Verify the scan tool Freeze Frame/Failure Records parameter: Engine Coolant Temperature = Colder than 125B°C (257B°F)
 - **If 125B°C (257B°F) or warmer**
Refer to [Engine Overheating](#)
 - **Go to next step: If colder than 125B°C (257B°F)**
3. Verify the scan tool parameter: TCM Temperature = -39 to 139B°C (-38 to 282B°F)
 - **If not between -39 and 139B°C (-38 and 282B°F)**
Replace the component: Q8 Control Solenoid Valve Assembly
 - **Go to next step: If between -39 and 139B°C (-38 and 282B°F)**
4. Verify the following parameters are within 8B°C (14B°F) of each other:
 - TCM Temperature
 - TCM Power-Up Temperature
 - **If not within 8B°C (14B°F) of each other**
Replace the component: Q8 Control Solenoid Valve Assembly
 - **Go to next step: If within 8B°C (14B°F) of each other**
5. Engine - Idling
6. Transmission - Park
7. Test for 12.6 to 15 V between the test points: Battery Positive Post & Battery Negative Post
 - **If not between 12.6 and 15 V**
Refer to [Charging System Test](#)
 - **Go to next step: If between 12.6 and 15 V**
8. Verify the condition does not exist: Incorrect fluid level or condition - Refer to [Transmission Fluid Level and Condition Check](#)
 - **If a condition exists**
Repair or replace as necessary
 - **Go to next step: If no condition exists**
9. Clear the DTCs.
10. Road test the vehicle.

Verify the scan tool parameter: Transmission Fluid Temperature = Colder than 140B°C (284B°F)

- **If 140B°C (284B°F) or warmer**

1. Ignition/Vehicle - Off

2. Verify the component location is free of debris, clutter or any obstruction that may reduce airflow which could cause an overheat condition: Radiator

- If a condition exists - Repair or replace as necessary
- Go to next step: If no condition exists

3. Verify the condition does not exist:

- Radiator - Visible Damage
- Transmission Fluid Cooler - Visible Damage
- Transmission Fluid Cooler Pipe - Kinked or Visible Damage
- If a condition exists - Repair or replace as necessary
- If no condition exists - Refer to [Transmission Fluid Level and Condition Check](#)

• **Go to next step: If colder than 140B°C (284B°F)**

11. 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.

Verify the DTC does not set.

• **If the DTC sets**

Replace the component: Q8 Control Solenoid Valve Assembly

• **Go to next step: If the DTC is not set**

12. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

For control module replacement, programming, and setup refer to [Control Module References](#)

Additional Procedures

[Reset Transmission Adapts](#) - Perform after any repair

DTC P0658 OR P0659

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0658

Actuator High Control Circuit Group 1 Low Voltage

DTC P0659

Actuator High Control Circuit Group 1 High Voltage

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
Control	The output circuit is switched to 12 V to activate the component.

Component	Description
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly
B - Q27A Pressure Control Solenoid Valve 1 - Q27B Pressure Control Solenoid Valve 2 - Q27C Pressure Control Solenoid Valve 3 - Q27D Pressure Control Solenoid Valve 4 - Q27E Pressure Control Solenoid Valve 5 - Q32A Shift Solenoid Valve 1 - Q39A Torque Converter Clutch Pressure Control Solenoid Valve	A solenoid valve is an electro-mechanically operated valve. The valve is controlled by an electric current through the solenoid. Q27A, Q27B, Q27C, Q27D, Q27E, Q32A, Q32B, Q39A is part of the component: Q8 Control Solenoid Valve Assembly

No external circuit diagnosis is involved.

Conditions for Running the DTC

P0658

- DTC P0658 = Not set
- High Side Driver 1 = Enabled
- System Voltage = Greater than 11 V

Frequency the DTC runs = Continuously - During control module power up

P0659

- DTC P0659 = Not set
- High Side Driver 1 = Disabled

Frequency the DTC runs = Continuously - During control module power down

Conditions for Setting the DTC

P0658

Control Circuit = Short to Ground - For greater than 1 s

P0659

Control Circuit = Short to Voltage - For greater than 1 s

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type B DTC - Additional actions taken:

- Grade braking = Disabled
- High Side Driver 1 = Disabled
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- Powertrain braking = Disabled
- TCC Control = Disabled
- Transmission Adaptive Pressure Control = Freeze current adapt values

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type B DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or **Inline Harness Connector End Views - Index** or **Component Connector End Views - Index**

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

Special Tools

EL-38522 Variable Signal Generator Equivalent regional tools:

Equivalent regional tools: **Special Tools**

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Perform the scan tool control function: High Side Driver 1 - On and Off

Verify the scan tool parameter:

- High Side Driver 1 Circuit Low Voltage Test Status = OK or Not Run
- High Side Driver 1 Circuit Open Test Status = OK or Not Run
- High Side Driver 1 Circuit High Voltage Test Status = OK or Not Run
- **If not the specified state**

Refer to Component Testing

- **Go to next step: If the specified state**

3. Perform the scan tool control function: High Side Driver 1 - On and Off

Verify the scan tool parameter: High Side Driver 1 = On and Off

- **If the parameter state does not change**

Refer to Component Testing

- **Go to next step: If the parameter state changes**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Component Testing

- **Go to next step: If the DTC is not set**

5. All OK.

Component Testing

1. Ignition/Vehicle - Off

2. Remove the component: Q8 Control Solenoid Valve Assembly

3. Verify the condition does not exist: Contamination with metallic debris

- **If a condition exists**

Repair or replace as necessary

- **Go to next step: If no condition exists**

4. Verify the resistance is within the specified range for each solenoid valve. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Inspection](#)

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

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the resistance is within range**

5. Test for infinite resistance between the test points: Each terminal of the component - Solenoid Valve & The component's housing

- **If less than infinite resistance**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If infinite resistance**

6. Install the special tool: DT-48616-10 Adapter Harness @ Q8 Control Solenoid Valve Assembly & Vehicle wiring harness X1
7. Ignition - On / Vehicle - In Service Mode
8. Perform the scan tool control function: High Side Driver 1 - On and Off

Verify the scan tool parameter:

- High Side Driver 1 Circuit Low Voltage Test Status = OK or Not Run
- High Side Driver 1 Circuit Open Test Status = OK or Not Run
- High Side Driver 1 Circuit High Voltage Test Status = OK or Not Run
- **If not the specified state**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the specified state**

9. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- [Control Solenoid Valve and Transmission Control Module Assembly Replacement](#) - Q8 Control Solenoid Valve Assembly
- For control module replacement, programming, and setup refer to [Control Module References](#)

Additional Procedures

[Reset Transmission Adapts](#) - Perform after any repair

DTC P0667, P0668, OR P0669

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

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

For an overview of the component/system, refer to [Electronic Component Description](#)

Component	Description
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly
Control Module Temperature Sensor	The temperature sensor is a negative temperature coefficient thermistor, a resistor which changes based on temperature. The component is part of the control module.

No external circuit diagnosis is involved.

Conditions for Running the DTC

P0667

- DTC P0101 - P0103, P0106 - P0108, P0171, P0172, P0174, P0175, P0201 - P0208, P0300 - P0308, P0401, P042E, P0658, P0667 - P0669, P06AD, P06AE, P0712, P0713, P0716, P0717, P0722, P0723, P0962, P0963, P0966, P0967, P0970, P0971, P215C, P2720, P2721, P2729, P2730 = Not set
- Accelerator pedal position signal = Valid
- Engine Torque Signal = Valid
- Engine Speed = 400 to 7, 500 RPM
- Ignition Voltage = 9 to 32 V

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 5 s

P0668, P0669

- {P0669} DTC P0716, P0717, P0722, P0723 = Not set
- Engine Speed = 400 to 7, 500 RPM
- Ignition Voltage = 9 to 32 V

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 5 s

Conditions for Setting the DTC

P0667

The difference between the following parameters is greater than a predefined value:

- TCM Power-Up Temperature
- TCM Temperature
- Transmission Fluid Temperature

The above conditions have to be met continuously for 5 min within a 6 min period.

P0668

TCM Temperature = Warmer than -249B°C (-416B°F) - For greater than 1 min

P0669

TCM Temperature = Colder than 249B°C (480B°F) - For greater than 1 min

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type B DTC

TCM Temperature = Default - TCM Power-Up Temperature

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type B DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or Inline Harness Connector End Views - Index or Component Connector End Views - Index

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

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Verify the scan tool parameter: TCM Temperature = -39 to 139B°C (-38 to 282B°F)
 - **If not between -39 and 139B°C (-38 and 282B°F)**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If between -39 and 139B°C (-38 and 282B°F)**

3. Verify the following parameters are within 8B°C (14B°F) of each other:
 - TCM Power-Up Temperature
 - TCM Temperature
 - **If not within 8B°C (14B°F) of each other**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If within 8B°C (14B°F) of each other**

4. Operate the cold vehicle above 55 km/h (35 MPH) for 10 min.

Verify the following parameters are within 25B°C (45B°F) of each other:

- TCM Temperature
- Transmission Fluid Temperature
- **If not within 25B°C (45B°F) of each other**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If within 25B°C (45B°F) of each other**

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.

Verify the DTC does not set.

- **If the DTC sets**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the DTC is not set**

6. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- [Control Solenoid Valve and Transmission Control Module Assembly Replacement](#) - Q8 Control Solenoid Valve Assembly
- For control module replacement, programming, and setup refer to [Control Module References](#)

Additional Procedures

[Reset Transmission Adapts](#) - Perform after any repair

DTC P06AC, P06AD, OR P06AE

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

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

For an overview of the component/system, refer to [Electronic Component Description](#)

Component	Description
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation.

Component	Description
	K71 is part of the component: Q8 Control Solenoid Valve Assembly
Control Module Power Up Temperature Sensor	The temperature sensor is a negative temperature coefficient thermistor, a resistor which changes based on temperature. The component is part of the control module.

No external circuit diagnosis is involved.

Conditions for Running the DTC

P06AC

- DTC P0101 - P0103, P0106 - P0108, P0171, P0172, P0174, P0175, P0201 - P0208, P0300 - P0308, P0401, P042E, P0658, P0668, P0669, P06AD, P06AE, P0712, P0713, P0716, P0717, P0722, P0723, P0962, P0963, P0966, P0967, P0970, P0971, P215C, P2720, P2721, P2729, P2730 = Not set
- Accelerator pedal position signal = Valid
- Engine Torque Signal = Valid
- Engine Speed = 400 to 7, 500 RPM
- Ignition Voltage = 9 to 32 V
- Throttle Position = Greater than 30%
- Vehicle Speed = Less than 9 km/h (6 MPH)

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 5 s

P06AD, P06AE

- {P06AD} DTC P06AD, P06AE, P0716, P0717, P0722, P0723 = Not set
- Engine Speed = 400 to 7, 500 RPM
- Ignition Voltage = 9 to 32 V

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 5 s

Conditions for Setting the DTC

P06AC

- The difference between the following parameters is greater than a predefined value:
 - TCM Power-Up Temperature
 - Transmission Fluid Temperature
- The difference between the following parameters is greater than a predefined value:
 - TCM Power-Up Temperature
 - TCM Temperature

The above conditions have to be met continuously for 5 min within a 6 min period.

P06AD

TCM Power-Up Temperature = Colder than -253B°C (-423B°F) - For greater than 1 min

P06AE

TCM Power-Up Temperature = Warmer than 253B°C (487B°F) - For greater than 1 min

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type B - Additional actions taken:

TCM Power-Up Temperature = TCM Temperature

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type B

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or **Inline Harness Connector End Views - Index** or **Component Connector End Views - Index**

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

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Verify the scan tool parameter: TCM Power-Up Temperature = -39 to 139B°C (-38 to 282B°F)
 - **If not between -39 and 139B°C (-38 and 282B°F)**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If between -39 and 139B°C (-38 and 282B°F)**

3. Verify the following parameters are within 8B°C (14B°F) of each other:
 - TCM Power-Up Temperature
 - TCM Temperature
 - **If not within 8B°C (14B°F) of each other**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If within 8B°C (14B°F) of each other**

4. Operate the cold vehicle above 55 km/h (35 MPH) for 10 min.

Verify the following parameters are within 25B°C (45B°F) of each other:

- TCM Power-Up Temperature

- Transmission Fluid Temperature
- **If not within 25B°C (45B°F) of each other**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If within 25B°C (45B°F) of each other**

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.

Verify that no DTC listed in the DTC Descriptor Category is set.

- **If any DTC listed in the DTC Descriptor Category is set**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If none of the DTCs listed in the DTC Descriptor Category is set**

6. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- [Control Solenoid Valve and Transmission Control Module Assembly Replacement](#) - Q8 Control Solenoid Valve Assembly
- For control module replacement, programming, and setup refer to [Control Module References](#)

Additional Procedures

[Reset Transmission Adapts](#) - Perform after any repair

DTC P0711-P0713

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

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

For an overview of the component/system, refer to [Electronic Component Description](#)

Component	Description
B13 Transmission Fluid Temperature Sensor	The temperature sensor is a negative temperature coefficient thermistor, a resistor which changes based on temperature. B13 is part of the component: Q8 Control Solenoid Valve Assembly
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly

The sensor is an input to the control module K71. The input signal is used to determine the temperature of the fluid: Transmission

No external circuit diagnosis is involved.

Conditions for Running the DTC

P0711

- DTC P0101 - P0103, P0106 - P0108, P0171, P0172, P0174, P0175, P0201 - P0208, P0300 - P0308, P0401, P042E, P0658, P0668, P0669, P06AD, P06AE, P0712, P0713, P0716, P0717, P0722, P0723, P0962, P0963, P0966, P0967, P0970, P0971, P215C, P2720, P2721, P2729, P2730 = Not set
- Accelerator pedal position signal = Valid
- Engine Speed = 400 to 7, 500 RPM
- Engine Torque Signal = Valid
- Ignition Voltage = 9 to 32 V

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 5 s

P0712, P0713

- DTC P0716, P0717, P0722, P0723 = Not set
- Ignition Voltage = 9 to 32 V
- Engine Speed = 400 to 7, 500 RPM

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 5 s

Conditions for Setting the DTC

P0711

- The difference between the following parameters is greater than a predefined value:
 - TCM Temperature
 - Transmission Fluid Temperature
- The difference between the following parameters is greater than a predefined value:
 - TCM Power-Up Temperature
 - Transmission Fluid Temperature

The above conditions have to be met continuously for 5 min within a 6 min period.

P0712

Transmission Fluid Temperature = Warmer than 253B°C (487B°F) - For greater than 1 min

P0713

Transmission Fluid Temperature = Colder than -253B°C (-423B°F) - For greater than 1 min

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type B DTC

Transmission Fluid Temperature = TCM Temperature

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type B DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or **Inline Harness Connector End Views - Index** or **Component Connector End Views - Index**

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

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Operate the cold vehicle above 55 km/h (35 MPH) for 10 min.

Verify the scan tool parameter: Transmission Fluid Temperature = -39 to 139B°C (-38 to 282B°F)

- **If not between -39 and 139B°C (-38 and 282B°F)**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If between -39 and 139B°C (-38 and 282B°F)**

3. Verify the following parameters are within 20B°C (68B°F) of each other:
 - TCM Temperature
 - Transmission Fluid Temperature
 - **If not within 20B°C (68B°F) of each other**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If within 20B°C (68B°F) of each other**

4. Verify the following parameters are within 20B°C (68B°F) of each other:

- TCM Power-Up Temperature
- Transmission Fluid Temperature
- **If not within 20B°C (68B°F) of each other**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If within 20B°C (68B°F) of each other**

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.

Verify the DTC does not set.

- **If the DTC sets**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the DTC is not set**

6. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- [Control Solenoid Valve and Transmission Control Module Assembly Replacement](#) - Q8 Control Solenoid Valve Assembly
- For control module replacement, programming, and setup refer to [Control Module References](#)

Additional Procedures

[Reset Transmission Adapts](#) - Perform after any repair

DTC P0716 OR P0717

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0716

Input Speed Sensor Performance

DTC P0717

Input Speed Sensor Circuit No Signal

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
8 V Reference	P0716, P0717	P0716, P0717	-	P0716
Signal	P0716, P0717	P0716, P0717	P0716, P0717*	P0716
*Internal control module or component damage may occur if the circuit shorts to B+.				

Typical Scan Tool Data

ISS/OSS Supply Voltage

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Ignition = On			
Parameter Normal Range: OK or Out Of Range			
8 V Reference	Out Of Range	OK	OK
Signal	OK	OK	OK

Transmission ISS

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Engine = Running			
Parameter Normal Range: 0 to 5, 000 RPM			
8 V Reference	0 RPM	0 RPM	-
Signal	0 RPM	0 RPM	0 RPM

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
8 V Reference	Regulated voltage supplied by the control module.
Signal	The control module input circuit has an internal resistance connected to ground.

Component	Description
Automatic Transmission Input Shaft Speed Sensor Reluctor Wheel	- The reluctor ring has 36 teeth, magnetic segments, or indentations. - The reluctor ring is part of the component: 3-5-R & 4-5-6 Clutch Housing Assembly - The following components rotate together: 3-5-R & 4-5-6 Clutch Housing Assembly - Turbine Shaft
B14C Transmission Input Shaft Speed Sensor	The sensor contains a hall-effect sensor and additional electronics that processes the signal. It detects the change of strength of the magnetic field caused by the reluctor ring. When the strength changes, the sensor changes the amount of current it consumes. This results in a square wave signal of the current, while the voltage stays constant. The control module detects the frequency in which the current changes, which is proportional to the rotational speed.
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation.

Component	Description
	K71 is part of the component: Q8 Control Solenoid Valve Assembly

Conditions for Running the DTC

P0716

- DTC P0101 - P0103, P0121 - P0123, P0717, P0752, P0973, P0974 = Not set
- Accelerator Pedal Position Signal from Engine Control Module = Valid
- Engine Speed = 400 to 7, 500 RPM
- Engine Torque = Valid
- Ignition Voltage = 9 to 32 V
- Vehicle Speed = Greater than 10 km/h (6 MPH)

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 5 s

P0717

- DTC P0101 - P0103, P0717, P0722, P0723 = Not set
- Engine Torque = 50 to 8200 Nm (37 to 6048 lb ft)
- Engine Speed = 400 to 7, 500 RPM
- Ignition Voltage = 9 to 32 V
- Vehicle Speed = Greater than 16 km/h (10 MPH)

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 5 s

Conditions for Setting the DTC

P0716

Transmission Input Speed = Decreases greater than 1350 RPM - For greater than 1 s

P0717 Condition 1

Transmission Input Speed = Less than 67 RPM - For greater than 4.5 s

Condition 2

- DTC P0722 = Test Failed
- Transmission Input Speed = Less than 1, 000 RPM

The above condition(s) must occur for greater than 3 s.

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type A DTC - Additional actions taken:

- Grade braking = Disabled
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- Powertrain braking = Disabled
- Tap Up or Tap Down = Disabled

- {P0716} TCC Control = Disabled
- {P0716, P0717} Torque Management = Active
- Transmission Adaptive Pressure Control = Freeze current adapt values
- Transmission gear allowed = Reverse & 4th Gear

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type A DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or Inline Harness Connector End Views - Index or Component Connector End Views - Index

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

Special Tools

EL-38522 Variable Signal Generator Equivalent regional tools:

Equivalent regional tools: Special Tools

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Verify the scan tool parameter: ISS/OSS Supply Voltage = OK
 - **If not the specified state**

Refer to Circuit/System Testing

- **Go to next step: If the specified state**
3. Transmission - Park
 4. Engine - Idling
 5. Increase the engine speed slowly to 3, 000 RPM and then back to idle.

Verify the scan tool parameter: Transmission ISS = The value should change smoothly and gradually as the engine speed is increased and decreased.

- **If the value does not change smoothly and gradually**

Refer to Circuit/System Testing

- **Go to next step: If the value changes smoothly and gradually**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC is not set**

7. All OK.

Circuit/System Testing

1. Ignition/Vehicle - Off
2. Remove the component: Transmission Fluid Pan Assembly
3. Connect the electrical connector: X1 @ Q8 Control Solenoid Valve Assembly
4. Disconnect the electrical connector: X3 @ Q8 Control Solenoid Valve Assembly - B14C Transmission Input Shaft Speed Sensor
5. Ignition - On / Vehicle - In Service Mode
6. Verify the scan tool parameter: ISS/OSS Supply Voltage = OK
 - **If not the specified state**
 1. Ignition/Vehicle - Off
 2. Disconnect the electrical connector: X4 @ Q8 Control Solenoid Valve Assembly - B14A Transmission Output Shaft Speed Sensor
 3. Verify the condition does not exist: Contamination with metallic debris @ Electrical Connector - X3 & X4
 - If a condition exists - Repair or replace as necessary
 - Go to next step: If no condition exists
 4. Ignition - On / Vehicle - In Service Mode
 5. Verify the scan tool parameter: ISS/OSS Supply Voltage = OK
 - If not the specified state - Replace the component: Q8 Control Solenoid Valve Assembly
 - If the specified state - Replace the component: B14A Transmission Output Shaft Speed Sensor
 - **Go to next step: If the specified state**
7. Perform the following procedure/test: **Control Solenoid Valve and Transmission Control Module Assembly Input Shaft Speed/Output Shaft Speed Input Test**

Verify the procedure/test passes.

- **If the procedure/test does not pass**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the procedure/test passes**

8. Verify the condition does not exist: Automatic Transmission Input Shaft Speed Sensor Reluctor Wheel - Damaged or misaligned reluctor ring.

- **If a condition exists**

Repair or replace as necessary

- Go to next step: If no condition exists

9. Test or replace the component: B14C Transmission Input Shaft Speed Sensor

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- [1-2-3-4 and 3-5 Reverse Clutch Fluid Seal Ring Installation \(6L45/6L50\)](#) - Reluctor Ring
- [1-2-3-4 and 3-5 Reverse Clutch Assembly and 4-5-6 Clutch Assembly Removal \(6L50/80/90\)](#) - Reluctor Ring
- [Automatic Transmission Fluid, Fluid Pan and/or Filter Replacement](#)
- [Input and Output Speed Sensor Replacement](#) - B14C Transmission Input Shaft Speed Sensor
- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0722 OR P0723

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0722

Output Speed Sensor Circuit No Signal

DTC P0723

Output Speed Sensor Circuit Intermittent

Diagnostic Fault Information

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

*Internal control module or component damage may occur if the circuit shorts to B+.

Typical Scan Tool Data

ISS/OSS Supply Voltage

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Ignition = On Parameter Normal Range: OK			
8 V Reference	Out Of Range	OK	OK
Signal	OK	OK	OK

Transmission Output Speed

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Vehicle Speed = Greater than 2 km/h (1.2 MPH)			

Circuit	Short to Ground	Open	Short to Voltage
Parameter Normal Range: 0 to 7, 000 RPM			
Signal	0 RPM	0 RPM	0 RPM

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
8 V Reference	Regulated voltage supplied by the control module.
Signal	The sensor produces a frequency modulated signal.

Component	Description
B14A Transmission Output Shaft Speed Sensor	The sensor contains a hall-effect sensor and additional electronics that processes the signal. It detects the change of strength of the magnetic field caused by the reluctor ring. When the strength changes, the sensor changes the amount of current it consumes. This results in a square wave signal of the current, while the voltage stays constant. The control module detects the frequency in which the current changes, which is proportional to the rotational speed.
K71 Transmission Control Module	The control module contains a microprocessor used to process input data to control outputs. The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation.
Reluctor Ring	- The reluctor ring has 27 teeth, magnetic segments, or indentations. - The reluctor ring is part of the component: Park Gear

The sensor is an input to the control module K71. The input signal is used to determine the rotational speed of the component: Output Shaft

Conditions for Running the DTC

P0722

- DTC P0101-P0102, P0121-P0123, P0716, P0717, P0723 = Not set
- Accelerator pedal position signal = Valid
- Engine Speed = 400 to 7, 500 RPM
- Engine Torque = Greater than 50 Nm (37 lb ft)
- Engine Torque Signal = Valid
- Ignition Voltage = 9 to 32 V
- Throttle Position Sensor = Greater than 7%
- Transmission Fluid Temperature = Warmer than -40B°C (-40B°F)

Frequency the DTC runs = Continuously - After the running conditions are met

P0723

- DTC P0101-P0102, P0121-P0123, P0973, P0974, P0976, P0977 = Not set

- Accelerator pedal position signal = Valid
- Engine Speed = 400 to 7, 500 RPM
- Engine Torque Signal = Valid
- Ignition Voltage = 9 to 32 V

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P0722

Output Speed Sensor = Less than 36 RPM - For 5 s

P0723

Output Speed Sensor = Greater than 105 RPM

Output Speed Sensor = Decrease Greater than 650 RPM - For 1.5 s

Transmission = Forward Gear

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type A DTC - Additional actions taken:

P0722

- Engine Torque = Reduced
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Tap Up & Tap Down = Disabled
- TCC Control = Disabled
- {Output Speed Sensor = Greater than 1, 350 RPM} Transmission = Neutral
- {Output Speed Sensor = Less than 1, 350 RPM} Transmission = 2nd Gear

P0723

- Engine Torque = Reduced
- High Side Driver = Off
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Neutral Idle Mode = Disabled
- Tap Up & Tap Down = Disabled
- TCC Control = Disabled

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type A

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

[Master Electrical Component List](#) , or [Inline Harness Connector End Views - Index](#) or [Component Connector End Views - Index](#)

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](#)

Special Tools

EL-38522 Variable Signal Generator Equivalent regional tools:

Equivalent regional tools: [Special Tools](#)

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Verify the scan tool parameter: ISS/OSS Supply Voltage = OK

- **If not the specified state**

Refer to Circuit/System Testing

- **Go to next step: If the specified state**

CAUTION: Support the lower control arms in the normal horizontal position in order to avoid damage to the drive axles. Do not operate the vehicle in gear with the wheels hanging down at full travel.

3. Raise and support the vehicle.
4. Start and idle the engine.
5. Transmission in Drive
6. Verify the scan tool parameter: Transmission OSS = The value should change smoothly and gradually as the vehicle speed is increased and decreased.

- **If the value does not change smoothly and gradually**

Refer to Circuit/System Testing

- **Go to next step: If the value changes smoothly and gradually**

7. 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. Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC is not set**

8. All OK.

Circuit/System Testing

1. Ignition/Vehicle - Off
2. Disconnect the electrical connector: X3 @ Q8 Control Solenoid Valve Assembly - B14A Transmission Output Shaft Speed Sensor
3. Ignition - On / Vehicle - In Service Mode
4. Verify the scan tool parameter: ISS/OSS Supply Voltage = OK
 - **If not the specified state**
 1. Ignition/Vehicle - Off
 2. Disconnect the electrical connector: X3 @ Q8 Control Solenoid Valve Assembly - B14C Transmission Input Shaft Speed Sensor
 3. Verify the condition does not exist: Contamination with metallic debris @ Electrical Connector - X3
 - If a condition exists - Repair or replace as necessary
 - Go to next step: If no condition exists
 4. Ignition - On / Vehicle - In Service Mode
 5. Verify the scan tool parameter: ISS/OSS Supply Voltage = OK
 - If not the specified state - Replace the component: Q8 Control Solenoid Valve Assembly
 - If the specified state - Replace the component: B14C Transmission Input Shaft Speed Sensor
 - **Go to next step: If the specified state**
5. Perform the following procedure/test: Control Solenoid Valve and Transmission Control Module Assembly Input Shaft Speed/Output Shaft Speed Input Test

Verify the procedure/test passes.

- **If the procedure/test does not pass**

Replace the component: Q8 Control Solenoid Valve Assembly
 - **Go to next step: If the procedure/test passes**
6. Verify the condition does not exist: Park Gear - Damaged or misaligned reluctor ring.
 - **If a condition exists**

Repair or replace as necessary
 - Go to next step: If no condition exists
 7. Test or replace the component: B14A Transmission Output Shaft Speed Sensor

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: Diagnostic Repair Verification

- Input and Output Speed Sensor Replacement
- For control module replacement, programming, and setup refer to Control Module References

Additional Procedures

Reset Transmission Adapts - Perform after any repair

DTC P0741 OR P0742

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0741

Torque Converter Clutch (TCC) System Stuck Off

DTC P0742

Torque Converter Clutch (TCC) System Stuck On

Diagnostic Fault Information

NOTE: The components are listed from the least to the most intrusive to service.

Component	DTC	Condition
Q8 Control Solenoid Valve Assembly	P0741, P0742	• Q39A Torque Converter Clutch Pressure Control Solenoid Valve - Binding or Sticking / Stuck • Control Solenoid Valve Assembly Filter Plate - Restricted or Cracked • O-Ring - Leaking
Control Valve Channel Plate	P0741	Oil Channels or Orifices - Restricted
Control Valve Channel Plate Spacer Plate	P0741	Oil Channels or Orifices/Restricted
Control Valve Upper Body	P0741	Exhaust - Oil Channels or Orifices - Restricted
	P0741, P0742	Torque Converter Clutch Regulator Valve - Binding or Sticking / Stuck
Torque Converter	P0741	• Torque converter clutch friction lining worn. • Torque converter bolts too long damaging the clutch friction surface. • Torque Converter Fluid Seal - Leaking
Automatic Transmission Case Cover	P0741, P0742	• Pressure release valve leaking. • Spring - Damaged spring
Automatic Transmission Fluid Pump Assembly	P0741, P0742	Torque Converter Clutch Control Valve - Binding or Sticking / Stuck
Stator Shaft Support	P0741	Seal - Leaking
Turbine Shaft	P0741	Turbine Shaft Seal - Leaking

Circuit/System Description

For an overview of the component/system, refer to

- [Drive Range, First Gear](#)
- [Drive Range, Second Gear](#)
- [Drive Range, Third Gear](#)

- [Drive Range, Fourth Gear](#)
- [Drive Range, Fifth Gear](#)
- [Drive Range, Sixth Gear](#)
- [Reverse](#)
- [Electronic Component Description](#)
- [Fluid Passages](#)

The solenoid valve is used to regulate fluid pressure to other transmission control valves for torque converter clutch operation.

DTC P0741, P0742 will set with a hydraulic/mechanical condition.

Conditions for Running the DTC

P0741

- DTC P0101 - P0103, P0106 - P0108, P0171, P0172, P0174, P0175, P0201 - P0208, P0300 - P0308, P0401, P042E, P0716, P0717, P0722, P0723, P0742, P2763, P2764 = Not set
- Accelerator Pedal Position = Greater than 8%
- Accelerator pedal position signal = Valid
- Engine Speed = 400 to 7, 500 RPM - For greater than 5 s
- Engine Torque = Greater than 50 Nm (37 lb ft)
- Engine Torque Signal = Valid
- Gear Ratio = Between:
 - 2nd Gear Ratio = 2.20 to 2.53
 - 3rd Gear Ratio = 1.44 to 1.65
 - 4th Gear Ratio = 1.07 to 1.23
 - 5th Gear Ratio = 0.79 to 0.91
 - 6th Gear Ratio = 0.62 to 0.72
- Ignition Voltage = 9 to 32 V
- Torque Converter Clutch = Greater than 60% Duty Cycle - For greater than 2 s
- Transmission Fluid Temperature = -6.6 to 130B°C (20 to 266B°F)

P0742

- DTC P0101 - P0103, P0106 - P0108, P0171, P0172, P0174, P0175, P0201 - P0208, P0300 - P0308, P0401, P042E, P0716, P0717, P0722, P0723, P0742, P2763, P2764 = Not set
- Accelerator Pedal Position = Greater than 8%
- Engine Speed = 400 to 7, 500 RPM - For greater than 5 s
- Engine Torque = Greater than 115 Nm (85 lb ft)
- Engine Torque Signal = Valid
- Ignition Voltage = 9 to 32 V
- Torque Converter Clutch = Off
- Transmission = 2nd Gear
- Transmission Fluid Temperature = -6.6 to 130B°C (20 to 266B°F)
- Vehicle Speed = Greater than 1 km/h (0.6 MPH)

Conditions for Setting the DTC

P0741

TCC Slip Speed = Greater than 130 RPM - For greater than 5 s

The above condition(s) must occur 2 times.

Torque Converter Clutch Pressure = Greater than 750 kPa (109 PSI) - For greater than 5 s

P0742

TCC Slip Speed = -50 to 13 RPM

The above condition(s) must occur 2 times.

Actions Taken When the DTC Sets

P0741

DTC P0741 = Type B DTC - Additional actions taken:

- TCC Control = Disabled
- Transmission - 6th gear = Disabled
- Transmission Adaptive Pressure Control = Freeze current adapt values
- Transmission Shift Mode = Transmission Hot Mode

P0742

DTC P0742 = Type A DTC - Additional actions taken:

- Neutral Idle Mode = Disabled
- TCC Control = Applied
- Transmission Adaptive Pressure Control = Freeze current adapt values
- Transmission Shift Mode = Transmission Hot Mode

Conditions for Clearing the DTC

- DTC P0741 = Type B DTC
- DTC P0742 = Type A DTC

Reference Information

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References

Circuit/System Verification

1. Verify the condition does not exist: Incorrect fluid level or condition - Refer to **Transmission Fluid Level and Condition Check**

- **If a condition exists**

Repair or replace as necessary

- **Go to next step: If no condition exists**

2. Ignition - On / Vehicle - In Service Mode
3. Clear the DTCs.

4. Road test the vehicle. - Refer to [Road Test](#)
5. Verify DTC P0716, P0717, P0722, P0723 is not set.

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

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#)

- **Go to next step: If none of the DTCs are set**

6. Verify DTC P0741, P0742 is not set.

- **If DTC P0741 or P0742 is set**

Refer to Circuit/System Testing

- **Go to next step: If none of the DTCs are set**

7. 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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC is not set**

8. All OK.

Circuit/System Testing

1. Verify the condition does not exist: Incorrect pressure - Refer to [Line Pressure Check](#)

- **If a condition exists**

Refer to [Fluid Pressure High or Low](#)

- **Go to next step: If no condition exists**

2. Ignition/Vehicle - Off

3. Remove the component: Q8 Control Solenoid Valve Assembly

4. Verify the procedure/test passes. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test](#)

- **If the procedure/test does not pass**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the procedure/test passes**

5. Refer to Diagnostic Fault Information

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- [Control Valve Body Assembly Removal](#)
- [Torque Converter Housing with Fluid Pump Removal](#)
- [Torque Converter Removal and Holding Fixture Installation \(6L50\)](#)
- [Torque Converter Installation and Holding Fixture Removal \(6L50\)](#)
- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0751 OR P0752

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0751

Shift Solenoid Valve 1 Performance - Stuck Off

DTC P0752

Shift Solenoid Valve 1 Performance - Stuck On

Diagnostic Fault Information

NOTE: The components are listed from the least to the most intrusive to service.

Component	DTC	Condition
Q8 Control Solenoid Valve Assembly	P0751 or P0752	• Q32A Shift Solenoid Valve 1 - Binding or Sticking/Stuck • Control Solenoid Valve Assembly Filter Plate - Restricted or Cracked • O-Ring - Leaking
Control Valve Body	P0751	• Clutch Selector Valve Bore Plug - Incorrect - Small • Check ball #1 missing or damaged.
	P0751 or P0752	• 1-R and 4-5-6 Clutch Regulator Valve - Binding or Sticking/Stuck • Clutch Selector Valve - Binding or Sticking/Stuck
Control Valve Channel Plate	P0751 or P0752	Oil Channels or Orifices - Restricted
Control Valve Channel Plate Spacer Plate	P0751 or P0752	Oil Channels or Orifices - Restricted
Output Carrier Assembly	P052	Pinion Pins - Incorrect installation

Circuit/System Description

The solenoid valve directs fluid pressure to the clutch select valve, which controls the position of the valve.

DTC P0751, P0752 will set with a hydraulic/mechanical condition.

For an overview of the component/system, refer to

- [Drive Range, First Gear](#)
- [Drive Range, Second Gear](#)
- [Drive Range, Third Gear](#)

- Drive Range, Fourth Gear
- Drive Range, Fifth Gear
- Drive Range, Sixth Gear
- Reverse
- Electronic Component Description
- Fluid Passages

Conditions for Running the DTC

- DTC P0101 - P0103, P0106 - P0108, P0171, P0172, P0174, P0175, P0201 - P0208, P0300 - P0308, P0401, P042E, P0716, P0717, P0722, P0723, P182E = Not set
- Accelerator Pedal Position = Greater than 0.5%
- Accelerator pedal position signal = Valid
- Engine Speed = 400 to 7, 500 RPM - For greater than 5 s
- Engine Torque Signal = Valid
- High Side Driver = Enabled
- Ignition Voltage = 9 to 32 V
- Transmission Park/Neutral/Reverse
- Transmission Fluid Temperature = Warmer than -6.6B°C (20.1B°F)
- Transmission Output Speed = Greater than 0 RPM

Frequency the DTC runs - After the running conditions are met

Conditions for Setting the DTC

P0751

- Gear Command = 1st Gear
- Gear ratio 1.09 to 1.20 detected.
- Transmission slip = Greater than 400 RPM - For greater than 2 s

The above condition(s) must occur 8 times.

P0752

- Gear Command = 3rd Gear
- Gear ratio 4.35 to 4.81 detected. - For greater than 1.5 s = 4th Gear
- Transmission = 1st Gear or 2nd Gear
- Transmission slip = Greater than 400 RPM - For greater than 1.5 s

The above conditions must occur in sequence 5 times

Actions Taken When the DTC Sets

P0751

- DTC P0751 = Type B DTC - Additional actions taken:
- 1st Gear = Inhibited
- Neutral Idle Mode = Disabled

P0752

- DTC P0752 = Type A DTC - Additional actions taken:
- Grade braking = Disabled

- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- Tap Up/Tap Down = Disabled
- Transmission Adaptive Pressure Control = Freeze current adapt values
- Transmission gear allowed = 2nd Gear or Neutral

Conditions for Clearing the DTC

DTC P0751 = Type B DTC

DTC P0752 = Type A DTC

Reference Information

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References

Circuit/System Verification

1. Verify the condition does not exist: Incorrect fluid level or condition - Refer to [Transmission Fluid Level and Condition Check](#)
 - **If a condition exists**
Repair or replace as necessary
 - **Go to next step: If no condition exists**
2. Ignition - On / Vehicle - In Service Mode
3. Clear the DTCs.
4. Road test the vehicle. - Refer to [Road Test](#)

Verify DTC P0716, P0717, P0722, P0723 is not set.

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

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#)

- **Go to next step: If none of the DTCs are set**

5. Verify DTC P0751, P0752 is not set.

- **If DTC P0751 or P0752 is set**

Refer to Circuit/System Testing

- **Go to next step: If none of the DTCs are 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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC is not set**

7. All OK.

Circuit/System Testing

1. Verify the condition does not exist: Incorrect pressure - Refer to [Line Pressure Check](#)

- **If a condition exists**

Refer to [Fluid Pressure High or Low](#)

- **Go to next step: If no condition exists**

2. Ignition/Vehicle - Off

3. Remove the component: Q8 Control Solenoid Valve Assembly

4. Verify the procedure/test passes. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test](#)

- **If the procedure/test does not pass**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the procedure/test passes**

5. Refer to Diagnostic Fault Information

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- [Control Valve Body Assembly Removal](#)
- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0756

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0756

Shift Solenoid Valve 2 Performance - Stuck Off

Circuit/System Description

For an overview of the component/system, refer to

- [Drive Range, First Gear](#)
- [Drive Range, Second Gear](#)
- [Drive Range, Third Gear](#)
- [Drive Range, Fourth Gear](#)
- [Drive Range, Fifth Gear](#)
- [Drive Range, Sixth Gear](#)

- [Reverse](#)
- [Electronic Component Description](#)
- [Fluid Passages](#)

The solenoid valve controls fluid pressure to the 3-5-R regulator valve that controls the fluid pressure to the 3-5-R clutch.

DTC P0756 will set with a hydraulic/mechanical condition.

Conditions for Running the DTC

- DTC P0101 - P0103, P0106 - P0108, P0171, P0172, P0174, P0175, P0201 - P0208, P0300 - P0308, P0401, P042E, P0716, P0717, P0722, P0723, P182E = Not set
- Accelerator Pedal Position = Greater than 0.5%
- Accelerator pedal position signal = Valid
- Engine Speed = 400 to 7, 500 RPM - For greater than 5 s
- High Side Driver = Enabled
- Ignition Voltage = 9 to 32 V
- Transmission Fluid Temperature = Warmer than -6.6B°C (20.1B°F)
- Transmission Output Speed = Greater than 66 RPM

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P0756

- Gear Command = 1st Gear
- Gear ratio 2.72 to 3.01 detected. - For greater than 1 s = 2nd Gear
- TCC Slip Speed = Greater than 400 RPM - For greater than 10 s

The above conditions must occur in sequence 3 times

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type A DTC

- Grade braking = Disabled
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- Powertrain braking = Disabled
- Transmission Adaptive Pressure Control = Freeze current adapt values
- Transmission gear allowed = 2nd Gear or Neutral

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type A DTC

Reference Information

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Control Module References

Circuit/System Verification

1. Verify the condition does not exist: Incorrect fluid level or condition - Refer to [Transmission Fluid Level and Condition Check](#)

- **If a condition exists**

Repair or replace as necessary

- **Go to next step: If no condition exists**

2. Ignition - On / Vehicle - In Service Mode
3. Clear the DTCs.
4. Road test the vehicle. - Refer to [Road Test](#)
5. Verify DTC P0716, P0717, P0722, P0723 is not set.

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

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#)

- **Go to next step: If none of the DTCs are set**

6. Verify DTC P0756 is not set.

- **If DTC P0756 is set**

Refer to Circuit/System Testing

- **Go to next step: If the DTC is not set**

7. 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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC is not set**

8. All OK.

Circuit/System Testing

1. Verify the condition does not exist: Incorrect pressure - Refer to [Line Pressure Check](#)

- **If a condition exists**

Refer to [Fluid Pressure High or Low](#)

- **Go to next step: If no condition exists**

2. Ignition/Vehicle - Off
 3. Remove the component: Q8 Control Solenoid Valve Assembly
 4. Verify the procedure/test passes. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test](#)
- **If the procedure/test does not pass**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the procedure/test passes**

5. Refer to Diagnostic Fault Information

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- [1-2-3-4 and 3-5 Reverse Clutch Assembly and 4-5-6 Clutch Assembly Removal \(6L50/80/90\)](#)
- [Control Valve Body Assembly Removal](#)
- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0776 OR P0777

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0776

Transmission Control Solenoid Valve 2 Stuck Off

DTC P0777

Transmission Control Solenoid Valve 2 Stuck On

Diagnostic Fault Information

NOTE: The components are listed from the least to the most intrusive to service.

Component	DTC	Condition
Q8 Control Solenoid Valve Assembly	P0776, P0777	• Q27B Pressure Control Solenoid Valve 2 - Binding or Sticking/Stuck • Control Solenoid Valve Assembly Filter Plate - Blocked or Cracked • O-Ring - Leaking
Control Valve Body	P0776, P0777	• Clutch Regulator Valve - Binding or Sticking/Stuck • Control Valve Body Ball Check Valve - Leaking or Blocked by debris • Oil Channels or Orifices - Restricted
Control Valve Body Spacer Plate	P0776	Oil Channels or Orifices - Restricted
Control Valve Channel Plate	P0776	Oil Channels or Orifices - Restricted
3-5-R and 4-5-6 Clutch Housing Assembly	P0776	• 3-5-R Clutch Backing Plate Retaining Ring - Not seated correctly • 3-5-R clutch plates worn or damaged. • Clutch Housing - Scored/Worn

Component	DTC	Condition
		- Clutch Piston - Cracked - Damaged seal.
Torque Converter with Fluid Pump Housing Assembly	P0776, P0777	- Oil Pump Drive Gear - Worn - Oil Pump Driven Gear - Worn - Transmission Fluid Pump Housing - Scored/Worn

Circuit/System Description

For an overview of the component/system, refer to

- [Drive Range, First Gear](#)
- [Drive Range, Second Gear](#)
- [Drive Range, Third Gear](#)
- [Drive Range, Fourth Gear](#)
- [Drive Range, Fifth Gear](#)
- [Drive Range, Sixth Gear](#)
- [Reverse](#)
- [Electronic Component Description](#)
- [Fluid Passages](#)

The solenoid valve controls fluid pressure to the 3-5-R regulator valve that controls the fluid pressure to the 3-5-R clutch.

DTC P0776, P0777 will set with a hydraulic/mechanical condition.

Conditions for Running the DTC

- DTC P0101 - P0103, P0106 - P0108, P0171, P0172, P0174, P0175, P0201 - P0208, P0300 - P0308, P0401, P042E, P0716, P0717, P0722, P0723, P182E = Not set
- Accelerator Pedal Position = Greater than 0.5%
- Accelerator pedal position signal = Valid
- Engine Speed = 400 to 7, 500 RPM - For greater than 5 s
- High Side Driver = Enabled
- Ignition Voltage = 9 to 32 V
- Transmission Fluid Temperature = Warmer than -6.6B°C (20.1B°F)
- Transmission Output Speed = Greater than 66 RPM

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P0776

3-5-R Clutch = Not applied

The above condition(s) must occur 3 times.

P0777

3-5-R Clutch = Not released

The above condition(s) must occur 3 times.

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type A DTC

- Grade braking = Disabled
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- Powertrain braking = Disabled
- Transmission Adaptive Pressure Control = Freeze current adapt values
- {P0776} Transmission gear allowed = 2nd Gear or Neutral
- {P0777} Transmission gear allowed = 3rd Gear

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type A DTC

Reference Information

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References

Circuit/System Verification

1. Verify the condition does not exist: Incorrect fluid level or condition - Refer to **Transmission Fluid Level and Condition Check**

- **If a condition exists**

Repair or replace as necessary

- **Go to next step: If no condition exists**

2. Ignition - On / Vehicle - In Service Mode
3. Clear the DTCs.
4. Road test the vehicle. - Refer to **Road Test**
5. Verify DTC P0716, P0717, P0722, P0723 is not set.

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

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

- **Go to next step: If none of the DTCs are set**

6. Verify DTC P0776, P0777 is not set.

- **If DTC P0776 or P0777 is set**

Refer to Circuit/System Testing

- **Go to next step: If none of the DTCs are set**

7. 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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC is not set**

8. All OK.

Circuit/System Testing

1. Verify the condition does not exist: Incorrect pressure - Refer to [Line Pressure Check](#)

- **If a condition exists**

Refer to [Fluid Pressure High or Low](#)

- **Go to next step: If no condition exists**

2. Ignition/Vehicle - Off

3. Remove the component: Q8 Control Solenoid Valve Assembly

4. Verify the procedure/test passes. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test](#)

- **If the procedure/test does not pass**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the procedure/test passes**

5. Refer to Diagnostic Fault Information

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- [1-2-3-4 and 3-5 Reverse Clutch Assembly and 4-5-6 Clutch Assembly Removal \(6L50/80/90\)](#)
- [Control Valve Body Assembly Removal](#)
- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0796 OR P0797

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0796

Transmission Control Solenoid Valve 3 Stuck Off

DTC P0797

Diagnostic Fault Information**NOTE:**

- **DTC P0796 will set with a hydraulic/mechanical condition or high resistance in the circuit of the component Q77C without setting component/control circuit DTCs.**
- **DTC P0797 will set with a hydraulic/mechanical condition.**
- **The components are listed from the least to the most intrusive to service.**

Component	DTC	Condition
Q77C Transmission Control Solenoid Valve 3	P0796, P0797	• Binding, sticking or stuck component: Solenoid Valve • Damaged or missing component: • Retaining Clip • Solenoid Valve
4-5-6 Clutch Regulator Valve	P0796, P0797	• Blocked or restricted component: Screen - Fluid/oil passage • Binding, sticking or stuck component: Valve • Debris on the component. • Damaged component: • Valve or Bore - Scored • Spring
4-5-6 Clutch Assembly	P0796, P0797	• Blocked or restricted component: Fluid/oil passage • Leaking component: • Clutch Piston • Clutch Housing • Gasket • O-Ring • Seal • Binding, sticking or stuck component: Clutch Plates • Damaged or worn component: • Clutch Plates • Clutch Piston • Clutch Housing

Circuit/System Description

The solenoid actuator controls fluid pressure by moving the clutch 4-5-6 regulator valve that controls the fluid pressure to the 4-5-6 clutch.

Conditions for Running the DTC

P0796, P0797

- DTC P0101-P0108, P0171-P0175, P0201-P0208, P0300-P0308, P0716, P0717, P0722, P0723, P077C, P077D, P07BF, P07C0, P1824, P182A-P182F, P1838-P1841, P18B5-P18BF, P18C0-P18C3, P1915, P2534 = Not set
- Accelerator Pedal Position = Greater than 1%
- Battery Voltage = 9 to 32 V
- High Side Driver 1 = On
- High Side Driver 2 = On
- Ignition Voltage = 9 to 32 V
- Transmission Gear = Drive
- Transmission OSS = Greater than 100 RPM

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P0796

Clutch 4-5-6 = Not applied

P0797

Clutch 4-5-6 = Not released

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type A DTC

- Autostart/Autostop = Disabled - If equipped
- Grade braking = Disabled
- Manual Shift Control = Disabled
- Neutral Idle Mode = Disabled
- Powertrain braking = Disabled
- Manual Shift Control = Disabled
- TCC Control = Disabled
- Transmission Adaptive Pressure Control = Freeze current adapt values
- {P0796} Transmission gear allowed = Reverse or Gear 4
- {P0797} Transmission gear allowed = Reverse or Gear 3

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type A DTC

Diagnostic Aids

High resistance in the circuits of the component Q77F may set DTC P2732 without setting control circuit DTC(s).

Reference Information

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References

Circuit/System Verification

1. Verify the condition does not exist: Incorrect fluid level or condition - Refer to [Transmission Fluid Level and Condition Check](#)
 - **If a condition exists**

Repair or replace as necessary
 - **Go to next step: If no condition exists**
2. Ignition - On / Vehicle - In Service Mode
3. Clear the DTCs.
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. Refer to [Road Test](#)

Verify that no DTC listed in the DTC Descriptor Category is set.

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

Refer to Diagnostic Fault Information & Verify the conditions listed in the table do not exist

- **Go to next step: If none of the DTCs are set**

5. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- [1-2-3-4 and 3-5 Reverse Clutch Assembly and 4-5-6 Clutch Assembly Removal \(6L50/80/90\)](#)
- [Control Valve Body Assembly Disassemble](#)
- [Control Valve Body Assembly Installation](#)
- [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0815, P0816, OR P0826

Diagnostic Instructions

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

DTC Descriptors

DTC P0815

Upshift Switch Circuit

DTC P0816

Downshift Switch Circuit

DTC P0826

Up and Down Shift Switch Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	P0815, P0816, P0826	P0815, P0816, P0826	P0815, P0816, P0826	-
Ground	P0826	P0826	P0826	-

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

The driver shift request, also known as the TAP Up/Downshift manual shift function, allows the driver to select the desired range of gears for current driving conditions. The driver shift request shift system is activated when the gear selector is in the manual position. The driver shift request system is deactivated in all other range positions. Pressing the plus (+) switch once will command the Body Control Module to signal the Transmission Control Module to upshift to the next high gear. Pressing the minus (-) switch once will command the Body Control Module to signal the Transmission Control Module to downshift to the next lowest or previous gear. The Transmission Control Module will not allow a downshift if the transmission is compromised by over-speeding. The automatic transmission manual shift switch is comprised of three different resistors values in series and two switches. The Body Control Module supplies a 12 volt circuit to the automatic transmission manual shift switch. The signal circuit varies the voltage back to the Body Control Module depending on which switch is depressed.

Conditions for Running the DTC

P0815

- DTC P0816, P0826, P182E, P1915 or P1761 is not set.
- The ignition voltage is between 8.6 - 32 V.
- The engine speed is between 400 - 7, 500 RPM for 5 s.

P0816

- DTC P0815, P0826, P182E, P1915 or P1761 is not set.
- The ignition voltage is between 8.6 - 32 V.
- The engine speed is between 400 - 7, 500 RPM for 5 s.

P0826

- DTC P1761 is not set.
- The ignition voltage is between 8.6 - 32 V.
- The engine speed is between 400 - 7, 500 RPM for 5 s.

P1876

- DTC U0100, P0815, P0816, P0826, P1761, P1825, or P1915 is not set.
- The ignition voltage is between 8.6 - 32 V.
- The engine speed is between 400 - 7, 500 RPM for 5 s.

Conditions for Setting the DTC

P0815 - Condition 1

The TCM detects a stuck ON Tap Up switch for 1 s in Park or Neutral.

P0815 - Condition 2

The TCM detects a stuck ON Tap Up switch for 10 min in any forward gear.

P0816 - Condition 1

The TCM detects a stuck ON Tap Down switch for 1 s in Park or Neutral.

P0816 - Condition 2

The TCM detects a stuck ON Tap Down switch for 10 min in any forward gear.

P0826

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

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or **Inline Harness Connector End Views - Index** or **Component Connector End Views - Index**

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Circuit/System Verification

1. Ignition ON.
2. Verify there are no other K9 Body Control Module, K71 Transmission Control Module or communication DTCs set.

- **If a DTC is set**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .

- **Go to next step: If a DTC is not set**

3. Verify the scan tool K9 Body Control Module, automatic transmission manual shift switch parameter displays ON.

- **If ON is not displayed**

Refer to Circuit/System Testing.

- **Go to next step: If ON is displayed**

4. Verify the scan tool K9 Body Control Module, automatic transmission manual shift switch parameter displays UP when depressing the plus (+) switch on the S3 Transmission Shift Lever.

- **If UP is not displayed**

Refer to Circuit/System Testing.

- **Go to next step: If UP is displayed**

5. Verify the scan tool K9 Body Control Module, automatic transmission manual shift switch parameter displays Down when depressing the minus (-) switch on the S3 Transmission Shift Lever.

- **If Down is not displayed**

Refer to Circuit/System Testing.

- **Go to next step: If Down is displayed**

6. Verify the scan tool K71 Transmission Control Module, driver shift control mode parameter displays Inactive.

- **If Inactive is not displayed**

Refer to Circuit/System Testing.

- **Go to next step: If Inactive is displayed**

7. Verify the scan tool K71 Transmission Control Module, driver shift control mode parameter displays In Transition when depressing the plus (+) and minus (-) switches on the S3 Transmission Shift Lever.

- **If In Transition is not displayed**

Refer to Circuit/System Testing.

- **Go to next step: If In Transition is displayed**

8. Verify the scan tool K71 Transmission Control Module, driver shift request parameter displays Up Shift when depressing the plus (+) switch on the S3 Transmission Shift Lever.

- **If Up Shift is not displayed**

Refer to Circuit/System Testing.

- **Go to next step: If Up Shift is displayed**

9. Verify the scan tool K71 Transmission Control Module, driver shift request parameter displays Down Shift when depressing the minus (-) switch on the S3 Transmission Shift Lever.

- **If Down Shift is not displayed**

Refer to Circuit/System Testing.

- **Go to next step: If Down Shift is displayed**

10. 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.
11. Verify the DTC does not set.
 - **If the DTC does set**

Refer to Circuit/System Testing.
 - **Go to next step: If the DTC does not set**
12. 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.
2. Test for less than 2 Ω between the ground circuit terminal 2 and ground.
 - **If 5 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 5 Ω in the ground circuit end to end.
 - If greater than 2 Ω , repair the Open/High resistance in the circuit.
 - If less than 2 Ω , repair the ground connection.
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 K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **Go to next step: If between 11 - 13 V**
5. Ignition OFF.
6. Test for 6000 - 6300 Ω between terminal 2 and terminal 3 on the S3 Transmission Shift Lever connector.
 - **If not within the specified range**

Replace the S3 Transmission Shift Lever.
 - **Go to next step: If within the specified range**
7. Test for 450 - 750 Ω between terminal 2 and terminal 3 on the S3 Transmission Shift Lever connector, while depressing and holding the plus (+) switch.
 - **If not within the specified range**

Replace the S3 Transmission Shift Lever.
 - **Go to next step: If within the specified range**
8. Test for 1850 - 2150 Ω between terminal 2 and terminal 3 on the S3 Transmission Shift Lever connector, while depressing and holding the minus (-) switch.
 - **If not within the specified range**

Replace the S3 Transmission Shift Lever.

- **Go to next step: If within the specified range**

9. Replace the K9 Body Control Module.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Replace the AT shift program switch. Refer to [Transmission Control Replacement](#).
- [Control Module References](#) for BCM replacement, programming, and setup

DTC P0842 OR P0843

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0842

Transmission Fluid Pressure Switch 1 Circuit Low Voltage

DTC P0843

Transmission Fluid Pressure Switch 1 Circuit High Voltage

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Component	Description
B12A Transmission Fluid Pressure Switch	B12A is part of the component: Q8 Control Solenoid Valve Assembly
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly

No external circuit diagnosis is involved.

Conditions for Running the DTC

- DTC P0711-P0713, P0716, P0717, P0722, P0723, P0742, P0751, P0757, P0973, P0974, P0976, P0977, P182E = Not set
- Engine Speed = 400 to 7, 500 RPM - For greater than 5 s
- Engine Speed = 550 RPM - Transmission = Drive
- High Side Driver = On
- Ignition Voltage = 9 to 32 V
- Transmission Fluid Temperature = -6.6 to 130B°C (-20 to 266B°F)

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P0842

Transmission Fluid Pressure Switch Signal = Short to Ground - For greater than 1 s

P0843

Transmission Fluid Pressure Switch Signal = Short to Voltage - For greater than 1 s

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type C DTC - Additional actions taken:

Transmission Adaptive Pressure Control = Freeze current adapt values

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type C DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or Inline Harness Connector End Views - Index or Component Connector End Views - Index

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

Special Tools

DT-48616-10 Adapter Harness

Equivalent regional tools: Special Tools

Circuit/System Verification

1. Engine Running
2. Brake Pedal Applied
3. Transmission = Select each position
4. Verify the scan tool parameter: Transmission Fluid Pressure Switch

Refer to [Transmission Fluid Pressure Switch Logic](#)

- **If not the specified state**

Refer to Circuit/System Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC does not set**

6. All OK.

Circuit/System Testing

1. Ignition/Vehicle - Off
2. Remove the component: Q8 Control Solenoid Valve Assembly
3. Install & Setup Special Tool DT-47825-10
4. Connect the tool between the test points: Q8 Control Solenoid Valve Assembly & Wiring Harness @ Vehicle
5. Use a suitable tool. Press and hold the switch - Transmission Fluid Pressure Switch
6. Verify the scan tool parameter changes
 - Transmission Fluid Pressure Switch 1
 - Transmission Fluid Pressure Switch 2
 - Transmission Fluid Pressure Switch 4
 - Transmission Fluid Pressure Switch 5
 - **If the parameter state does not change**
Replace the component: Q8 Control Solenoid Valve Assembly
 - **Go to next step: If the parameter state changes**
7. Verify a condition does not exist with the component: Filter Plate Assembly
 - **If a condition exists**
Clean the components as necessary.
 - **Go to next step: If no condition exists**
8. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0851

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0851

Park/Neutral Position Switch Circuit Low Voltage

Diagnostic Fault Information

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

Typical Scan Tool Data

Park/Neutral Position Switch

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Ignition = On Parameter Normal Range: • In Gear • Park/Neutral			
Signal	Park/Neutral	In Gear	In Gear
Low Reference	-	In Gear	-

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
Signal	The control module input circuit has an internal resistance connected to 12 V.
Low Reference	Grounded through the control module.

Component	Description
B15 Transmission Internal Mode Switch	The assembly contains 5 individual switches.
K20 Engine Control Module	The control module controls a series of actuators to ensure optimal engine performance. The control module does this by reading values from a variety of sensors, interprets the data and adjusts the engine actuators accordingly.
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation.

The control module K71 uses 4 of the switches as inputs to determine the gear selector lever position. The control module K20 uses 1 of the switches as an input to determine when the transmission is in park or neutral for engine starting.

Conditions for Running the DTC

- DTC P182E = Not set
- Engine = Running
- Engine Torque = Greater than 60 Nm (44 lb ft)
- Ignition Voltage = 8 to 32 V
- Throttle Position = Greater than 8%
- Vehicle Speed = Greater than 10 km/h (6 MPH)

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

Park/Neutral Position Switch = Park/Neutral

The above condition(s) must occur for greater than 1 s.

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type C DTC

The control module K20 uses the gear selector lever position sent by the control module K71 over serial data to determine park/neutral for engine starting.

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type C DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or Inline Harness Connector End Views - Index or Component Connector End Views - Index

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

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Verify DTC P182E, P1915 is not set as a history DTC.

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

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#)

3. Operate the component: S3 Transmission Shift Lever - Select each position

Verify the scan tool parameter: Internal Mode Switch @ K71 Transmission Control Module = Matches the selector lever position

- **If not the specified state**

Refer to [Range Selector Lever Cable Adjustment](#)

- **Go to next step: If the specified state**

4. Operate the component: S3 Transmission Shift Lever - Select each position

Verify the scan tool parameter:

- {R, D, L} Park/Neutral Position Switch = In Gear
- {P, N} Park/Neutral Position Switch = Park/Neutral
- **If not the specified state**

Refer to Circuit/System Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC is not set**

6. All OK.

Circuit/System Testing

NOTE: It may take up to 2 min for all vehicle systems to power down before an accurate ground or low reference circuit continuity test can be performed.

1. Ignition/Vehicle & All vehicle systems - Off
2. Disconnect the electrical connector: X1 @ Q8 Control Solenoid Valve Assembly
3. Ignition - On / Vehicle - In Service Mode
4. Test for 11 to 13 V between the test points: Signal circuit terminal 3 @ Component harness & Ground
 - **If not between 11 and 13 V**
 1. Ignition/Vehicle - Off
 2. Disconnect the appropriate electrical connector: K20 Engine Control Module
 3. Test for infinite resistance between the test points: Signal circuit terminal 3 @ Component harness & Ground
 - If less than infinite resistance - Repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 4. Test for less than 2 ohms between the test points: Signal circuit terminal 3 @ Component harness & The other end of the circuit

- If 2 ohms or greater - Repair the open/high resistance in the circuit.
- If less than 2 ohms - Replace the component: K20 Engine Control Module
- **Go to next step: If between 11 and 13 V**

5. Ignition/Vehicle - Off

6. Remove the component: Control Valve Body Cover

7. Connect the electrical connector: X1 @ Q8 Control Solenoid Valve Assembly

8. Disconnect the electrical connector: X2 @ Q8 Control Solenoid Valve Assembly - B15 Transmission Internal Mode Switch

9. Ignition/Vehicle - On

10. Verify the scan tool parameter: Park/Neutral Position Switch = In Gear

- **If not the specified state**

1. Test for 11 to 13 V between the test points: Signal circuit terminal 3 & Ground

- If not between 11 and 13 V - Replace the component: Q8 Control Solenoid Valve Assembly
- Go to next step: If between 11 and 13 V

2. Replace the component: K20 Engine Control Module

11. Connect a 3 A fused jumper wire between the test points: Signal circuit terminal A & Low Reference circuit terminal F

12. Verify the scan tool parameter: Park/Neutral Position Switch = Park/Neutral

- **If not the specified state**

1. Ignition/Vehicle - Off & Remove - Jumper wire(s)

2. Disconnect the appropriate electrical connector: K20 Engine Control Module

3. Ignition - On / Vehicle - In Service Mode

4. Test for less than 1 V between the test points: Signal circuit terminal A @ Q8 Control Solenoid Valve Assembly & Ground

- If 1 V or greater - Repair the short to voltage on the circuit.
- Go to next step: If less than 1 V

5. Ignition/Vehicle - Off

6. Test for less than 2 ohms between the test points: Signal circuit terminal 3 @ Q8 Control Solenoid Valve Assembly & The other end of the circuit

- If 2 ohms or greater - Repair the open/high resistance in the circuit.
- If less than 2 ohms - Replace the component: K20 Engine Control Module

- **Go to next step: If the specified state**

13. Test or replace the component: B15 Transmission Internal Mode Switch

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- [Control Solenoid Valve and Transmission Control Module Assembly Replacement](#) - Q8 Control Solenoid Valve Assembly
- [Manual Shift Shaft Position Switch Replacement](#) - B15 Transmission Internal Mode Switch
- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0851 OR P0852

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)

- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0851

Park/Neutral Position Switch Circuit Low Voltage

DTC P0852

Park/Neutral Position Switch Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	P0851	P0852	P0852	-
Low Reference	-	-	-	-

Typical Scan Tool Data

Park/Neutral Position Switch

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Ignition = On Parameter Normal Range: • In Gear • Park/Neutral			
Signal	Park/Neutral	In Gear	In Gear
Low Reference	-	In Gear	-

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
Signal	The control module input circuit has an internal resistance connected to 12 V.
Low Reference	Grounded through the control module.

Component	Description
B15 Transmission Internal Mode Switch	The assembly contains 5 individual switches.
K20 Engine Control Module	The control module controls a series of actuators to ensure optimal engine performance. The control module does this by reading values from a variety of sensors, interprets the data and adjusts the engine actuators accordingly.
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation.

The control module K71 uses 4 of the switches as inputs to determine the gear selector lever position. The control module K20 uses 1 of the switches as an input to determine when the transmission is in park or neutral

for engine starting.

Conditions for Running the DTC

P0851

- DTC P182E = Not set
- Engine Speed = 400 to 7, 500 RPM
- Engine Torque = Greater than 60 Nm (44 lb ft)
- Ignition Voltage = 8 to 32 V
- Throttle Position = Greater than 8%
- Vehicle Speed = Greater than 10 km/h (6 MPH)
- Transmission Range Forward or Reverse

Frequency the DTC runs = Continuously - After the running conditions are met

{P0852}

- DTC P182E = Not set
- Engine Speed = 400 to 7, 500 RPM
- Ignition Voltage = 8 to 32 V
- Transmission Range = Park/Neutral

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P0851

Park/Neutral Position Switch = Park/Neutral - For 3 s

P0852

Park/Neutral Position Switch = In Gear - For 3 s

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type C DTC - Additional actions taken:

The control module K20 uses the gear selector lever position sent by the control module K71 over serial data to determine park/neutral for engine starting.

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type C DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

[Master Electrical Component List](#) , or [Inline Harness Connector End Views - Index](#) or [Component Connector End Views - Index](#)

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](#)

[Circuit/System Verification](#)

1. Ignition - On / Vehicle - In Service Mode
2. Verify DTC P182E, P1915 is not set as a history DTC.
 - **If any of the DTCs are set as history**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#)

3. Operate the component: S3 Transmission Shift Lever - Select each position

Verify the scan tool parameter: Internal Mode Switch @ K71 Transmission Control Module = Matches the selector lever position

- **If not the specified state**

Refer to [Range Selector Lever Cable Adjustment](#)

- **Go to next step: If the specified state**

4. Operate the component: S3 Transmission Shift Lever - Select each position

Verify the scan tool parameter:

- {R, D, L} Park/Neutral Position Switch @ K20 Engine Control Module = In Gear
- {P, N} Park/Neutral Position Switch @ K20 Engine Control Module = Park/Neutral
- **If not the specified state**

Refer to Circuit/System Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC is not set**

6. All OK.

[Circuit/System Testing](#)

NOTE: It may take up to 2 min for all vehicle systems to power down before an accurate ground or low reference circuit continuity test can be performed.

1. Ignition/Vehicle & All vehicle systems - Off
2. Disconnect the electrical connector: X1 @ T12 Automatic Transmission Assembly
3. Ignition - On / Vehicle - In Service Mode
4. Test for 11 to 13 V between the test points: Signal circuit terminal 3 @ Component harness & Ground
 - **If not between 11 and 13 V**
 1. Ignition/Vehicle - Off
 2. Disconnect the appropriate electrical connector: K20 Engine Control Module
 3. Test for infinite resistance between the test points: Signal circuit terminal 3 @ Component harness & Ground
 - If less than infinite resistance - Repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 4. Test for less than 2 ohms between the test points: Signal circuit terminal 3 @ Component harness & The other end of the circuit
 - If 2 ohms or greater - Repair the open/high resistance in the circuit.
 - If less than 2 ohms - Replace the component: K20 Engine Control Module
 - **Go to next step: If between 11 and 13 V**
5. Ignition/Vehicle - Off
6. Remove the component: Transmission Fluid Pan Assembly
7. Disconnect the electrical connector: X2 @ Q8 Control Solenoid Valve Assembly - B15 Transmission Internal Mode Switch
8. Ignition/Vehicle - On
9. Verify the scan tool parameter: Park/Neutral Position Switch = In Gear
 - **If not the specified state**
 1. Test for 11 to 13 V between the test points: Signal terminal F @ Q8 Control Solenoid Valve Assembly & Ground
 - If not between 11 and 13 V - Replace the component: Q8 Control Solenoid Valve Assembly
 - Go to next step: If between 11 and 13 V
 2. Replace the component: K20 Engine Control Module
10. Connect a 3 A fused jumper wire between the test points: Signal terminal F @ Q8 Control Solenoid Valve Assembly & Low Reference terminal A Low Reference circuit terminal F
11. Verify the scan tool parameter: Park/Neutral Position Switch = Park/Neutral
 - **If not the specified state**
 1. Ignition/Vehicle - Off & Remove - Jumper wire(s)
 2. Disconnect the appropriate electrical connector: K20 Engine Control Module
 3. Ignition - On / Vehicle - In Service Mode
 4. Test for less than 1 V between the test points: Signal terminal F @ Q8 Control Solenoid Valve Assembly & Ground
 - If 1 V or greater - Repair the short to voltage on the circuit.
 - Go to next step: If less than 1 V
 5. Ignition/Vehicle - Off
 6. Test for less than 2 ohms between the test points: Signal terminal F @ Q8 Control Solenoid Valve Assembly & The other end of the circuit
 - If 2 ohms or greater - Repair the open/high resistance in the circuit.
 - If less than 2 ohms - Replace the component: K20 Engine Control Module

- **Go to next step: If the specified state**

12. Test or replace the component: B15 Transmission Internal Mode Switch

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- [Control Solenoid Valve and Transmission Control Module Assembly Replacement](#) - Q8 Control Solenoid Valve Assembly
- [Automatic Transmission Fluid, Fluid Pan and/or Filter Replacement](#)
- [Manual Shift Shaft Position Switch Replacement](#) - B15 Transmission Internal Mode Switch
- For control module replacement, programming, and setup refer to [Control Module References](#)

Additional Procedures

[Reset Transmission Adapts](#) - Perform only when the component/system is serviced.

DTC P0872 OR P0873

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0872

Transmission Fluid Pressure Switch 3 Circuit Low Voltage

DTC P0873

Transmission Fluid Pressure Switch 3 Circuit High Voltage

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Component	Description
B12A Transmission Fluid Pressure Switch	B12A is part of the component: Q8 Control Solenoid Valve Assembly
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly

No external circuit diagnosis is involved.

Conditions for Running the DTC

- DTC P0711-P0713, P0716, P0717, P0722, P0723, P0742, P0751, P0757, P0973, P0974, P0976, P0977, P182E = Not set
- Engine Speed = 400 to 7, 500 RPM - For greater than 5 s

- Engine Speed = 550 RPM - Transmission = Drive
- High Side Driver = On
- Ignition Voltage = 9 to 32 V
- Transmission Fluid Temperature = -6.6 to 130B°C (-20 to 266B°F)

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P0872

Transmission Fluid Pressure Switch 3 Signal = Short to Ground - For greater than 1 s

P0873

Transmission Fluid Pressure Switch 3 Signal = Short to Voltage - For greater than 1 s

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type C DTC - Additional actions taken:

Transmission Adaptive Pressure Control = Freeze current adapt values

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type C DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or Inline Harness Connector End Views - Index or Component Connector End Views - Index

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

Special Tools

DT-48616-10 Adapter Harness

Equivalent regional tools: Special Tools

Circuit/System Verification

1. Engine Running
2. Brake Pedal Applied
3. Transmission = Select each position
4. Verify the scan tool parameter: Transmission Fluid Pressure Switch

Refer to [Transmission Fluid Pressure Switch Logic](#)

- **If not the specified state**

Refer to Circuit/System Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC does not set**

6. All OK.

Circuit/System Testing

1. Ignition/Vehicle - Off
2. Remove the component: Q8 Control Solenoid Valve Assembly
3. Install & Setup Special Tool DT-47825-10
4. Connect the tool between the test points: Q8 Control Solenoid Valve Assembly & Wiring Harness @ Vehicle
5. Use a suitable tool. Press and hold the switch - Transmission Fluid Pressure Switch
6. Verify the scan tool parameter changes
 - Transmission Fluid Pressure Switch 1
 - Transmission Fluid Pressure Switch 2
 - Transmission Fluid Pressure Switch 4
 - Transmission Fluid Pressure Switch 5
 - **If the parameter state does not change**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the parameter state changes**

7. Verify a condition does not exist with the component: Filter Plate Assembly

- **If a condition exists**

Clean the components as necessary.

- **Go to next step: If no condition exists**

8. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0877 OR P0878

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0877

Transmission Fluid Pressure Switch 4 Circuit Low Voltage

DTC P0878

Transmission Fluid Pressure Switch 4 Circuit High Voltage

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Component	Description
B12A Transmission Fluid Pressure Switch	B12A is part of the component: Q8 Control Solenoid Valve Assembly
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly

No external circuit diagnosis is involved.

Conditions for Running the DTC

- DTC P0711-P0713, P0716, P0717, P0722, P0723, P0742, P0751, P0757, P0973, P0974, P0976, P0977, P182E = Not set
- Engine Speed = 400 to 7, 500 RPM - For greater than 5 s
- Engine Speed = 550 RPM - Transmission = Drive
- High Side Driver = On
- Ignition Voltage = 9 to 32 V
- Transmission Fluid Temperature = -6.6 to 130B°C (-20 to 266B°F)

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P0877

Transmission Fluid Pressure Switch 4 Signal = Short to Ground - For greater than 1 s

P0878

Transmission Fluid Pressure Switch 4 Signal = Short to Voltage - For greater than 1 s

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type C DTC - Additional actions taken:

Transmission Adaptive Pressure Control = Freeze current adapt values

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type C DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or Inline Harness Connector End Views - Index or Component Connector End Views - Index

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

Special Tools

DT-48616-10 Adapter Harness

Equivalent regional tools: Special Tools

Circuit/System Verification

1. Engine - Running
2. Brake Pedal - Applied
3. Transmission - Select each position
4. Verify the scan tool parameter: Transmission Fluid Pressure Switch

Refer to Transmission Fluid Pressure Switch Logic

- **If not the specified state**

Refer to Circuit/System Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC does not set**

6. All OK.

Circuit/System Testing

1. Ignition/Vehicle - Off
2. Remove the component: Q8 Control Solenoid Valve Assembly
3. Install & Setup Special Tool DT-47825-10
4. Connect the tool between the test points: Q8 Control Solenoid Valve Assembly & Wiring Harness @ Vehicle
5. Use a suitable tool. Press and hold the switch - Transmission Fluid Pressure Switch
6. Verify the scan tool parameter changes
 - Transmission Fluid Pressure Switch 1
 - Transmission Fluid Pressure Switch 2
 - Transmission Fluid Pressure Switch 4
 - Transmission Fluid Pressure Switch 5
 - **If the parameter state does not change**

Replace the component: Q8 Control Solenoid Valve Assembly

 - **Go to next step: If the parameter state changes**
7. Verify a condition does not exist with the component: Filter Plate Assembly
 - **If a condition exists**

Clean the components as necessary.

 - **Go to next step: If no condition exists**
8. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0961-P0963

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

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

Typical Scan Tool Data

Line Pressure Control Solenoid Valve Control Circuit Open Test Status

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Engine = Running Parameter Normal Range: Not Run or OK			
Control	Malfunction	Malfunction	Not Run or OK

Line Pressure Control Solenoid Valve Control Circuit Low Voltage Test Status

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Engine = Running Parameter Normal Range: OK or Not Run			
Control	Malfunction	Malfunction	Not Run or OK

Line Pressure Control Solenoid Valve Control Circuit High Voltage Test Status

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Engine = Running Parameter Normal Range: OK or Not Run			
Control	Not Run or OK	Not Run or OK	Malfunction

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
Control	The output circuit is switched to ground to activate the component. The output is PWM controlled.

Component	Description
K71 Transmission Control Module	The control module contains a microprocessor used to process input data to control outputs. The control module contains a microprocessor used to process input data to control outputs. The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation.
Q8 Control Solenoid Valve Assembly	A linear solenoid actuator is an electro-mechanical device that converts electrical power into a mechanical pushing or pulling force or motion.

Component	Description
	• The solenoid actuator varies the force depending on the current applied to the solenoid coil. • The solenoid actuator applies minimum force with minimum current applied to the solenoid coil. • The solenoid actuator applies maximum force with maximum current applied to the solenoid coil.

Conditions for Running the DTC

- Engine Speed = 400 to 7, 500 RPM - For greater than 5 s
- Ignition Voltage = 9 to 32 V

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P0961

Control Circuit = Commanded state does not match the actual state - For greater than 5 s

P0962

Line Pressure Control Solenoid Valve Control Circuit = Short to Ground - For greater than 1 s

P0963

Line Pressure Control Solenoid Valve Control Circuit = Short to Voltage - For greater than 1 s

Actions Taken When the DTC Sets

P0961, P0963

- DTC P0961, P0963 = Type B DTC - Additional actions taken:
- Line Pressure Command = Maximum
- Transmission Adaptive Pressure Control = Freeze current adapt values

P0962

- DTC P0962 = Type A DTC - Additional actions taken:
- Engine Torque = Reduced
- Grade braking = Disabled
- High Side Driver = Off
- Line Pressure Command = Maximum
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- Powertrain braking = Disabled
- Tap Up/Tap Down = Disabled
- Transmission Adaptive Pressure Control = Freeze current adapt values
- Transmission gear allowed = 2nd Gear or Neutral

Conditions for Clearing the DTC

DTC P0961, P0963 = Type B DTC

DTC P0962 = Type A DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or Inline Harness Connector End Views - Index or Component Connector End Views - Index

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

Special Tools

DT-48616-10 Adapter Harness

Equivalent regional tools: Special Tools

Circuit/System Verification

1. Engine Running
2. Brake Pedal Applied
3. Transmission = Select each position - For 3 s
4. Verify the scan tool parameter: = OK or Not Run
 - Line Pressure Control Solenoid Valve Performance Test Status
 - Line Pressure Control Solenoid Valve Control Circuit High Voltage Test Status
 - Line Pressure Control Solenoid Valve Control Circuit Low Voltage Test Status
 - **If not the specified state**

Refer to Circuit/System Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC does not set**

6. All OK.

Circuit/System Testing

1. Ignition/Vehicle - Off & Remove - Test lamp
2. Remove the component: Q8 Control Solenoid Valve Assembly
3. Verify a condition does not exist with the component: Q8 Control Solenoid Valve Assembly

Refer to [Control Solenoid Valve and Transmission Control Module Assembly Inspection](#)

- **If a condition exists**

Clean the components as necessary.

- **Go to next step: If no condition exists**

4. Install & Setup Special Tool DT-47825-10
5. Connect the tool between the test points: Q8 Control Solenoid Valve Assembly & Wiring Harness @ Vehicle
6. Verify the scan tool parameter: = OK or Not Run
 - Line Pressure Control Solenoid Valve Performance Test Status
 - Line Pressure Control Solenoid Valve Control Circuit High Voltage Test Status
 - Line Pressure Control Solenoid Valve Control Circuit Low Voltage Test Status
 - **If not the specified state**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the specified state**

7. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0965-P0967

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

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

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
Control	The output circuit is switched to ground to activate the component.

Component	Description
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly
Q27B Pressure Control Solenoid Valve 2	A solenoid valve is an electro-mechanically operated valve. The valve is controlled by an electric current through the solenoid. The solenoid valve varies the control pressure depending on the current applied to the solenoid coil. • The solenoid valve control pressure decreases with increasing current. • The solenoid valve control pressure is high with minimum current. • Q27B is part of the component: Q8 Control Solenoid Valve Assembly

No external circuit diagnosis is involved.

Conditions for Running the DTC

- Engine Speed = 400 to 7, 500 RPM
- High Side Driver = On
- Ignition Voltage = 9 to 32 V

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 5 s

Conditions for Setting the DTC

P0965

Control Circuit = Commanded state does not match the actual state - For greater than 5 s - Within 5 s

P0966

Control Circuit = Short to Ground - For greater than 1 s - Within 1 s

P0967

Control Circuit = Open Circuit or Short to Voltage - For greater than 1 s Within 1 s

Actions Taken When the DTC Sets

DTC P0965 = Type C DTC - Additional actions taken:

Transmission Adaptive Pressure Control = Freeze current adapt values

DTC P0966, P0967 = Type A DTC - Additional actions taken:

- High Side Driver = Disabled
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- TCC Control = Disabled
- Transmission Adaptive Pressure Control = Freeze current adapt values
- Transmission gear allowed = Reverse & 3rd Gear

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type A DTC - Exceptions listed below

DTC P0965 = Type C DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or **Inline Harness Connector End Views - Index** or **Component Connector End Views - Index**

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

Special Tools

DT-48616-10 Adapter Harness

Equivalent regional tools: **Special Tools**

Circuit/System Verification

1. Transmission = Park
2. Engine - Idling - At normal operating temperature
3. Perform the scan tool control function: Pressure Control Solenoid Valve 2 - On

Verify the scan tool parameter:

- Pressure Control Solenoid Valve 2 Control Circuit High Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 2 Control Circuit Low Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 2 Performance Test Status = OK Not Run
- **If not the specified state**

Refer to Component Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Component Testing

- **Go to next step: If the DTC is not set**

5. All OK.

Component Testing

1. Ignition/Vehicle - Off
2. Remove the component: Q8 Control Solenoid Valve Assembly
3. Verify a condition does not exist with the component: Contamination with metallic debris

- **If a condition exists**

Repair or replace as necessary

- **Go to next step: If no condition exists**

4. Verify the resistance is within the specified range for each solenoid valve. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Inspection](#)

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

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the resistance is within range**

5. Install Special Tool DT-48616-10 Adapter Harness @ Q8 Control Solenoid Valve Assembly & Vehicle wiring harness X1

6. Ignition - On / Vehicle - In Service Mode

7. Perform the scan tool control function: Pressure Control Solenoid Valve 2 - On

Verify the scan tool parameter:

- Pressure Control Solenoid Valve 2 Control Circuit High Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 2 Control Circuit Low Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 2 Performance Test Status = OK or Not Run
- **If not the specified state**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the specified state**

8. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0969-P0971

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

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

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
Control	The output circuit is switched to ground to activate the component.

Component	Description
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly
Q27C Pressure Control Solenoid Valve 3	A solenoid valve is an electro-mechanically operated valve. The valve is controlled by an electric current through the solenoid. The solenoid valve varies the control pressure depending on the current applied to the solenoid coil. • The solenoid valve control pressure is high with minimum current.

Component	Description
	The solenoid valve control pressure decreases with increasing current. Q27C is part of the component: Q8 Control Solenoid Valve Assembly

No external circuit diagnosis is involved.

Conditions for Running the DTC

- Engine Speed = 400 to 7, 500 RPM
- Ignition Voltage = 9 to 32 V

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 5 s

Conditions for Setting the DTC

P0969

Control Circuit = Commanded state does not match the actual state - For greater than 5 s - Within 5 s

P0970

Control Circuit = Short to Ground - For greater than 1 s

P0971

Control Circuit = Open Circuit or Short to Voltage - For greater than 1 s

Actions Taken When the DTC Sets

P0969 = Type C DTC - Additional actions taken:

Freeze current adapt values - 4-5-6 Clutch

DTC P0970, P0971 = Type A DTC - Additional actions taken:

- Grade braking = Disabled
- High Side Driver = Disabled
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- Powertrain braking = Disabled
- TCC Control = Disabled
- Transmission Adaptive Pressure Control = Freeze current adapt values
- Transmission gear allowed = Reverse & 3rd Gear

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type A DTC - Exceptions listed below

DTC P0969 = Type C DTC

Reference Information

Schematic Reference

[Automatic Transmission Controls Wiring Schematics](#)

Connector End View Reference

[Master Electrical Component List](#) , or [Inline Harness Connector End Views - Index](#) or [Component Connector End Views - Index](#)

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](#)

Special Tools

DT-48616-10 Adapter Harness

Equivalent regional tools: [Special Tools](#)

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Perform the scan tool control function: Pressure Control Solenoid Valve 3 - On and Off

Verify the scan tool parameter:

- Pressure Control Solenoid Valve 3 Control Circuit High Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 3 Control Circuit Low Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 3 Control Circuit Open Test Status = OK or Not Run
- **If not the specified state**

Refer to Component Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Component Testing

- **Go to next step: If the DTC is not set**

4. All OK.

Component Testing

1. Ignition/Vehicle - Off
2. Remove the component: Q8 Control Solenoid Valve Assembly
3. Verify a condition does not exist with the component: Contamination with metallic debris
 - **If a condition exists**

Repair or replace as necessary
 - **Go to next step: If no condition exists**
4. Verify the resistance is within the specified range for each solenoid valve. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Inspection](#)
 - **If the resistance is not within range**

Replace the component: Q8 Control Solenoid Valve Assembly
 - **Go to next step: If the resistance is within range**
5. Install Special Tool DT-48616-10 Adapter Harness @ Q8 Control Solenoid Valve Assembly & Vehicle wiring harness X1
6. Connect the electrical connector: B15 Transmission Internal Mode Switch
7. Ignition - On / Vehicle - In Service Mode
8. Perform the scan tool control function: Pressure Control Solenoid Valve 3 - On and Off

Verify the scan tool parameter:

- Pressure Control Solenoid Valve 3 Control Circuit High Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 3 Control Circuit Low Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 3 Control Circuit Open Test Status = OK or Not Run
- **If not the specified state**

Replace the component: Q8 Control Solenoid Valve Assembly
- **Go to next step: If the specified state**

9. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0973 OR P0974

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0973

Shift Solenoid Valve 1 Control Circuit Low Voltage

DTC P0974

Shift Solenoid Valve 1 Control Circuit High Voltage

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
Control	The output circuit is switched to ground to activate the component.

Component	Description
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly
Q32A Shift Solenoid Valve 1	A solenoid valve is an electro-mechanically operated valve. The valve is controlled by an electric current through the solenoid. This is a normally closed valve that is controlled on/off. Q32A is part of the component: Q8 Control Solenoid Valve Assembly

No external circuit diagnosis is involved.

Conditions for Running the DTC

- Engine Speed = 400 to 7, 500 RPM
- Ignition Voltage = 9 to 32 V

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P0973

Control Circuit = Short to Ground - For greater than 2 s

P0974

Control Circuit = Open Circuit or Short to Voltage - For greater than 2 s

Actions Taken When the DTC Sets

DTC P0973 = Type A DTC - Additional actions taken:

- Grade braking = Disabled
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- Tow/Haul Mode = Disabled
- TCC Control = Disabled

- Torque Management = Enabled
- Transmission Adaptive Pressure Control = Freeze current adapt values
- {Output Speed Sensor = Greater than 1, 350 RPM} Transmission = Neutral
- {Output Speed Sensor = Less than 1, 350 RPM} Transmission = 2nd Gear

DTC P0974 = Type B DTC - Additional actions taken:

- 1st Gear = Disabled
- Neutral Idle Mode = Disabled

Conditions for Clearing the DTC

DTC P0973 = Type A DTC

DTC P0974 = Type B DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or Inline Harness Connector End Views - Index or Component Connector End Views - Index

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

Special Tools

DT-48616-10 Adapter Harness

Equivalent regional tools: Special Tools

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Perform the scan tool control function: Shift Solenoid Valve 1 - On and Off

Verify the scan tool parameter:

- Shift Solenoid Valve 1 Control Circuit High Voltage Test Status = OK or Not Run
- Shift Solenoid Valve 1 Control Circuit Low Voltage Test Status = OK or Not Run
- Shift Solenoid Valve 1 Control Circuit Open Test Status = OK or Not Run

- **If not the specified state**

Refer to Component Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Component Testing

- **Go to next step: If the DTC is not set**

4. All OK.

Component Testing

1. Ignition/Vehicle - Off

2. Remove the component: Q8 Control Solenoid Valve Assembly

3. Verify a condition does not exist with the component: Contamination with metallic debris

- **If a condition exists**

Repair or replace as necessary

- **Go to next step: If no condition exists**

4. Verify the resistance is within the specified range for each solenoid valve. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Inspection](#)

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

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the resistance is within range**

5. Install Special Tool DT-48616-10 Adapter Harness @ Q8 Control Solenoid Valve Assembly & Vehicle wiring harness X1

6. Connect the electrical connector: B15 Transmission Internal Mode Switch

7. Ignition - On / Vehicle - In Service Mode

8. Perform the scan tool control function: Pressure Control Solenoid Valve 1 - On and Off

Verify the scan tool parameter:

- Shift Solenoid Valve 1 Control Circuit High Voltage Test Status = OK or Not Run
- Shift Solenoid Valve 1 Control Circuit Low Voltage Test Status = OK or Not Run
- Shift Solenoid Valve 1 Control Circuit Open Test Status = OK or Not Run

- **If not the specified state**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the specified state**

9. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0976 OR P0977

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0976

Shift Solenoid Valve 2 Control Circuit Low Voltage

DTC P0977

Shift Solenoid Valve 2 Control Circuit High Voltage

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
Control	The output circuit is switched to ground to activate the component.

Component	Description
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly
Q32B Shift Solenoid Valve 2	A solenoid valve is an electro-mechanically operated valve. The valve is controlled by an electric current through the solenoid. This is a normally closed valve that is controlled on/off. Q32B is part of the component: Q8 Control Solenoid Valve Assembly

No external circuit diagnosis is involved.

Conditions for Running the DTC

- Engine Speed = 400 to 7, 500 RPM
- Ignition Voltage = 9 to 32 V

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P0973

Control Circuit = Short to Ground - For greater than 2 s

P0974

Control Circuit = Open Circuit or Short to Voltage - For greater than 2 s

Actions Taken When the DTC Sets

DTC P0976 = Type C DTC - Additional actions taken:

Transmission Adaptive Pressure Control = Freeze current adapt values

DTC P0977 = Type A DTC - Additional actions taken:

- Grade braking = Disabled
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- Tow/Haul Mode = Disabled
- TCC Control = Disabled
- Torque Management = Enabled
- Transmission Adaptive Pressure Control = Freeze current adapt values
- {Output Speed Sensor = Greater than 1, 350 RPM} Transmission = Neutral
- {Output Speed Sensor = Less than 1, 350 RPM} Transmission = 2nd Gear

Conditions for Clearing the DTC

DTC P0976 = Type C DTC

DTC P0977 = Type A DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or **Inline Harness Connector End Views - Index** or **Component Connector End Views - Index**

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

Special Tools

DT-48616-10 Adapter Harness

Equivalent regional tools: [Special Tools](#)

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Perform the scan tool control function: Shift Solenoid Valve 2 - On and Off

Verify the scan tool parameter:

- Shift Solenoid Valve 2 Control Circuit High Voltage Test Status = OK or Not Run
- Shift Solenoid Valve 2 Control Circuit Low Voltage Test Status = OK or Not Run
- Shift Solenoid Valve 2 Control Circuit Open Test Status = OK or Not Run
- **If not the specified state**

Refer to Component Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Component Testing

- **Go to next step: If the DTC is not set**

4. All OK.

Component Testing

1. Ignition/Vehicle - Off
2. Remove the component: Q8 Control Solenoid Valve Assembly
3. Verify a condition does not exist with the component: Contamination with metallic debris

- **If a condition exists**

Repair or replace as necessary

- **Go to next step: If no condition exists**

4. Verify the resistance is within the specified range for each solenoid valve. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Inspection](#)

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

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the resistance is within range**

5. Install Special Tool DT-48616-10 Adapter Harness @ Q8 Control Solenoid Valve Assembly & Vehicle wiring harness X1
6. Connect the electrical connector: B15 Transmission Internal Mode Switch
7. Ignition - On / Vehicle - In Service Mode
8. Perform the scan tool control function: Shift Solenoid Valve 2 - On and Off

Verify the scan tool parameter:

- Shift Solenoid Valve 2 Control Circuit High Voltage Test Status = OK or Not Run
- Shift Solenoid Valve 2 Control Circuit Low Voltage Test Status = OK or Not Run
- Shift Solenoid Valve 2 Control Circuit Open Test Status = OK or Not Run
- **If not the specified state**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the specified state**

9. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P0989 OR P0990

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P0989

Transmission Fluid Pressure Switch 5 Circuit Low Voltage

DTC P0990

Transmission Fluid Pressure Switch 5 Circuit High Voltage

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Component	Description
B12A Transmission Fluid Pressure Switch	B12A is part of the component: Q8 Control Solenoid Valve Assembly
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly

No external circuit diagnosis is involved.

Conditions for Running the DTC

- DTC P0711-P0713, P0716, P0717, P0722, P0723, P0742, P0751, P0757, P0973, P0974, P0976, P0977, P182E = Not set
- Engine Speed = 400 to 7, 500 RPM - For greater than 5 s
- Engine Speed = 550 RPM - Transmission = Drive
- High Side Driver = On
- Ignition Voltage = 9 to 32 V
- Transmission Fluid Temperature = -6.6 to 130B°C (-20 to 266B°F)

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P0989

Transmission Fluid Pressure Switch 5 Signal = Short to Ground - For greater than 1 s

P0990

Transmission Fluid Pressure Switch 5 Signal = Short to Voltage - For greater than 1 s

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type C DTC - Additional actions taken:

Transmission Adaptive Pressure Control = Freeze current adapt values - Clutch 4-5-6

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type C DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or Inline Harness Connector End Views - Index or Component Connector End Views - Index

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

Special Tools

Equivalent regional tools: [Special Tools](#)

Circuit/System Verification

1. Engine - Running
2. Brake Pedal - Applied
3. Transmission - Select each position
4. Verify the scan tool parameter: Transmission Fluid Pressure Switch

Refer to [Transmission Fluid Pressure Switch Logic](#)

- **If not the specified state**

Refer to Circuit/System Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC does not set**

6. All OK.

Circuit/System Testing

1. Ignition/Vehicle - Off
2. Remove the component: Q8 Control Solenoid Valve Assembly
3. Install & Setup Special Tool DT-47825-10
4. Connect the tool between the test points: Q8 Control Solenoid Valve Assembly & Wiring Harness @ Vehicle
5. Use a suitable tool. Press and hold the switch - Transmission Fluid Pressure Switch
6. Verify the scan tool parameter changes
 - Transmission Fluid Pressure Switch 1
 - Transmission Fluid Pressure Switch 2
 - Transmission Fluid Pressure Switch 4
 - Transmission Fluid Pressure Switch 5
 - **If the parameter state does not change**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the parameter state changes**

7. Verify a condition does not exist with the component: Filter Plate Assembly

- **If a condition exists**

Clean the components as necessary.

- **Go to next step: If no condition exists**

8. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P1761

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P1761

Up and Down Shift Switch Signal Message Counter Incorrect

Circuit/System Description

Control modules connected to the serial data circuits monitor the communication during normal vehicle operation. Operating information and commands are exchanged among the control modules. Each module on the serial data circuit maintains a transmit error counter and a receive error counter. The counter values increase with detected errors and decrease with error-free messages.

Conditions for Running the DTC

Engine Speed = 400 to 7, 500 RPM

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 5 s

Conditions for Setting the DTC

Serial Data = Message Counter Incorrect - Between the following control modules:

- K9 Body Control Module
- K71 Transmission Control Module

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type C DTC

Manual Shift Control /Tap Up & Tap Down = Disabled

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type C DTC

Reference Information

DTC Type Reference

[Powertrain Diagnostic Trouble Code \(DTC\) Type Definitions](#)

Scan Tool Reference

[Control Module References](#)

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Verify there are no DTCs set related to the following component/system: Serial Data
 - **If a related DTC is set**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#)

- **If a related DTC is not set**
 1. Ignition/Vehicle - Off
 2. Replace the component: Q8 Control Solenoid Valve Assembly
 3. Operate the vehicle within the Conditions for Running the DTC.
 4. Verify the DTC does not set.
 - If the DTC sets - Replace the component: K9 Body Control Module
 - Go to next step: If the DTC is not set
 5. All OK.
 - **Go to next step: If no DTC is set**
3. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P182E OR P1915

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

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 terminal A	P182E	P1915	P1915*	P182E, P1915
Signal terminal B	P1915	P182E	P182E*	P182E, P1915
Signal terminal C	P1915	P182E	P182E*	P182E, P1915
Signal terminal P	P182E	P1915	P1915*	P182E, P1915
Low Reference	-	P182E	P182E*	P182E, P1915
*Internal control module or component damage may occur if the circuit shorts to B+.				

Typical Scan Tool Data

Internal Mode Switch A/B/C/P

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Ignition = On Parameter Normal Range: High or Low			
Signal	Low	High	High
Low Reference	-	High	-

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
Signal	The control module input circuit has an internal resistance connected to 12 V.
Low Reference	Grounded through the control module.

Component	Description
B15 Transmission Internal Mode Switch	The assembly contains 5 individual switches.
K20 Engine Control Module	The control module contains a microprocessor used to process input data to control outputs.
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation.

The control module K71 uses 4 of the switches as inputs to determine the gear selector lever position. The control module K20 uses 1 of the switches as an input to determine when the transmission is in park or neutral for engine starting.

Conditions for Running the DTC

- Ignition Voltage = 6 to 32 V
- {P1915} DTC P0722, P0723 = Not set
- {P1915} Transmission Output Speed = Less than 90 RPM

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

DTC P182E

Internal Mode Switch Indicates Invalid Range - For greater than 7 s

DTC P1915

Park or neutral not indicated during the following sequence:

- Engine Speed = Less than 50 RPM - For greater than 0.1 s
- Engine Speed = 50 to 480 RPM - For greater than 0.07 s
- Engine Speed = Greater than 500 RPM- For greater than 1.2 s

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type B DTC - Additional actions taken:

- High Side Driver = Disabled
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Neutral Idle Mode = Disabled
- Torque Converter Clutch = Disabled
- Torque Management = Enabled
- Transmission = 3rd Gear
- Transmission Adaptive Pressure Control = Freeze current adapt values

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type B DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or Inline Harness Connector End Views - Index or Component Connector End Views - Index

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

Circuit/System Verification

1. Verify DTC P0851 is not set.
 - If the DTC is set

Refer to **DTC P0851**

2. Perform the following action: **Range Selector Lever Cable Adjustment**
3. Operate the component: S3 Transmission Shift Lever - Select each position

Verify the scan tool parameter: Internal Mode Switch A/B/C/P = The switch states match the values given in the table. - Refer to **Transmission Internal Mode Switch Logic**

- **If not the specified state**

Refer to Circuit/System Testing

- **Go to next step: If the specified state**

4. Operate the component: S3 Transmission Shift Lever - Select each position

- {R, D, M} Verify the scan tool parameter: Park/Neutral Position Switch @ Engine Control Module = In Gear
- {P, N} Verify the scan tool parameter: Park/Neutral Position Switch @ Engine Control Module = Park/Neutral
- **If not the specified state**

Refer to Circuit/System Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC is not set**

6. All OK.

Circuit/System Testing

NOTE: It may take up to 2 min for all vehicle systems to power down before an accurate ground or low reference circuit continuity test can be performed.

1. Ignition/Vehicle & All vehicle systems - Off
2. Remove the component: Control Valve Body Cover
3. Connect the electrical connector: X1 @ Q8 Control Solenoid Valve Assembly
4. Disconnect the electrical connector: B15 Transmission Internal Mode Switch
5. Ignition - On / Vehicle - In Service Mode
6. Verify the scan tool parameter: Internal Mode Switch A/B/C/P = High High High High

- **If not the specified state**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the specified state**

7. Verify the scan tool parameter: Park/Neutral Position Switch = In Gear

- **If not the specified state**

1. Ignition/Vehicle - Off
2. Disconnect the appropriate electrical connector: Engine Control Module
3. Test for infinite resistance between the test points: Signal circuit terminal A @ Q8 Control Solenoid Valve Assembly & Ground
 - If less than infinite resistance - Repair the short to ground on the circuit.
 - If infinite resistance - Replace the component: K20 Engine Control Module

- **Go to next step: If the specified state**

8. Connect a 3 A fused jumper wire between each of the following circuit pairs, one at a time:

- Signal circuit terminal B & Low Reference circuit terminal F @ Q8 Control Solenoid Valve Assembly
- Signal circuit terminal C & Low Reference circuit terminal F @ Q8 Control Solenoid Valve Assembly

- Signal circuit terminal D & Low Reference circuit terminal F @ Q8 Control Solenoid Valve Assembly
- Signal circuit terminal E & Low Reference circuit terminal F @ Q8 Control Solenoid Valve Assembly

Verify the scan tool parameter: Internal Mode Switch A/B/C/P = 3 High and 1 Low

- **If not the specified state**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the specified state**

9. Connect a 3 A fused jumper wire between the test points: Signal circuit terminal A & Low Reference circuit terminal F @ Q8 Control Solenoid Valve Assembly

Verify the scan tool parameter: Park/Neutral Position Switch = Park/Neutral

- **If not the specified state**

1. Test for less than 1 V between the test points: Signal circuit terminal A @ Q8 Control Solenoid Valve Assembly & Ground

- If 1 V or greater - Repair the short to voltage on the circuit.
- Go to next step: If less than 1 V

2. Ignition/Vehicle - Off

3. Disconnect the appropriate electrical connector: Engine Control Module

4. Test for less than 10 ohms between the test points: Signal circuit terminal F @ Q8 Control Solenoid Valve Assembly & The other end of the circuit

- If 10 ohms or greater - Repair the open/high resistance in the circuit.
- If less than 10 ohms - Replace the component: K20 Engine Control Module

- **Go to next step: If the specified state**

10. Test or replace the component: B15 Transmission Internal Mode Switch

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- [Control Valve Body Assembly Removal](#)
- [Control Valve Body Assembly Installation](#)
- [Manual Shift Shaft Position Switch Replacement](#) - B15 Transmission Internal Mode Switch
- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P2714 OR P2715

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P2714

Pressure Control Solenoid Valve 4 Stuck Off

DTC P2715

Pressure Control Solenoid Valve 4 Stuck On

Diagnostic Fault Information

NOTE: The components are listed from the least to the most intrusive to service.

Component	DTC	Condition
Q8 Control Solenoid Valve Assembly	P2714, P2715	• Q27D Pressure Control Solenoid Valve 4 - Binding or Sticking/Stuck • Control Solenoid Valve Assembly Filter Plate - Blocked or Cracked • O-Ring - Leaking
Control Valve Channel Plate	P2714	Oil Channels or Orifices - Restricted
Control Valve Channel Plate Spacer Plate	P2714	Oil Channels or Orifices - Restricted
Control Valve Body	P2714, P2715	2-6 Clutch Regulator Valve - Binding or Sticking/Stuck
Automatic Transmission Fluid Filter	P2714	Oil Filter Assembly Pipe Seal - Leaking
Torque Converter with Fluid Pump Housing Assembly	P2714	Transmission Fluid Pump Housing - Scored/Worn
2-6 Clutch Backing Plate Retaining Ring	P2714	Retaining Ring - Not seated correctly
Output Sun Gear Assembly	P2714	Output Sun Gear - Broken Weld
2-6 Clutch Assembly	P2714	• 2-6 Clutch Piston Assembly - Cracked • 2-6 Piston Seal - Leaking

Circuit/System Description

For an overview of the component/system, refer to

- [Drive Range, First Gear](#)
- [Drive Range, Second Gear](#)
- [Drive Range, Third Gear](#)
- [Drive Range, Fourth Gear](#)
- [Drive Range, Fifth Gear](#)
- [Drive Range, Sixth Gear](#)
- [Reverse](#)
- [Electronic Component Description](#)
- [Fluid Passages](#)

The solenoid valve directs fluid pressure to the 2-6 regulator valve that controls the fluid pressure to the 2-6 clutch.

DTC P2714, P2715 will set with a hydraulic/mechanical condition.

Conditions for Running the DTC

DTC P2714

- DTC P0101 - P0103, P0106 - P0108, P0171, P0172, P0174, P0175, P0201 - P0208, P0300 - P0308, P0401, P042E, P0716, P0717, P0722, P0723, P18BA-P182F, P18C0-P18C3, P1915, P2534 = Not set
- Accelerator Pedal Position Sensor = Greater than 0.5%
- Accelerator pedal position signal = Valid
- Engine Speed = 400 to 7, 500 RPM
- High Side Driver = Enabled
- Ignition Voltage = 9 to 32 V
- Internal Mode Switch Default
- Transmission Output Speed = Greater than 67 RPM
- Transmission Fluid Temperature = Warmer than -6.6B°C (20.1B°F)
- 2-6 Clutch = Applied

Frequency the DTC runs = Continuously - After the running conditions are met

DTC P2715

- DTC P0101 - P0103, P0106 - P0108, P0171, P0172, P0174, P0175, P0201 - P0208, P0300 - P0308, P0401, P042E, P0716, P0717, P0722, P0723, P18BA-P182F, P18C0-P18C3, P1915, P2534 = Not set
- 2-6 Clutch = Commanded Off
- Commanded gear = 1st Gear
- High Side Driver = Enabled
- Transmission Input Speed = Greater than 150 RPM
- Transmission Output Speed = Greater than 100 RPM

Conditions for Setting the DTC

P2714

Transmission Gear Ratio = Incorrect

The above condition(s) must occur 3 times.

P2715

2-6 Clutch = Applied

Transmission Gear Ratio = Incorrect

The above condition(s) must occur 3 times.

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type A DTC - Additional actions taken:

- Grade braking = Disabled
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- {P2715} {Output Speed Sensor = Greater than 1, 400 RPM} Transmission = Neutral
- {P2715} {Output Speed Sensor = Less than 1, 400 RPM} Transmission = 2nd Gear
- Powertrain braking = Disabled
- Transmission Adaptive Pressure Control = Freeze current adapt values

- {P2714} Transmission gear allowed = 3rd Gear & Reverse

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type A DTC

Reference Information

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References

Circuit/System Verification

1. Verify the condition does not exist: Incorrect fluid level or condition - Refer to [Transmission Fluid Level and Condition Check](#)

- **If a condition exists**

Repair or replace as necessary

- **Go to next step: If no condition exists**

2. Ignition - On / Vehicle - In Service Mode

3. Clear the DTCs.

4. Road test the vehicle. - Refer to [Road Test](#)

Verify DTC P0716, P0717, P0722, P0723 is not set.

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

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#)

- **Go to next step: If none of the DTCs are set**

5. Verify DTC P2714, P2715 is not set.

- **If DTC P2714 or P2715 is set**

Refer to Circuit/System Testing

- **Go to next step: If none of the DTCs are 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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC is not set**

7. All OK.

Circuit/System Testing

1. Verify the condition does not exist: Incorrect pressure - Refer to [Line Pressure Check](#)

- **If a condition exists**

Refer to [Fluid Pressure High or Low](#)

- **Go to next step: If no condition exists**

2. Ignition/Vehicle - Off

3. Remove the component: Q8 Control Solenoid Valve Assembly

4. Verify the procedure/test passes. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test](#)

- **If the procedure/test does not pass**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the procedure/test passes**

5. Refer to Diagnostic Fault Information

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P2719-P2721

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P2719

Pressure Control Solenoid Valve 4 System 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

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
Control	The output circuit is switched to ground to activate the component.

Component	Description
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation.

Component	Description
	K71 is part of the component: Q8 Control Solenoid Valve Assembly
Q27D Pressure Control Solenoid Valve 4	A solenoid valve is an electro-mechanically operated valve. The valve is controlled by an electric current through the solenoid. The solenoid valve varies the control pressure depending on the current applied to the solenoid coil. • The solenoid valve control pressure is high with minimum current. • The solenoid valve control pressure decreases with increasing current. Q27D is part of the component: Q8 Control Solenoid Valve Assembly

No external circuit diagnosis is involved.

Conditions for Running the DTC

- Engine Speed = 400 to 7, 500 RPM
- Ignition Voltage = 9 to 32 V

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 5 s

Conditions for Setting the DTC

P2719

Control Circuit = Commanded state does not match the actual state - For greater than 5 s - Within 5 s

P2720

Control Circuit = Short to Ground - For greater than 1 s

P2721

Control Circuit = Open Circuit or Short to Voltage - For greater than 1 s

Actions Taken When the DTC Sets

DTC P2719 = Type C DTC - Additional actions taken:

Freeze current adapt values - 4-5-6 Clutch

DTC P2720, P2721 = Type A DTC - Additional actions taken:

- Grade braking = Disabled
- High Side Driver = Disabled
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- {P2720} {Output Speed Sensor = Greater than 1, 350 RPM} Transmission = Neutral
- {P2720} {Output Speed Sensor = Less than 1, 350 RPM} Transmission = 2nd Gear

- Powertrain braking = Disabled
- TCC Control = Disabled
- Transmission Adaptive Pressure Control = Freeze current adapt values
- {P2721} Transmission = 3rd Gear

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type A DTC - Exceptions listed below

DTC P2719 = Type C DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or Inline Harness Connector End Views - Index or Component Connector End Views - Index

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

Special Tools

DT-48616-10 Adapter Harness

Equivalent regional tools: Special Tools

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Perform the scan tool control function: Pressure Control Solenoid Valve 4 - On and Off

Verify the scan tool parameter:

- Pressure Control Solenoid Valve 4 Control Circuit High Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 4 Control Circuit Low Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 4 Control Circuit Open Test Status = OK or Not Run
- **If not the specified state**

Refer to Component Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Component Testing

- **Go to next step: If the DTC is not set**

4. All OK.

Component Testing

1. Ignition/Vehicle - Off
2. Remove the component: Q8 Control Solenoid Valve Assembly
3. Verify a condition does not exist with the component: Contamination with metallic debris
 - **If a condition exists**
Repair or replace as necessary
 - **Go to next step: If no condition exists**
4. Verify the resistance is within the specified range for each solenoid valve. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Inspection](#)
 - **If the resistance is not within range**
Replace the component: Q8 Control Solenoid Valve Assembly
 - **Go to next step: If the resistance is within range**
5. Install Special Tool DT-48616-10 Adapter Harness @ Q8 Control Solenoid Valve Assembly & Vehicle wiring harness X1
6. Connect the electrical connector: B15 Transmission Internal Mode Switch
7. Ignition - On / Vehicle - In Service Mode
8. Perform the scan tool control function: Pressure Control Solenoid Valve 4 - On and Off

Verify the scan tool parameter:

- Pressure Control Solenoid Valve 4 Control Circuit High Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 4 Control Circuit Low Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 4 Control Circuit Open Test Status = OK or Not Run
- **If not the specified state**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the specified state**

9. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P2723 OR P2724

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P2723

Pressure Control Solenoid Valve 5 Stuck Off

DTC P2724

Pressure Control Solenoid Valve 5 Stuck On

Diagnostic Fault Information

NOTE: The components are listed from the least to the most intrusive to service.

Component	DTC	Condition
Q8 Control Solenoid Valve Assembly	P2723, P2724	• Q27E Pressure Control Solenoid Valve 5 - Binding or Sticking/Stuck • Control Solenoid Valve Assembly Filter Plate - Blocked or Cracked • O-Ring - Leaking
Control Valve Channel Plate	P2723	Oil Channels or Orifices - Restricted
Control Valve Channel Plate Spacer Plate	P2723	Oil Channels or Orifices - Restricted
Control Valve Body	P2723, P2724	1-2-3-4 Clutch Regulator Valve - Binding or Sticking/Stuck
Automatic Transmission Fluid Filter	P2723	Oil Filter Assembly Pipe Seal - Leaking
Torque Converter with Fluid Pump Housing Assembly	P2723	Transmission Fluid Pump Housing - Scored/Worn
1-2-3-4 Clutch Backing Plate Retaining Ring	P2723	Retaining Ring - Not seated correctly
Output Sun Gear Assembly	P2723	Output Sun Gear - Broken Weld
1-R and 1-2-3-4 Clutch Housing Assembly	P2723	• 1-2-3-4 Clutch Piston - Cracked • 1-2-3-4 Clutch Piston Seal - Leaking

Circuit/System Description

For an overview of the component/system, refer to

- [Drive Range, First Gear](#)
- [Drive Range, Second Gear](#)
- [Drive Range, Third Gear](#)
- [Drive Range, Fourth Gear](#)
- [Drive Range, Fifth Gear](#)
- [Drive Range, Sixth Gear](#)
- [Reverse](#)

- **Electronic Component Description**
- **Fluid Passages**

The solenoid valve directs fluid pressure to the 1-2-3-4 regulator valve that controls the fluid pressure to the 1-2-3-4 clutch.

DTC P2723, P2724 will set with a hydraulic/mechanical condition.

Conditions for Running the DTC

DTC P2723

- DTC P0101 - P0103, P0106 - P0108, P0171, P0172, P0174, P0175, P0201 - P0208, P0300 - P0308, P0401, P042E, P0716, P0717, P0722, P0723, P18BA-P182F, P18C0-P18C3, P1915, P2534 = Not set
- Accelerator Pedal Position Sensor = Greater than 0.5%
- Accelerator pedal position signal = Valid
- Engine Speed = 400 to 7, 500 RPM
- High Side Driver = Enabled
- Ignition Voltage = 9 to 32 V
- Internal Mode Switch Default
- Transmission Output Speed = Greater than 67 RPM
- Transmission Fluid Temperature = Warmer than -6.6B°C (20.1B°F)
- 1-2-3-4 Clutch = Applied

Frequency the DTC runs = Continuously - After the running conditions are met

DTC P2724

- DTC P0101 - P0103, P0106 - P0108, P0171, P0172, P0174, P0175, P0201 - P0208, P0300 - P0308, P0401, P042E, P0716, P0717, P0722, P0723, P18BA-P182F, P18C0-P18C3, P1915, P2534 = Not set
- 1-2-3-4 Clutch = Commanded Off
- Commanded gear = 1st Gear
- Transmission Input Speed = Greater than 150 RPM
- Transmission Output Speed = Greater than 100 RPM

Conditions for Setting the DTC

P2723

Transmission Gear Ratio = Incorrect

The above condition(s) must occur 3 times.

P2724

1-2-3-4 Clutch = Applied

Transmission Gear Ratio = Incorrect

The above condition(s) must occur 3 times.

Actions Taken When the DTC Sets

DTCs listed in the DTC Descriptor Category = Type A DTC - Additional actions taken:

- Grade braking = Disabled

- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Mode Switch = Disabled - {If equipped}
- Neutral Idle Mode = Disabled - {If equipped}
- {P2724} {Output Speed Sensor = Greater than 1, 400 RPM} Transmission = 4th Gear
- {P2724} {Output Speed Sensor = Less than 1, 400 RPM} Transmission = 2nd Gear
- Powertrain braking = Disabled
- Transmission Adaptive Pressure Control = Freeze current adapt values
- {P2723} Transmission gear allowed = 5th Gear & Reverse
- {P2724} Transmission gear allowed = 3rd Gear

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type A DTC

Reference Information

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References

Circuit/System Verification

WARNING: If DTC P2724 is present, the vehicle could have forward propulsion while in neutral. Failure to keep the brake pedal depressed while starting or shifting through the gear ranges may cause the vehicle to move forward resulting in potential vehicle damage and possibly injury or death.

1. Verify the condition does not exist: Incorrect fluid level or condition - Refer to Transmission Fluid Level and Condition Check
 - If a condition exists
Repair or replace as necessary
 - Go to next step: If no condition exists
2. Ignition - On / Vehicle - In Service Mode
3. Clear the DTCs.
4. Road test the vehicle. - Refer to Road Test

Verify DTC P0716, P0717, P0722, P0723 is not set.

- If any of the DTCs are set

Refer to Diagnostic Trouble Code (DTC) List - Vehicle

- Go to next step: If none of the DTCs are set

5. Verify DTC P2723, P2724 is not set.

- If DTC P2723 or P2724 is set

Refer to Circuit/System Testing

- **Go to next step: If none of the DTCs are 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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Circuit/System Testing

- **Go to next step: If the DTC is not set**

7. All OK.

Circuit/System Testing

1. Verify the condition does not exist: Incorrect pressure - Refer to [Line Pressure Check](#)

- **If a condition exists**

Refer to [Fluid Pressure High or Low](#)

- **Go to next step: If no condition exists**

2. Ignition/Vehicle - Off

3. Remove the component: Q8 Control Solenoid Valve Assembly

4. Verify the procedure/test passes. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test](#)

- **If the procedure/test does not pass**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the procedure/test passes**

5. Refer to Diagnostic Fault Information

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P2728-P2730

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

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

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
Control	The output circuit is switched to ground to activate the component.

Component	Description
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly
Q27E Pressure Control Solenoid Valve 5	A solenoid valve is an electro-mechanically operated valve. The valve is controlled by an electric current through the solenoid. The solenoid valve varies the control pressure depending on the current applied to the solenoid coil. • The solenoid valve control pressure is high with minimum current. • The solenoid valve control pressure decreases with increasing current. Q27E is part of the component: Q8 Control Solenoid Valve Assembly

No external circuit diagnosis is involved.

Conditions for Running the DTC

- Engine Speed = 400 to 7, 500 RPM
- Ignition Voltage = 9 to 32 V

Frequency the DTC runs = Continuously - After the running conditions are met

Conditions for Setting the DTC

P2728

Control Circuit = Commanded state does not match the actual state - For greater than 5 s - Within 5 s

P2729

Control Circuit = Short to Ground - For greater than 1 s

P2730

Control Circuit = Open Circuit or Short to Voltage - For greater than 1 s

Actions Taken When the DTC Sets

DTC P2728 = Type C DTC - Additional actions taken:

Freeze current adapt values - 2-6 Clutch

DTC P2729, P2730 = Type A DTC - Additional actions taken:

- Grade braking = Disabled
- High Side Driver = Disabled
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- {P2729} {Output Speed Sensor = Greater than 1, 350 RPM} Transmission = Neutral
- {P2729} {Output Speed Sensor = Less than 1, 350 RPM} Transmission = 2nd Gear
- Powertrain braking = Disabled
- TCC Control = Disabled
- Tow/Haul Mode = Disabled
- Transmission Adaptive Pressure Control = Freeze current adapt values

Conditions for Clearing the DTC

DTCs listed in the DTC Descriptor Category = Type A DTC - Exceptions listed below

DTC P2728 = Type C DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or **Inline Harness Connector End Views - Index** or **Component Connector End Views - Index**

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

Special Tools

DT-48616-10 Adapter Harness

Equivalent regional tools: [Special Tools](#)

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Perform the scan tool control function: Pressure Control Solenoid Valve 5 - On and Off

Verify the scan tool parameter:

- Pressure Control Solenoid Valve 5 Control Circuit High Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 5 Control Circuit Low Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 5 Control Circuit Open Test Status = OK or Not Run
- **If not the specified state**

Refer to Component Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Component Testing

- **Go to next step: If the DTC is not set**

4. All OK.

Component Testing

1. Ignition/Vehicle - Off
2. Remove the component: Q8 Control Solenoid Valve Assembly
3. Verify a condition does not exist with the component: Contamination with metallic debris

- **If a condition exists**

Repair or replace as necessary

- **Go to next step: If no condition exists**

4. Verify the resistance is within the specified range for each solenoid valve. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Inspection](#)

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

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the resistance is within range**

5. Install Special Tool DT-48616-10 Adapter Harness @ Q8 Control Solenoid Valve Assembly & Vehicle wiring harness X1
6. Connect the electrical connector: B15 Transmission Internal Mode Switch
7. Ignition - On / Vehicle - In Service Mode
8. Perform the scan tool control function: Pressure Control Solenoid Valve 5 - On and Off

Verify the scan tool parameter:

- Pressure Control Solenoid Valve 5 Control Circuit High Voltage Test Status = OK or Not Run

- Pressure Control Solenoid Valve 5 Control Circuit Low Voltage Test Status = OK or Not Run
- Pressure Control Solenoid Valve 5 Control Circuit Open Test Status = OK or Not Run
- **If not the specified state**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the specified state**

9. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

DTC P2762, P2763, OR P2764

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC P2762

Torque Converter Clutch (TCC) Pressure Control Solenoid Valve Performance

DTC P2763

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

DTC P2764

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

Circuit/System Description

For an overview of the component/system, refer to [Electronic Component Description](#)

Circuit	Description
Control	The output circuit is switched to ground to activate the component.

Component	Description
K71 Transmission Control Module	The control module receives information from a variety of sensors, switches and serial data information from other control modules. This information is used to control a combination of solenoid valves to obtain the correct line pressure, gear ratio and torque converter clutch operation. K71 is part of the component: Q8 Control Solenoid Valve Assembly
Q39A Torque Converter Clutch Pressure Control Solenoid Valve	A solenoid valve is an electro-mechanically operated valve. The valve is controlled by an electric current through the solenoid.

Component	Description
	The solenoid valve varies the control pressure depending on the current applied to the solenoid coil. • The solenoid valve control pressure is high with minimum current. • The solenoid valve control pressure decreases with increasing current. Q39A is part of the component: Q8 Control Solenoid Valve Assembly

No external circuit diagnosis is involved.

Conditions for Running the DTC

- Engine Speed = 400 to 7, 500 RPM
- {P2763, P2764} High Side Driver = Enabled
- Ignition Voltage = 9 to 32 V

Frequency the DTC runs = Continuously - After the running conditions are met - For greater than 5 s

Conditions for Setting the DTC

P2762

Control Circuit = Commanded state does not match the actual state - For greater than 5 s - Within 5 s

P2763

Control Circuit = Short to Ground - For greater than 1 s

P2764

Control Circuit = Open Circuit or Short to Voltage - For greater than 1 s

Actions Taken When the DTC Sets

DTC P2762 = Type C DTC

DTC P2763 = Type B DTC - Additional actions taken:

- 6th gear = Disabled - Transmission Hot Mode
- Line Pressure Command = Maximum
- Manual Shift Control = Disabled
- Neutral Idle Mode = Disabled
- TCC Control = Disabled
- Torque Management = Enabled
- Transmission Adaptive Pressure Control = Freeze current adapt values

DTC P2764 = Type A DTC - Additional actions taken:

- Engine Torque = Reduced
- High Side Driver = Disabled
- Line Pressure Command = Maximum

- Manual Shift Control = Disabled
- Mode Switch = Disabled
- Neutral Idle Mode = Disabled
- TCC Control = Disabled
- Torque Management = Enabled
- Transmission Adaptive Pressure Control = Freeze current adapt values

Conditions for Clearing the DTC

DTC P2762 = Type C DTC

DTC P2763 = Type B DTC

DTC P2764 = Type A DTC

Reference Information

Schematic Reference

Automatic Transmission Controls Wiring Schematics

Connector End View Reference

Master Electrical Component List , or Inline Harness Connector End Views - Index or Component Connector End Views - Index

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

Special Tools

DT-48616-10 Adapter Harness

Equivalent regional tools: Special Tools

Circuit/System Verification

1. Ignition - On / Vehicle - In Service Mode
2. Perform the scan tool control function: TCC Pressure Control Solenoid Valve - On and Off

Verify the scan tool parameter:

- TCC Pressure Control Solenoid Valve Control Circuit High Voltage Test Status = OK or Not Run
- TCC Pressure Control Solenoid Valve Control Circuit Low Voltage Test Status = OK or Not Run
- TCC Pressure Control Solenoid Valve Control Circuit Open Test Status = OK or Not Run

- **If not the specified state**

Refer to Component Testing

- **Go to next step: If the specified state**

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.

Verify the DTC does not set.

- **If the DTC sets**

Refer to Component Testing

- **Go to next step: If the DTC is not set**

4. All OK.

Component Testing

1. Ignition/Vehicle - Off

2. Remove the component: Q8 Control Solenoid Valve Assembly

3. Verify a condition does not exist with the component: Contamination with metallic debris

- **If a condition exists**

Repair or replace as necessary

- **Go to next step: If no condition exists**

4. Verify the resistance is within the specified range for each solenoid valve. - Refer to [Control Solenoid Valve and Transmission Control Module Assembly Inspection](#)

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

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the resistance is within range**

5. Install Special Tool DT-48616-10 Adapter Harness @ Q8 Control Solenoid Valve Assembly & Vehicle wiring harness X1

6. Connect the electrical connector: B15 Transmission Internal Mode Switch

7. Ignition - On / Vehicle - In Service Mode

8. Perform the scan tool control function: TCC Pressure Control Solenoid Valve - On and Off

Verify the scan tool parameter:

- TCC Pressure Control Solenoid Valve Control Circuit High Voltage Test Status = OK or Not Run
- TCC Pressure Control Solenoid Valve Control Circuit Low Voltage Test Status = OK or Not Run
- TCC Pressure Control Solenoid Valve Control Circuit Open Test Status = OK or Not Run

- **If not the specified state**

Replace the component: Q8 Control Solenoid Valve Assembly

- **Go to next step: If the specified state**

9. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair: [Diagnostic Repair Verification](#)

- Perform the scan tool configuration/reset function: [Reset Transmission Adapts](#)
- For control module replacement, programming, and setup refer to [Control Module References](#)

SOLENOID VALVE CHARACTERIZATION REPROGRAMMING

The solenoids in this transmission require unique performance characteristic data in order to function at maximum efficiency. This data is programmed and stored in the vehicle's transmission control module (TCM). When a transmission assembly, TCM, or solenoids are replaced during service, the performance characteristic data for the solenoids must be retrieved from a web server "cloud" repository and reprogrammed into the TCM.

Reprogramming also ensures that the characteristic data relationship is properly matched between the solenoids, valve body, and transmission.

Solenoid characterization reprogramming is performed using the TIS2Web Service Programming System (SPS).

Solenoid Reprogramming Procedure

Perform solenoid characterization reprogramming after one of the following service procedures:

NOTE: Select "Replace Transmission" at the MCVM Characterization selection screen.

- Replace transmission assembly

NOTE: Select "Replace Valve Body" at the MCVM Characterization selection screen.

- Replace valve body assembly

NOTE: Select "Replace Solenoid" at the MCVM Characterization selection screen.

- Replace solenoid (currently not an available Service Procedure)

NOTE: Select "Refresh Characterization Data" at the MCVM Characterization selection screen.

- Replace TCM

To perform solenoid characterization after a transmission component replacement:

1. Document the new Transmission Unique Number (TUN) or Part Unique Number (PUN) as required.
 - The TUN location may be found here: [TRANSMISSION IDENTIFICATION INFORMATION](#). Since the TUN can be difficult to access when the transmission is installed in the vehicle, ensure you document the 16-digit TUN prior to installing the transmission in the vehicle.
 - Before installing the control valve solenoid body onto the transmission, document the 16-digit PUN. If the control valve solenoid body PUN has not been saved for reference, it may be necessary to disassemble the control valve solenoid body from the transmission to clearly read the control valve solenoid body PUN.
2. Log into TIS2Web/SPS.
3. Type the vehicle identification number (VIN).
4. Perform the SPS Transmission Control Module programming event.
 - Select "Transmission Control Module - Programming" to update TCM calibrations and Solenoid Characterization data.

OR

- Select "Transmission Control Module - MCVM Operations" to update Solenoid Characterization data only.
5. From the "MCVM (Mechanical Characterization and Virtual Matching) Operation Selection" screen, select the applicable service procedure to be performed. You will be prompted to provide the necessary Transmission Unique Number (TUN) or Part Unique Number (PUN) when replacing a transmission part.
 6. After Solenoid Characterization Reprogramming has completed, turn the ignition OFF for at least 30 seconds and then turn back ON in order to reset the controller.

At this point, the system will read the VIN from the engine control module (ECM) using the multiple diagnostic interface (MDI) and then retrieve the applicable genealogy data tree from the cloud. This data tree accesses the original characterization data so that it may be updated with the new component information. The system acquires characterization data for the given TUN/PUN via the cloud and updates the genealogy tree. The TCM is updated with the correct solenoid characterization data, and the cloud is updated with the new genealogy relationship.

SYMPTOMS - AUTOMATIC TRANSMISSION

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

- Refer to [Diagnostic Starting Point - Vehicle](#) .
 - There are no DTCs set.
- IMPORTANT:
- 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](#) , or [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. [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 That Changes with Vehicle Speed](#)
 - [Whine/Growl Noise That Changes with Vehicle Speed](#)
 - [Noise in First or Reverse Gear](#)
 - [Noise in First, Second, Third, Fourth, Fifth, or Reverse Gear](#)
 - [Noise in First, Second, Sixth, or Reverse Gear](#)
 - [Noise in Second or Sixth Gear](#)
 - [Noise During 3-4 or 4-3 Shifts](#)

- Noise in Fourth, Fifth, or Sixth Gear
- Vibration
- Flex Plate/Torque Converter Vibration Test
- Noise and Vibration Analysis
- Range Performance Diagnosis
 - No Park or Drive
 - No Drive in All Ranges
 - No Reverse Gear
- Shift Quality Feel Diagnosis
 - Harsh Garage Shift
 - Harsh, Soft, Delayed or Slipping First or Reverse Gear
 - Harsh, Soft, Delayed or Slipping 1-2-3-4 Shift
 - Harsh, Soft, Delayed or Slipping 4-5-6 Shift
 - Harsh, Soft, Delayed or Slipping Third, Fifth, or Reverse Gear
 - Harsh, Soft, Delayed or Slipping Second or Sixth Gear
- Shift Pattern
 - No First Gear
 - 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

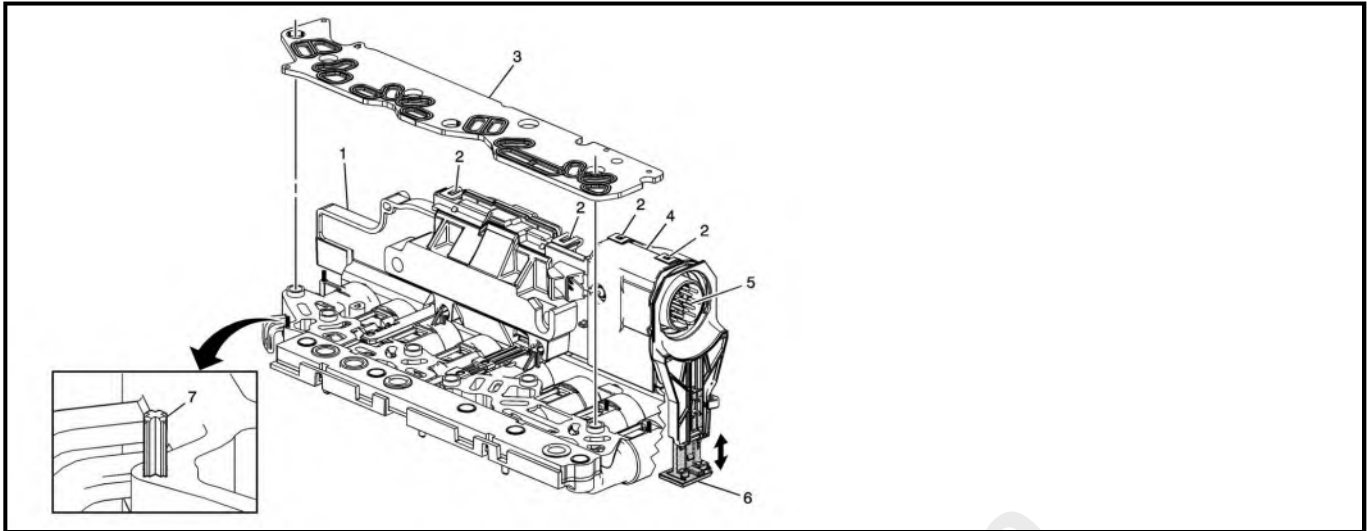
During transmission manufacturing and assembly, small pieces of material may become dislodged. This may also happen after the transmission has been in operation for a period of time. Because the transmission control solenoid valve assembly is continually immersed in transmission oil, material particles or slivers of metallic debris may become deposited on the control solenoid valve assembly. Often this material is very small and can be hard to see. For this reason, it is important that the control solenoid valve assembly be thoroughly inspected.

A thorough inspection of the control solenoid valve assembly should include the following:

- Clean inspection area - Like all transmission service work, cleanliness is very important. Be sure the area where you are inspecting is free of dust and dirt. Have non-glossy white or lightly colored paper down on the inspection surface. This will enhance the lighting and help to see particles that have come from the control solenoid valve assembly.
- Lighting - Good lighting is necessary for a thorough inspection. If shop lighting is limited, use natural light. A second source of lighting, such as a penlight, is helpful for close examination. A magnifying glass can also be helpful to see into difficult places.

- Cleaning - Clean shop air may be used for spot cleaning as long as the debris can be removed without it becoming lodged somewhere else. It is best to rinse or flush particles away with GM Brake Parts Cleaner. Do not use a cloth rag to wipe the control solenoid valve assembly, as it could leave lint behind.

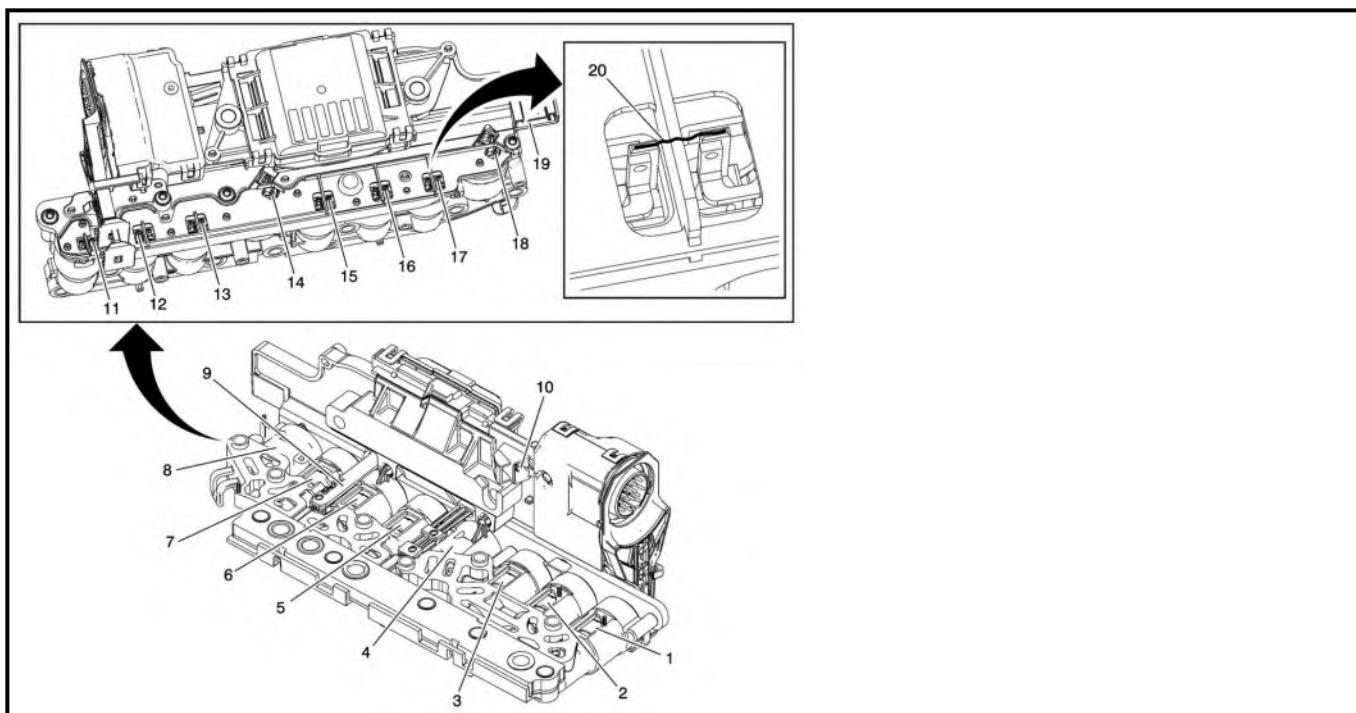
Control Solenoid Valve Assembly Housing and Filter Plate



NOTE: At the end of the inspection process where debris is found, it is required the transmission fluid and filter be replaced. Any time the control solenoid valve assembly has been removed, it is mandatory the filter plate assembly (3) be replaced.

1. Inspect the control solenoid valve assembly housing (1) for damage, cracks, or parting seam (4) separation. Inspect all housing lock tabs (2). Any defect will need to be evaluated for critical operation. Ensure all screws along the control solenoid valve assembly housing are present. Remove and closely examine the filter plate assembly (3) for sediment or debris attached to the screen. If sediment or debris is found on the filter screen, be sure to inspect the solenoid supply or control ports that correspond to location of the debris on the filter plate screen. Inspect the filter plate gasket for proper sealing. If poor sealing is found, be sure to inspect the affected solenoid fluid port entrance and exit for sediment or debris deposits. Thoroughly flush the solenoid cavity with GM Brake Parts Cleaner and replace the filter plate assembly (3). It is not necessary to remove all clutch plate soot from the entire surface of the control solenoid valve assembly housing. Inspect the control solenoid valve assembly filter plate retaining tabs (7). Broken or missing tabs do not require the control solenoid valve assembly be replaced. The filter plate can still be adequately aligned using the bolt hole sleeves. Early design control solenoid valve assembly use four filter plate retaining tabs (7).
2. Examine the 16-way connector (5) cavity for material that could make contact between the electrical pins. Also, look for bent or loose connector pins and ensure the connector lock (6) is functioning and is in good condition.

Control Solenoid Valve Assembly Inspection - Solenoids, Sensors, and Contacts



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Pressure Control Solenoid 3 (PCS3)
2	Pressure Control Solenoid 4 (PCS4)
3	Pressure Control Solenoid 2 (PCS2)
4	Shift Solenoid 2 (SS2)
5	Torque Converter Clutch (TCC) Solenoid
6	Pressure Control Solenoid 5 (PCS5)
7	Pressure Control Solenoid 1 (PCS1)
8	Shift Solenoid 1 (SS1)
9	Transmission Fluid Temperature (TFT) Sensor
10	Input Speed Sensor/Output Speed Sensor (ISS/OSS) Connector
11	Pressure Control Solenoid 3 (PCS3) Contact Lead
12	Pressure Control Solenoid 4 (PCS4) Contact Lead
13	Pressure Control Solenoid 2 (PCS2) Contact Lead
14	Shift Solenoid 2 (SS2) Contact Lead
15	Torque Converter Clutch (TCC) Solenoid Contact Lead
16	Pressure Control Solenoid 5 (PCS5) Contact Lead
17	Pressure Control Solenoid 1 (PCS1) Contact Lead
18	Shift Solenoid 1 (SS1) Contact Lead
19	Internal Mode Switch (IMS) Connector
20	Metallic Slivers, Debris or Sediment

1. With the filter plate removed, the control solenoid valve assemblies (1 - 8) can be inspected. Closely examine the solenoid electrical contact lead solder connections (11 - 18). Look for material that could make contact between the electrical leads. This is where material particles, metallic slivers, debris or sediment (20) can collect. Carefully inspect all sixteen solenoid electrical contact leads (11 - 18) for build up of material that could form an electrical short. Inspect the solenoid contact leads (11 - 18) for terminal separation or weak solder joints. Thoroughly flush away all debris with GM Brake Parts Cleaner.
2. Inspect the transmission fluid temperature (TFT) sensor (9), the input speed sensor/output speed sensor (ISS/OSS) connector (10), and the internal mode switch (IMS) connector (19). Look inside the connector cavities for material that could make contact between the electrical pins. Also look for bent or loose

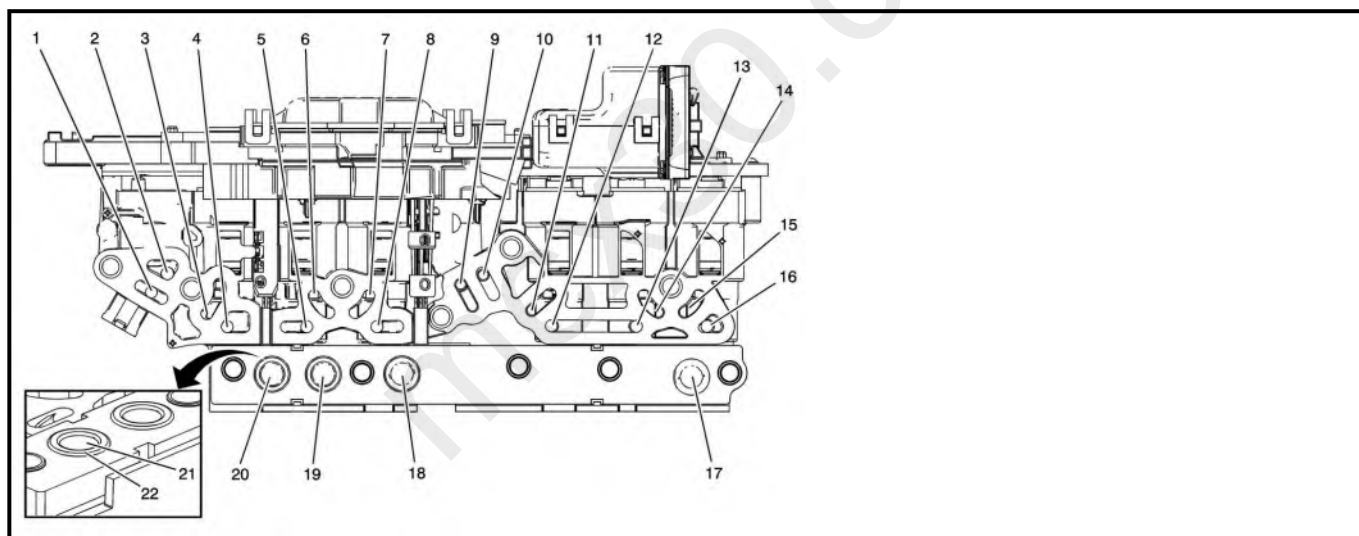
electrical pins. If the TFT sensor (9) is heavily coated with clutch soot, rinse with GM Brake Parts Cleaner.

3. Check the resistance of the solenoids at room temperature and verify with the following table. If the resistance is not within the expected range, carefully inspect the solenoid contact leads.

Solenoid Resistance

Solenoid Name	Illustration Number of Solenoid Lead	Expected Resistance (Ohms)
Pressure Control Solenoid 3 (PCS3)	11	4.5 - 5.5 Ω
Pressure Control Solenoid 4 (PCS4)	12	4.5 - 5.5 Ω
Pressure Control Solenoid 2 (PCS2)	13	4.5 - 5.5 Ω
Shift Solenoid 2 (SS2)	14	23.5 - 24.5 Ω
Torque Converter Clutch (TCC) Solenoid	15	4.5 - 5.5 Ω
Pressure Control Solenoid 5 (PCS5)	16	4.5 - 5.5 Ω
Pressure Control Solenoid 1 (PCS1)	17	4.5 - 5.5 Ω
Shift Solenoid 1 (SS1)	18	23.5 - 24.5 Ω

Control Solenoid Valve Assembly Supply and Control Fluid Inspection



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Shift Solenoid 1 Supply Port
2	Shift Solenoid 1 Control Port
3	Line Pressure Control Solenoid 1 Control Port
4	Line Pressure Control Solenoid 1 Supply Port
5	Pressure Control Solenoid 5 Supply Port
6	Pressure Control Solenoid 5 Control Port
7	TCC Pressure Control Solenoid Control Port
8	TCC Pressure Control Solenoid Supply Port
9	Shift Solenoid 2 Supply Port
10	Shift Solenoid 2 Control Port

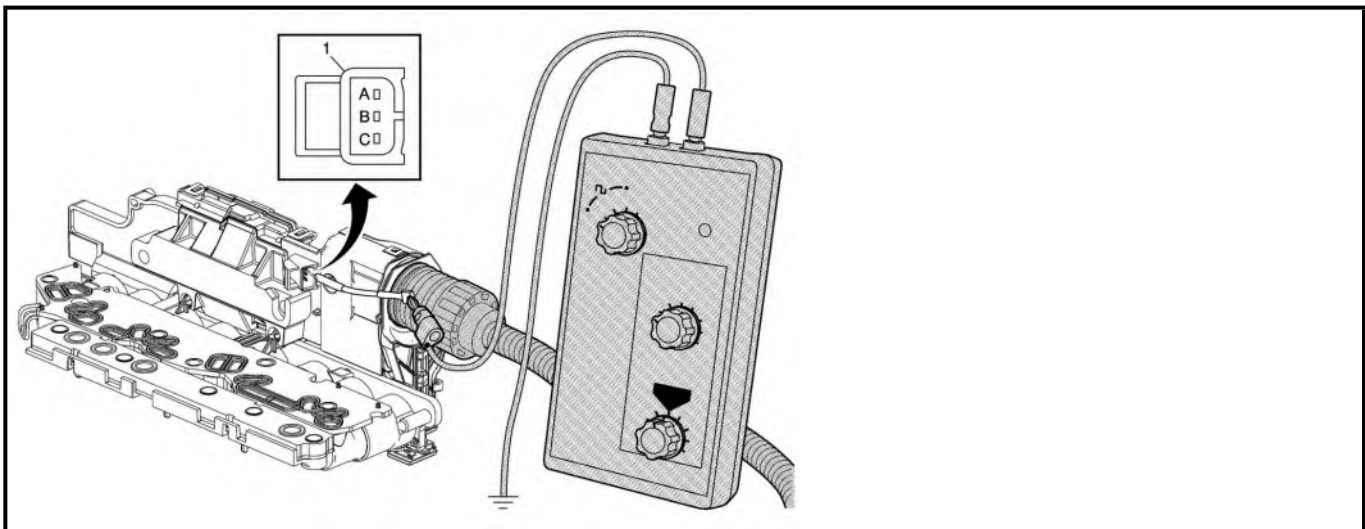
Callout	Component Name
11	Pressure Control Solenoid 2 Control Port
12	Pressure Control Solenoid 2 Supply Port
13	Pressure Control Solenoid 4 Supply Port
14	Pressure Control Solenoid 4 Control Port
15	Pressure Control Solenoid 3 Control Port
16	Pressure Control Solenoid 3 Supply Port
17	Transmission Fluid Pressure (TFP) Switch 5
18	Transmission Fluid Pressure (TFP) Switch 3
19	Transmission Fluid Pressure (TFP) Switch 1
20	Transmission Fluid Pressure (TFP) Switch 4
21	TFP Switch Membrane
22	TFP Switch Gasket

1. With the filter plate removed, the control solenoid valve fluid supply and control ports (1 - 16) can be inspected. Solenoid openings are identified in the illustration. Inspect the following supply and control opening for material particles, metallic slivers, debris, or sediment. Look into solenoid fluid supply openings 1, 4, 5, 8, 9, 12, 13, and 16. Look inside the solenoid fluid control ports 2, 3, 6, 7, 10, 11, 14 and 15. If sediment or debris is found in any one of these port openings, look for holes or tears in the filter plate screen. The filter plate gasket may be leaking caused by a torn gasket, poor sealing, or a deformed plate. As necessary, thoroughly flush away all debris in the supply and control fluid ports with GM Brake Parts Cleaner.
2. Inspect the four transmission fluid pressure (TFP) switches (17 - 20) for trapped debris or sediment. Any sediment or debris found under a switch membrane requires the control solenoid valve assembly to be replaced. Check all TFP switch membranes (21) for cracks, cuts or pin holes. Ensure all TFP switch gaskets (22) are secure and are not deformed, torn, or improperly seated. As necessary, thoroughly rinse debris and sediment from the top of the switches. It is not necessary to remove the clutch plate soot from the entire surface of the control solenoid valve assembly housing.

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

Special Tools

- **DT-47825-10** Jumper Harness
- **J 35616** GM-Approved Terminal Test Kit
- **J 38522** Variable Signal Generator



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, connect the **DT-47825-10** jumper harness between the vehicle wire harness electrical connector, and the control solenoid valve assembly electrical connector.
2. Disconnect the ISS/OSS wiring harness connector X3 (1) from the control solenoid valve assembly.
3. Ignition ON, test for 8.3 - 9.3 volts between the ISS/OSS voltage circuit terminal B on the control solenoid valve assembly and ground at the transmission case.
 - If not within the specified range, replace the control solenoid valve and transmission control module assembly. Refer to [Control Module References](#).
4. Using the **J 35616** terminal test kit, connect the **J 38522** variable signal generator red lead to the ISS signal circuit terminal A on the TCM.
5. Connect the black lead from the **J 38522** variable signal generator to ground at the transmission case.
6. Set the **J 38522** variable signal generator to 5 volts, the frequency to 300, and the percent duty cycle to 50 or the normal position.
7. Ignition ON, verify with a scan tool the Transmission ISS parameter is between 760 - 785 RPM.
 - If not within the specified range, replace the control solenoid valve and transmission control module assembly. Refer to [Control Module References](#).

Transmission Output Speed Sensor

1. Ignition OFF, connect the **DT-47825-10** jumper harness between the vehicle wire harness electrical connector, and the control solenoid valve assembly electrical connector.
2. Disconnect the ISS/OSS wiring harness connector X3 (1) from the control solenoid valve assembly.
3. Ignition ON, test for 8.3 - 9.3 volts between the ISS/OSS voltage circuit terminal B on the control solenoid valve assembly and ground at the transmission case.
 - If not within the specified range, replace the control solenoid valve and transmission control module assembly. Refer to [Control Module References](#).
4. Using the **J 35616** terminal test kit, connect the **J 38522** variable signal generator red lead to the OSS signal circuit terminal C on the TCM.
5. Connect the black lead from the **J 38522** variable signal generator to ground at the transmission case.
6. Set the **J 38522** variable signal generator to 5 volts, the frequency to 300, and the percent duty cycle to 50 or the normal position.
7. Ignition ON, verify with a scan tool the Transmission OSS parameter is between 495 - 505 RPM.
 - If not within the specified range, replace the control solenoid valve and transmission control module assembly. Refer to [Control Module References](#).

CONTROL SOLENOID VALVE AND TRANSMISSION CONTROL MODULE ASSEMBLY SOLENOID PERFORMANCE TEST

Special Tools

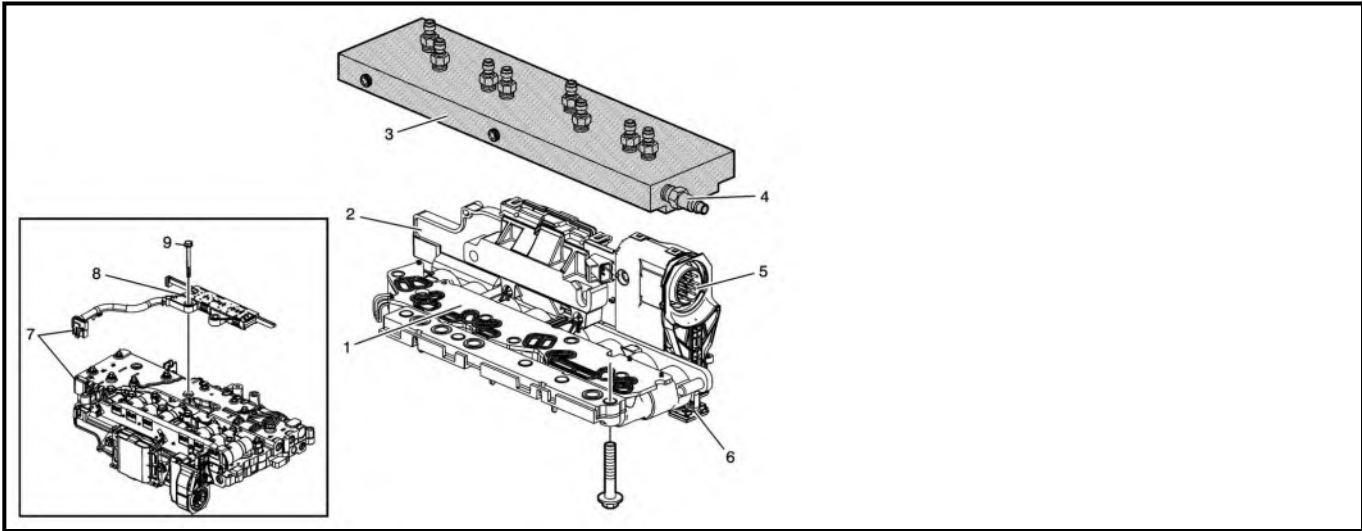
DT-47825 Control Solenoid Test Plate

The purpose of this procedure is to test the operation of the control solenoid valve assembly for a stuck open or stuck closed solenoid. The **DT-47825** control solenoid test plate bolts to the mounting surface of the control solenoid valve assembly. Pressurized air is routed into the aluminum test block, through the control solenoid valve assembly, and back to the gauge on the test block.

A pressure gauge is used to measure the pressurized air through the solenoid control ports. When a solenoid is commanded ON with the scan tool, pressurized air flows through the solenoid control port and displays on the pressure gauge. When the solenoid is commanded OFF with the scan tool, there is no pressurized air flow

through the solenoid control port to the pressure gauge. The recommended shop air pressure for this test is 620.5 - 690.4 Kpa (90 - 100 psi).

Control Solenoid Valve Assembly with Control Solenoid Test Plate



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Filter Plate Assembly
2	Control Solenoid Valve Assembly
3	DT-47825 Control Solenoid Test Plate
4	Air Connection Port
5	Transmission 16-Way Pass-Through Connector
6	Electrical Connector Slide Lock
7	A/Trans Manual Shift Shaft Position Switch Assembly Electrical Connector
8	A/Trans Manual Shift Shaft Position Switch Assembly
9	Bolt M6 x 14.5

NOTE: To avoid solenoid overheating and possible internal damage, do not continuously operate the solenoid for more than 2 minutes at a time.

The TCM will normally cycle some of the transmission solenoids ON and OFF to keep the solenoid passages clean and clear. This is a normal function and may cause the valves to cycle open and closed quickly when the TCM is powered up. This can make the pressure gauge needle flicker or move from high and low as the valves open and close, allowing air to exit the ports where the pressure gauge is not connected.

WARNING: Use of eye goggles is necessary to prevent personal injury.

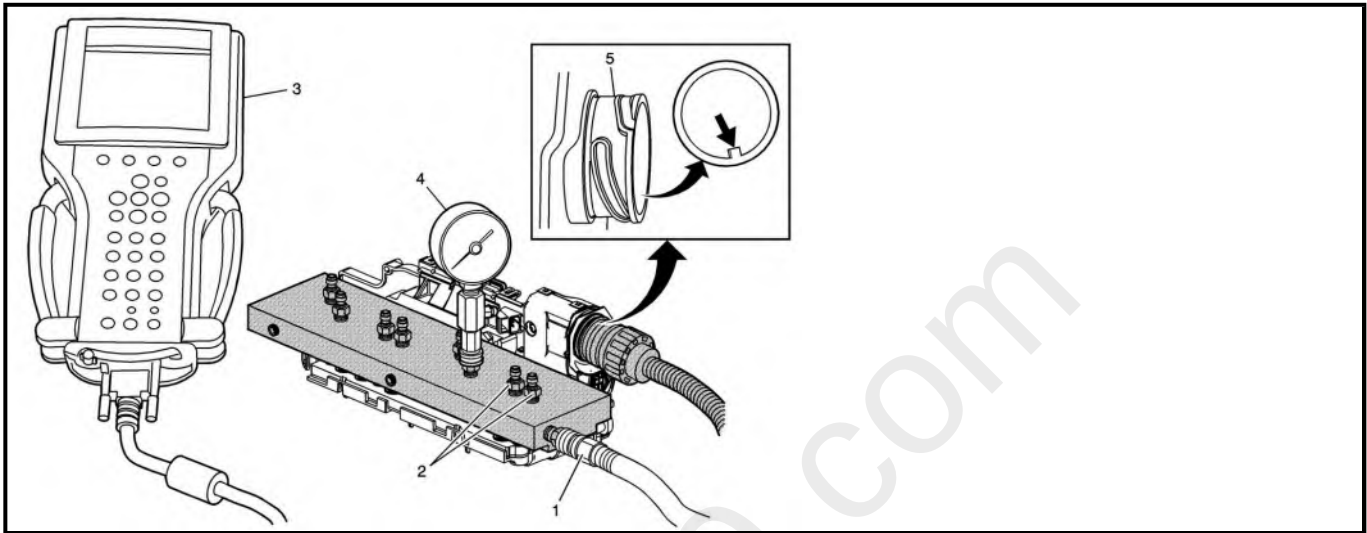
WARNING: To avoid transmission fluid contact with exposed skin, use shop towels to cover the test plate parts in order to prevent fluid from being released into the air, as any remaining transmission fluid in the control solenoid valve assembly will be forced out, and bodily injury may occur.

It is necessary to drain the control solenoid valve assembly of all remaining transmission fluid before attaching the test plate. Use caution when attaching air to the test plate, as any residual transmission fluid in the control solenoid valve assembly will be forced out. Use shop towels to cover the test plate ports in order to prevent fluid from being released into the air.

Preliminary Procedures

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the transmission fluid pan and filter. Refer to [Automatic Transmission Fluid, Fluid Pan and/or Filter Replacement](#) .
3. Remove the transmission electrical connector. Refer to [Automatic Transmission Electrical Connector Passage Sleeve Replacement](#) .
4. Remove the control solenoid valve assembly from the transmission. Refer to [Control Valve Lower Body and Upper Body Replacement](#) .
5. Ensure that the manual shift shaft position switch is disconnected and removed before performing the test. Failure to disconnect the switch will cause inaccurate test results and possible misdiagnosis.

Solenoid Testing Procedure



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Regulated Air Supply
2	Test Ports
3	Scan Tool
4	Test Pressure Gauge
5	Electrical Connector Sleeve

CAUTION: Do not probe any circuit with a multi-meter. Resistance tests across the serial data bus circuits will damage the TCM.

CAUTION: The TCM connector sleeve allows the test tool harness to be correctly orientated for electrical operation of the TCM. Do not connect the test harness to the TCM without using the connector sleeve. Failure to use the sleeve could allow the test harness to be incorrectly positioned which will result in permanent TCM damage.

1. Align and install the electrical connector sleeve to the control solenoid valve assembly and secure with the connector slide lock.
2. If necessary, clean each side of the filter plate assembly and install the filter plate assembly back on the control solenoid valve assembly. Clean the mounting surface of the **DT-47825** control solenoid test plate.
3. Bolt the **DT-47825** control solenoid test plate to the control solenoid valve assembly mounting surface. Use the bolts and washers supplied with the tool to attach the test block. Tighten the bolts to 5 N.m (44 lb in).

4. Connect the test harness supplied with the **DT-47825** control solenoid test plate to the vehicle harness and to the TCM. Engage the connector locks.
5. Connect shop air to the **DT-47825** control solenoid test plate air inlet. Do not exceed the recommended air pressure of 620.5 - 689.4 Kpa (90 - 100 psi).
6. Connect the test pressure gauge to the test port for the solenoid to be tested.
7. With the ignition ON and the scan tool communicating with the vehicle, command the solenoid to be tested ON and OFF. Watch the air pressure gauge for a change as you command the solenoid. Refer to Control Solenoid Valve Assembly Solenoid Performance Test Plate to Component Identification for correct solenoid function and test plate port connections for the solenoid being tested.
8. The solenoid should allow air pressure to flow when commanded ON and prevent air pressure flow when commanded OFF. The test results are read on the pressure gauge.
9. Command the solenoid valve ON and OFF several times to determine the condition of the solenoid in question. Release the test air pressure from the pressure gauge between solenoid tests.

Control Solenoid Valve Assembly Solenoid Performance Test Plate to Component Identification

Solenoid	Test Plate Port	Commanded State	
		ON	OFF
PC Solenoid 2, 3-5 Rev. CL	C	Full pressure to gauge	No pressure to gauge
PC Solenoid 3, 4-5-6 Low Rev CL	A	Full pressure to gauge	No pressure to gauge
PC Solenoid 4, 2-6 CL	B	Full pressure to gauge	No pressure to gauge
PC Solenoid 5, 1-2-3-4 CL	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
TCC PC Solenoid	E	Full pressure to gauge	No pressure to gauge
Line PC Solenoid	G	Command to highest setting, full pressure to gauge	Command to lowest setting, below 620.5 Kpa (90 psi) to gauge

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.

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

5. Ignition ON, engine running, with a scan tool Reset Transmission Adapts.
6. Perform the **Road Test**.
7. Ignition OFF for 2 minutes.

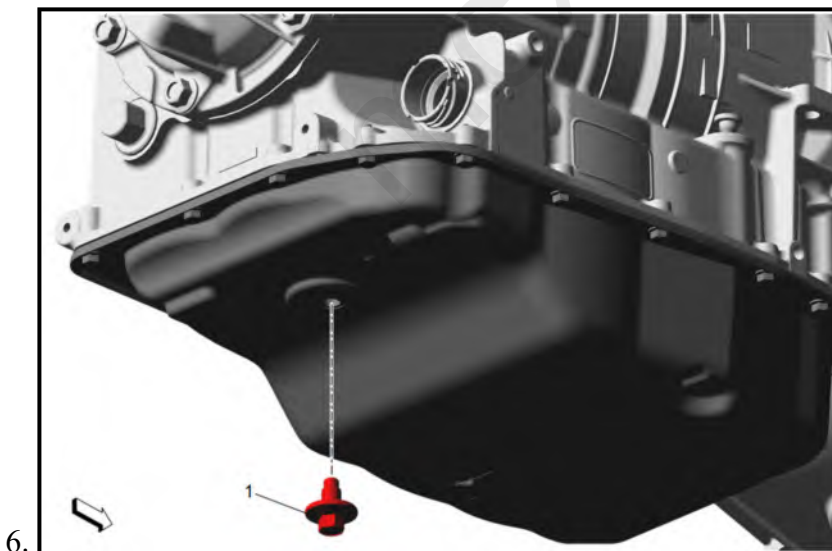
TRANSMISSION FLUID LEVEL AND CONDITION CHECK

This procedure checks both the transmission fluid level, as well as the condition of the fluid itself. Since the transmission on this vehicle is not equipped with a fill tube and dipstick, a tube in the bottom pan is used to set the fluid level.

More information, including an instructional video, can be found at the GM training website: Center of Learning: 17041.62V - 6-Speed Automatic Transmission Fluid Checking and Filling Procedures.

CAUTION: The transmission fluid level must be checked when the transmission fluid temperature (TFT) is between 30 - 50°C (86 - 122°F). If the TFT is not within this range, operate the vehicle or allow the fluid to cool as required. Setting the fluid level with a TFT outside this range will result in either an under or over-filled transmission. TFT > 50°C = under-filled, TFT < 30°C = over-filled. An under-filled transmission will cause premature component wear or damage. An over-filled transmission will cause fluid to discharge out the vent tube, fluid foaming, or pump cavitation.

1. Observe the TFT using the driver information center (DIC) or a scan tool.
2. Start and idle the engine.
3. Depress the brake pedal and move the shift lever through each gear range. Pause for at least 3 seconds in each range. Move the shift lever back to PARK. Ensure the engine RPM is low (500 - 800 RPM).
4. Allow the engine to idle for at least 1 minute.
5. Raise the vehicle on a hoist. The vehicle must be level, with the engine running and the shift lever in the PARK range.



CAUTION: THE ENGINE MUST BE RUNNING when the trans oil level check plug is removed or excessive fluid loss will occur, resulting in an under-filled condition. An under-filled transmission will cause premature component wear or damage.

NOTE: Continue to monitor the TFT. If the TFT is not within the specified values, reinstall the trans oil level check plug and repeat the previous steps.

Remove the trans oil level check plug (1) from the transmission fluid pan. Allow any fluid to drain.

- If the fluid is flowing as a steady stream, wait until the fluid begins to drip.
- If no fluid comes out, add fluid until fluid drips out, refer to [Transmission Fluid Fill Procedure](#).

7. 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 and inside of the bottom pan for excessive metal particles or other debris. A small amount of "friction" material in the bottom pan is a "normal" condition. If large pieces and/or metal particles are noted in the fluid or bottom pan, flush the oil cooler and cooler lines and overhaul the transmission. If there are no signs of transmission internal damage noted, replace the fluid filter assembly, 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](#).

CAUTION: Refer to [Fastener Caution](#) .

8. Replace the transmission oil level check plug and tighten.

- M6 oil level check plug 9 N.m (80 lb in)
- M12 oil level check plug 25 N.m (18 lb ft)

9. Inspect for external leaks, refer to [Fluid Leak Diagnosis](#).

10. Reset the oil life monitor only if the fluid was changed.

TRANSMISSION FLUID FILL PROCEDURE

Special Tools

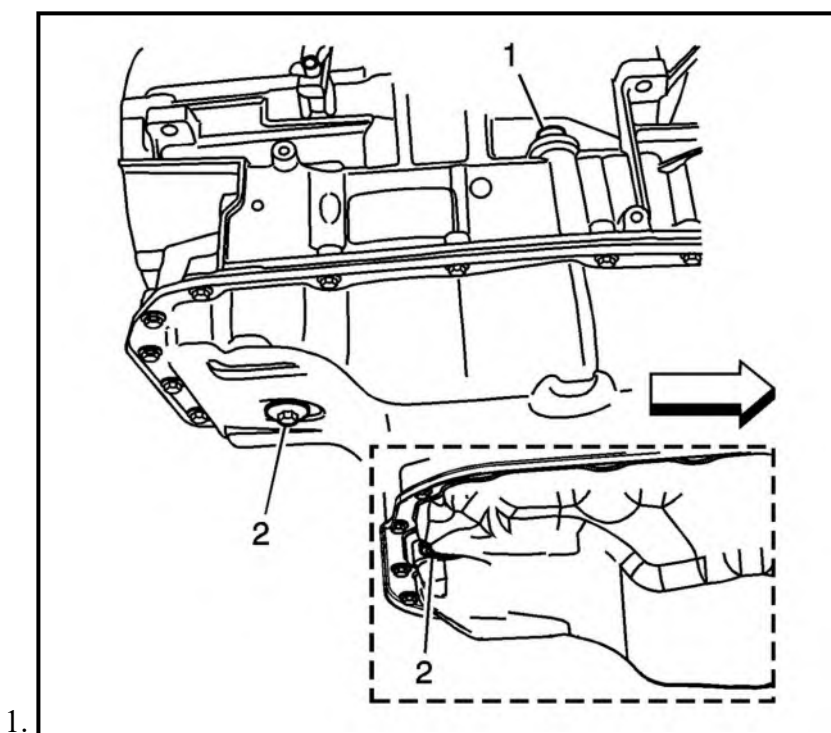
- **DT-47784** Transmission Fluid Fill Pan Adapter
- **DT-51190** Transmission Fluid Fill Pan Adapter

Equivalent regional tools: [Special Tools](#)

CAUTION: Check the transmission fluid level immediately after adding fluid and before vehicle operation. Do not overfill the transmission. An overfilled transmission may result in foaming or fluid to be expelled out the vent tube when the vehicle is operated. Overfilling will result in possible damage to the transmission.

Check the transmission fluid level, refer to [Transmission Fluid Level and Condition Check](#).

Fill Tube Plug Method



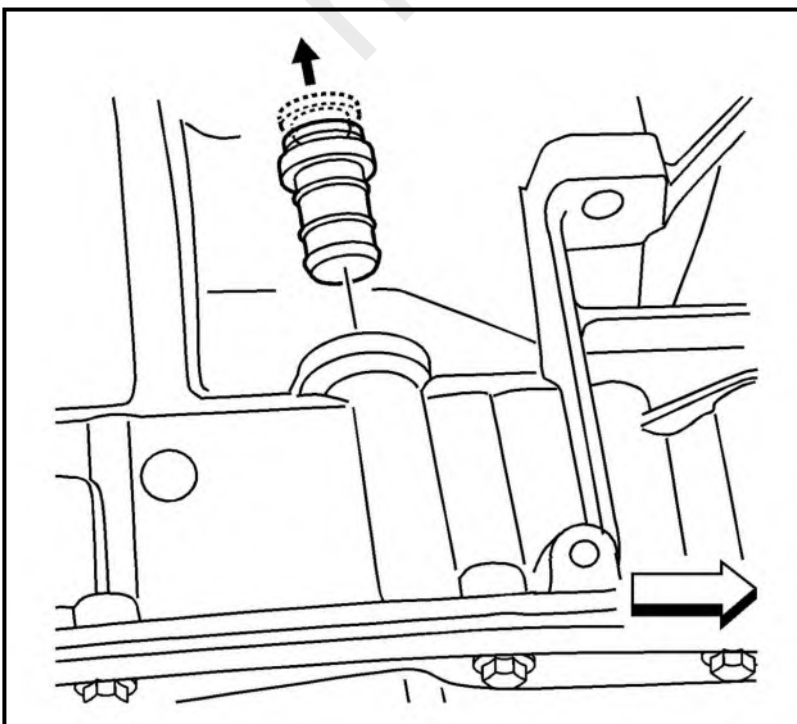
1.

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

Perform this procedure for vehicles with transmissions that are not equipped with a fill tube and dipstick. Based on accessibility, transmission fluid may be added through the fluid fill tube plug assembly (1) hole or through the oil level check plug (2) hole in the bottom of the transmission fluid pan.

CAUTION: Before removing the transmission fluid fill tube plug assembly, thoroughly clean around the plug to prevent dirt or contaminants from entering the transmission during plug removal. Use compressed air to dislodge any caked dirt that may be stuck on and around the plug area. Use a mirror to confirm the area is free of dirt before removing the plug. Failure to clean around the plug may result in transmission contamination.

2. Clean around the fluid fill tube plug (1).



3.

NOTE: It may be necessary to use a long pair of 90 degree needle nose pliers to lift the plunger and remove the plug assembly.

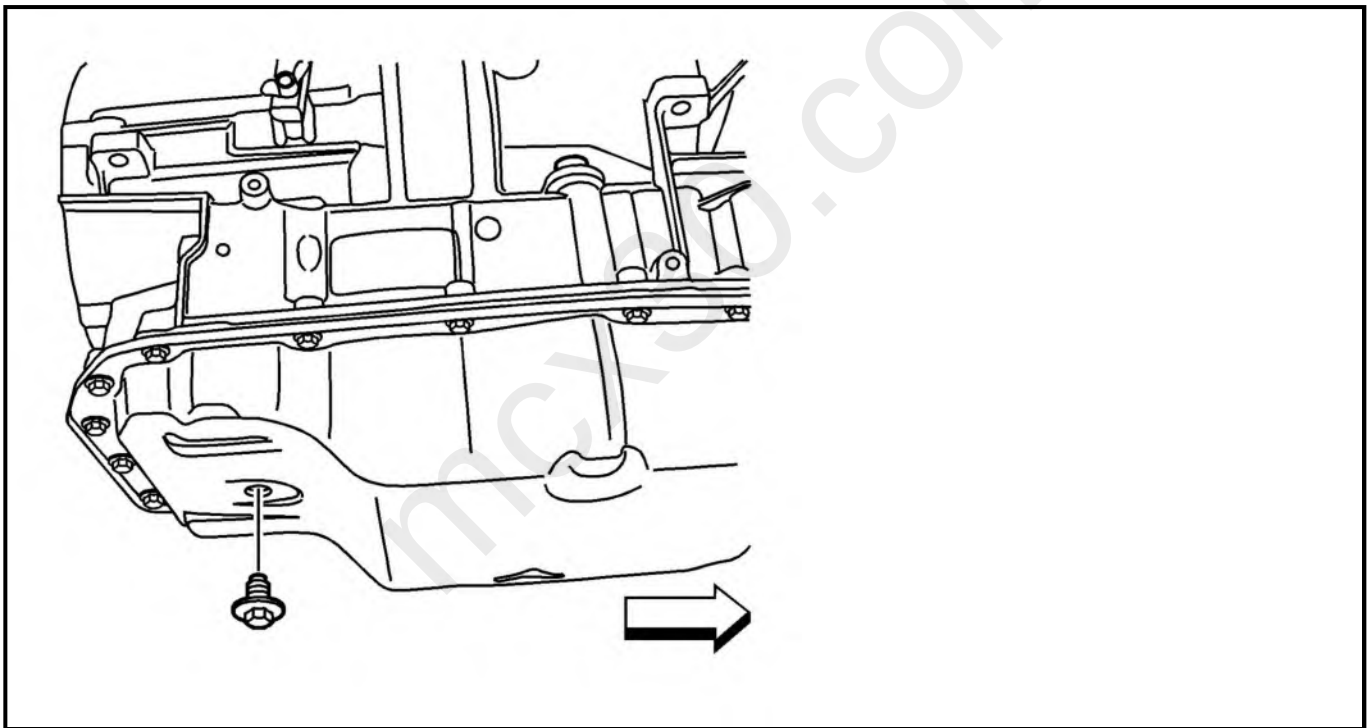
Unlock the fill tube plug by lifting the plunger. Once the plunger is lifted, remove the entire plug assembly.

4. Determine the approximate amount of fluid needed to fill the transmission, based on the repair performed. Refer to [Approximate Fluid Capacities](#) . To avoid an under-fill condition, slightly overfill the transmission, and then allow the extra fluid to drain out through the oil level check plug during the transmission fluid level and condition check procedure.
5. Using a pneumatic air fluid dispenser pump tool or a suitable hand pump, add transmission fluid through the fill tube plug opening.

CAUTION: Check the transmission fluid level immediately after adding fluid and before vehicle operation. Do not overfill the transmission. An overfilled transmission may result in foaming or fluid to be expelled out the vent tube when the vehicle is operated. Overfilling will result in possible damage to the transmission.

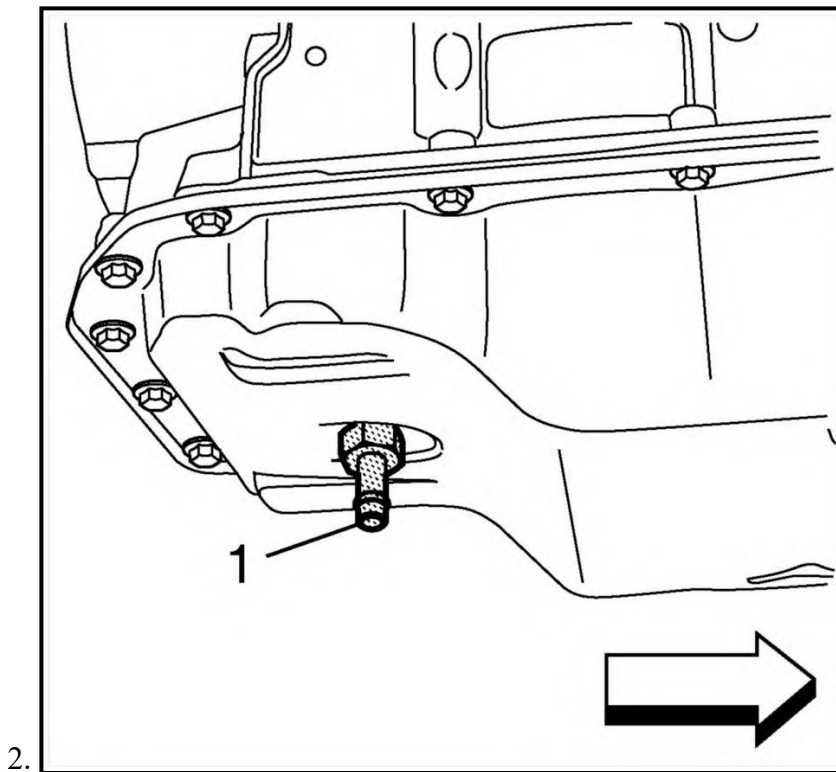
6. Check the fluid level. Refer to [Transmission Fluid Level and Condition Check](#).

Check Plug Method



NOTE: When the oil level check plug is removed with the engine OFF, transmission fluid may drain from the hole.

1. Remove the oil level check plug.



NOTE: The M6 check plug uses DT-51190 Transmission Fluid Fill Pan Adapter. The M12 check plug uses DT-47784 Transmission Fluid Fill Pan Adapter

Install the appropriate transmission fluid fill pan adapter (1).

3. Determine the approximate amount of fluid needed to fill the transmission, based on the repair performed. Refer to [Approximate Fluid Capacities](#). To avoid an under-fill condition, slightly overfill the transmission, and then allow the extra fluid to drain out through the oil level check plug during the transmission fluid level and condition check procedure.
4. Using the appropriate transmission fluid fill pan adapter (1), and a pneumatic air fluid dispenser pump tool or a suitable hand pump, add transmission fluid through the check plug hole.

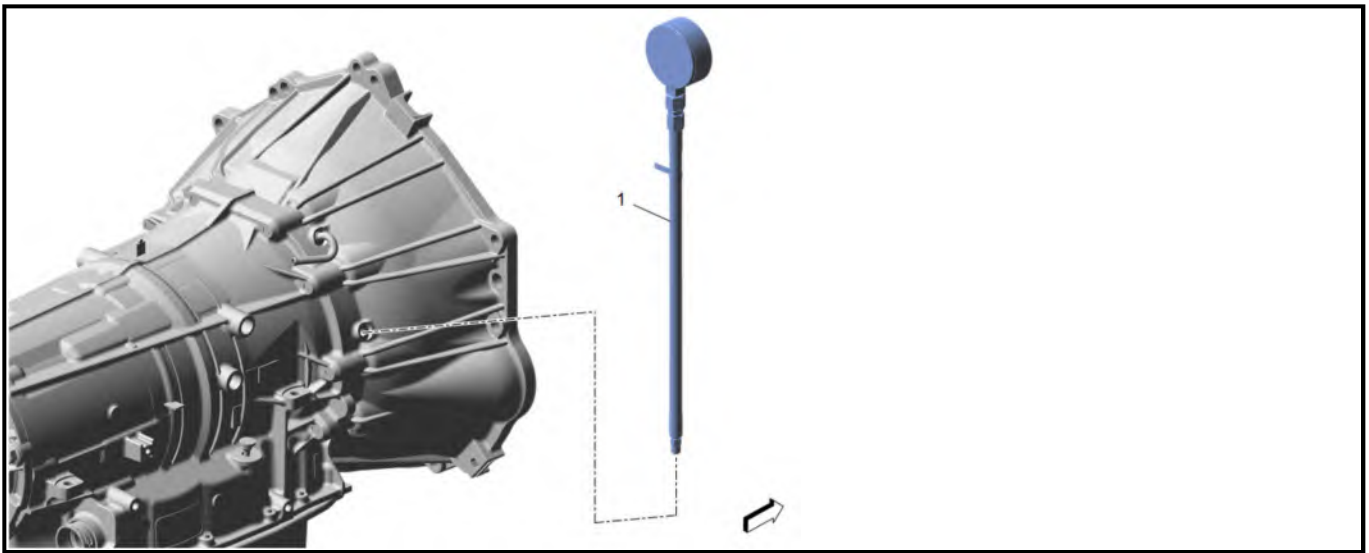
NOTE: Failure to start the engine and move the shift lever through the gear ranges before removing the fluid fill pan adapter, and fluid dispenser pump tool from the bottom pan will result in an excess amount of fluid draining from the check plug hole. This may lead to an under-fill condition.

5. Start the engine and move the shift lever through each gear range. Pause for at least 3 seconds in each gear range.

CAUTION: Check the transmission fluid level immediately after adding fluid and before vehicle operation. Do not overfill the transmission. An overfilled transmission may result in foaming or fluid to be expelled out the vent tube when the vehicle is operated. Overfilling will result in possible damage to the transmission.

6. With the engine still running, remove the fluid fill pan adapter (1), and fluid dispenser pump tool, then check the fluid level. Refer to [Transmission Fluid Level and Condition Check](#).

LINE PRESSURE CHECK



Special Tools

GE 21867 Pressure Gauge

Equivalent regional tools: [Special Tools](#) .

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

1. Scan Tool - Install
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.

NOTE: You may need to remove or disconnect components in order to gain access to the transmission line pressure test hole plug.

7. Line Pressure Test Hole Plug - Remove
8. GE 21867 pressure gauge (1) - Install
9. Access the Scan Tool Transmission Output Controls for the Line PC Solenoid.
10. Start the engine.

NOTE: In order to achieve accurate line pressure readings, the following procedure should be performed at least three times.

The values displayed on the scan tool screen will not match the actual pressures indicated on the pressure gauge.

Control the Line PC Solenoid in PARK or NEUTRAL with the engine speed at approximately 1500 RPM and the TFT between 35 - 55B°C (95 - 131B°F). This protects the clutches from extreme high or low line pressures and ensures a consistent pump capacity.

11. Use the scan tool to increase and decrease line pressure, allowing the pressure to stabilize between increments.

12. Compare the pressure readings on the gauge with the table below.
13. If the pressure readings on the gauge are erratic, or are more than 10% greater or less than the range specified in the table below, refer to [Fluid Pressure High or Low](#).
14. Turn the engine OFF.
15. **GE 21867** pressure gauge - Remove

CAUTION: Refer to [Fastener Caution](#) .

16. Line Pressure Test Hole Plug - Install and tighten 11 N.m (97 lb in)

Line Pressure

Scan tool Line PC Solenoid Commanded State (KPa)	Approximate line pressure shown on pressure gauge @ 1500 RPM	
	Kpa	PSI
None	310 - 550	45 - 80
200	655 - 900	95 - 130
400	1100 - 1310	160 - 190
600	1520 - 1725	220 - 250
800	1860 - 2070	270 - 300

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:
 - PARK to REVERSE
 - REVERSE to NEUTRAL
 - NEUTRAL to DRIVE
 - DRIVE to REVERSE
 - 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 20B°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.

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, Soft, Delayed or Slipping First or Reverse Gear](#).

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, Soft, Delayed or Slipping First or Reverse Gear](#).

6. Monitor transmission range on the scan tool, transmission data list.
 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 percent. 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.

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 chuggle caused by TCC apply. Full lockup is available at highway speeds on some applications.

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:

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 percent) 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 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 with the 6L45/50/80/90 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 percent 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 RPMs.

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.

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

3. Depress the accelerator to approximately 1, 200 RPM for no more than six 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.

Isolating Vibration

NOTE: Some engine/transmission combinations cannot be balanced in this manner due to restricted access or limited clearances between the torque converter bolts and the engine.

To isolate and correct a flexplate or torque converter vibration:

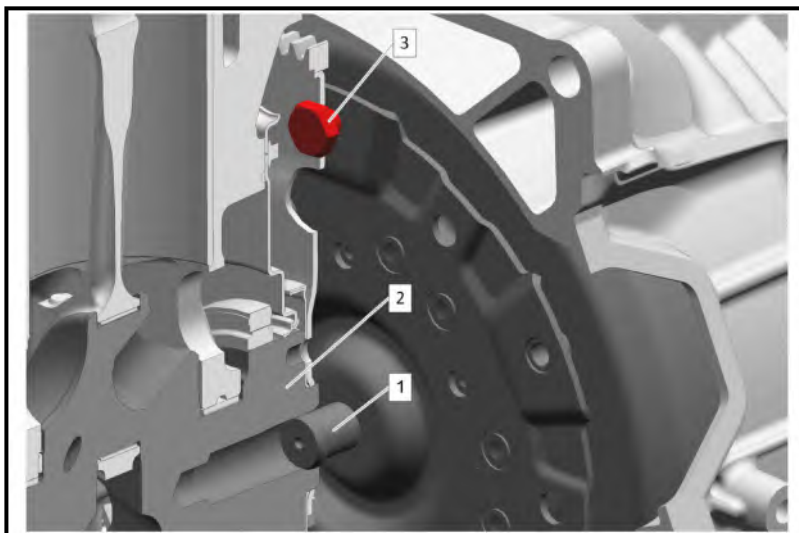
1. With the engine at idle speed and the transmission in PARK or NEUTRAL, observe the vibration.
2. Turn the engine OFF.
3. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle**.
4. Remove the torque converter access cover and the bolts (if equipped).
5. Mark the relationship of the torque converter to the flexplate.
6. Rotate the torque converter to inspect for defects or missing balance weights.
7. Index the converter according to "Indexing Torque Converter" procedure located within this procedure.
8. If the vibration remains, it is most likely caused by the engine.
9. Refer to "Torque Converter Replacement Guide" located within this procedure.

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.



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](#) .

Align the torque converter pilot (1) in the engine crankshaft (2). Install the torque converter to flexplate bolts (3), and tighten according to [Fastener Specifications \(On Vehicle\)](#) , or [Fastener Specifications \(Off Vehicle\)](#) .

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 Specifications \(On Vehicle\)](#) , or [Fastener Specifications \(Off Vehicle\)](#) .

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 Check .
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

Condition	Action
	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 Symptoms - Automatic Transmission .
Noise - Whine	- Refer to Symptoms - Automatic Transmission. - Do not replace the torque converter if noise is present in Neutral/Park. Refer to Symptoms - Engine Mechanical.
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 Symptoms - Engine Controls .
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 Symptoms - Engine Controls .
DTC P0741 - TCC Stuck OFF/High Slip - Intermittent Only	Do not replace the torque converter. Refer to DTC P0741 or P0742 diagnostic table.
DTC P0741 - TCC Stuck OFF/High Slip	Do not replace the torque converter. Refer to DTC P0741 or P0742 diagnostic table.
DTC P0742 - TCC Stuck ON	Do not replace the torque converter. Refer to DTC P0741 or P0742 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. Refer to Torque Converter Stator in this procedure.

Condition	Action
	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.

FLEX PLATE/TORQUE CONVERTER VIBRATION TEST

Isolating Vibration

CAUTION: Some engine/transaxle combinations cannot be balanced in this manner due to restricted access or limited clearances between the torque converter bolts and the engine. Ensure that the bolts do not bottom out in the lug nuts or the torque converter cover which could dent and cause internal damage.

To isolate and correct a flywheel or torque converter vibration, separate the torque converter from the flywheel to determine if vibration is in the engine or transmission.

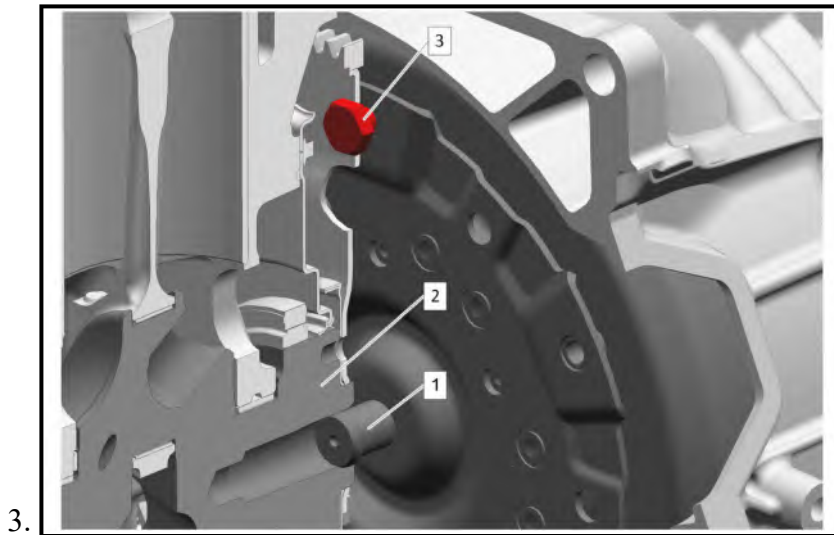
1. With the engine at idle speed and the transmission in PARK or NEUTRAL, observe the vibration.
2. Turn the engine OFF.
3. Raise and suitably support the vehicle, refer to [Lifting and Jacking the Vehicle](#) .
4. Remove the transmission converter cover bolts and the cover.
5. Mark the relationship of the converter to the flywheel.
6. Remove the bolts attaching the converter to the flywheel.
7. Slide the torque converter away from the flywheel.
8. Rotate the flywheel and torque converter to inspect for defects or missing balance weights.
9. Lower the vehicle.
10. With the engine at idle speed and the transmission in PARK or NEUTRAL, observe the vibration. Refer to [Diagnostic System Check - Vehicle](#) .
11. Turn the engine OFF.

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 flywheel balance.

1. Raise and suitably support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .

2. Rotate the torque converter one bolt position.



Align the torque converter hub (2) in the engine crankshaft (3) and install the torque converter to flywheel bolts.

4. Lower the vehicle.

5. With the engine at idle speed and the transmission in PARK or NEUTRAL, observe the vibration. Refer to [Noise and Vibration Analysis](#).

Repeat this procedure until you obtain the best possible balance.

6. Install the transmission converter cover bolts and the cover.

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

VIBRATION

Checks	Causes
Lug bolts for the Torque Converter (1)	Inspect for loose torque converter (1) lug bolts.
Input Sun Gear Thrust Washer (55)	Inspect for wear or damage.
Turbine Shaft Thrust Bearing Assembly (57)	Inspect for wear or damage.
2-6 and 3-5-Reverse Clutch Hub Thrust Bearing (65)	Inspect the bearing for wear or damage.
Output Carrier (68)	- Inspect the carrier assembly for damaged pinion gears, thrust washers, pins, and rollers. - Inspect for a worn or damaged center support roller bearing assembly (485). - Inspect for damaged thrust bearings (486, 488). - Inspect the carrier assembly for damaged output carrier rear sun gear thrust bearing (captured).
Output Carrier Thrust Bearing Assembly (69)	Inspect the bearing for wear or damage.
Output Shaft Thrust Bearing (71)	Inspect the bearing for wear or damage.
1-2-3-4 Clutch Hub Thrust Bearing (63)	Inspect the bearing for wear or damage.
Turbine Shaft Thrust Bearing Assembly (57)	Inspect the bearing for wear or damage.
Torque Converter Clutch Regulator Apply Valve Spring (353)	Inspect for broken spring within the lower valve body in the torque converter clutch regulator apply valve line up (355).

NOISE AND VIBRATION ANALYSIS

NOTE: The following is only a general noise and vibration analysis. For more detailed and vehicle specific noise and vibration analysis, refer to the latest published Preliminary Information documents and Field Service Bulletins available in eSI.

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 cause may be from poor engine performance.

- Vibration may also be caused by a small amount of water inside the converter.
- Inspect the tires for the following conditions:
 - Uneven wear
 - Imbalance
 - Mixed sizes
 - Mixed radial and bias ply
- Inspect the suspension components for the following conditions:
 - Alignment wear or damage
 - Loose fasteners
 - Driveline damage or wear
- 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

WHINE/GROWL NOISE THAT CHANGES WITH VEHICLE SPEED

Checks	Causes
2-6 and 3-5-Reverse Clutch Hub Thrust Bearing (65)	Inspect the bearing for wear or damage.
Output Carrier Assembly (68)	• Inspect the carrier assembly for damaged pinion gears, thrust washers, pins, and rollers. • Inspect for a damaged center support roller bearing assembly (485). • Inspect for damaged thrust bearings (486, 488). • Inspect for damaged sun gears (487, 489). • Inspect the carrier assembly for damaged output carrier rear sun gear thrust bearing (captured). • Inspect for damaged or stripped splines on the output carrier assembly.
Output Carrier Thrust Bearing Assembly (69)	Inspect the bearing for wear or damage.
Output Shaft Assembly (70)	• Inspect for damaged internal gears (495, 497). • Inspect the output carrier bushing (498) for damage or wear.
Output Shaft Thrust Bearing (71)	Inspect the bearing for wear or damage.
Input Sun Gear Thrust Washer (55)	Inspect the washer for wear or damage.
Input Sun Gear Thrust Bearing (54)	Inspect the bearing for wear or damage.
Input Sun Gear (53)	Inspect for spline wear or damage.
Input Carrier Assembly (52)	Inspect the carrier assembly for damaged pinion gears, thrust washers, pins, and rollers.
1-2-3-4 Clutch Hub Thrust Bearing (63)	Inspect the bearing for wear or damage.
2-6 and 3-5-Reverse Clutch Hub (64)	Inspect the output carrier inner sun gear shaft bushings (60 and 62) for damage or wear.
Turbine Shaft Thrust Bearing Assembly (57)	Inspect the bearing for wear or damage.
Automatic Transmission Fluid Filter (26)	• Inspect for damaged or restricted fluid filter assembly (26) • Inspect for damaged fluid filter seal assembly (25) or improper sealing interface (leaks, fluid aeration).
Automatic Transmission Fluid Pump Seal (5)	Inspect for worn or damaged seal.

Checks	Causes
Transmission Fluid Level	Inspect to ensure the transmission fluid is at the proper level. <u>Transmission Fluid Level and Condition Check</u>

WHINE/GROWL NOISE THAT CHANGES WITH ENGINE SPEED

Checks	Causes
Transmission Fluid Level	Inspect to ensure the transmission fluid is at the proper level. <u>Transmission Fluid Level and Condition Check</u>

NOISE IN FIRST OR REVERSE GEAR

Checks	Causes
Center Support (67)	- Inspect for damaged or worn low and reverse clutch plates (463 - 465). - Inspect for damaged low and reverse clutch backing plate (462). Inspect for worn splines on backing plate. - Inspect for damaged low and reverse clutch backing plate retaining ring (461). - Inspect for damaged low and reverse clutch piston assembly (470), spring (469), spring retaining ring (466), and center support assembly (459). - Inspect for damaged low clutch sprag assembly (467). Holding the sprag assembly with the retaining ring facing up, and the inner race of the sprag assembly fixed, the outer race should freewheel counterclockwise. - Inspect for cut, worn, or damaged low clutch sprag seal (468).
Output Carrier Assembly (68)	Inspect for damaged or stripped splines on the output carrier assembly.

NOISE IN FIRST, SECOND, THIRD, FOURTH, FIFTH, OR REVERSE GEAR

Checks	Causes
Input Carrier Assembly (52)	Inspect thrust washers, pinion gears, and pins for wear or damage.
Input Sun Gear (53)	Inspect for damaged sun gear.
1-2-3-4 and 3-5-Reverse Clutch (51)	Inspect for worn or damaged clutch bearing (428).

NOISE IN FIRST, SECOND, SIXTH, OR REVERSE GEAR

Checks	Causes
Center Support (67)	Inspect for worn or damaged output carrier outer sun gear shaft front and rear bushings (458 and 460).
Output Carrier Assembly (68)	Inspect for a worn or damaged center support roller bearing assembly (485).

NOISE IN SECOND OR SIXTH GEAR

Checks	Causes
Center Support (67)	- Inspect for damaged or worn output carrier outer sun gear shaft front bushing (458). - Inspect for damaged or worn output carrier outer sun gear shaft rear bushing (460).

Checks	Causes
	- Inspect for damaged 2 - 6 clutch backing plate (451). Inspect for worn splines on backing plate. - Inspect for damaged 2 - 6 clutch backing plate retaining ring (450). - Inspect for damaged 2 - 6 clutch piston assembly (457), spring (456), retaining ring (455), and center support assembly (459).

NOISE DURING 3-4 OR 4-3 SHIFTS

Checks	Causes
4-5-6 Clutch Hub (58)	- Inspect hub assembly (475), dampener (476), and apply plate (477) for wear or damage. - Inspect for damaged or worn 4 - 5 - 6 clutch backing plate (432).

NOISE IN FOURTH, FIFTH, OR SIXTH GEAR

Checks	Causes
Input Sun Gear Thrust Washer (55)	Inspect for wear or damage.
Turbine Shaft Thrust Bearing Assembly (57)	Inspect for wear or damage.
4-5-6 Clutch Hub (58)	- Inspect for damaged or worn 4 - 5 - 6 clutch backing plate (432). - Inspect for improper selective 4 - 5 - 6 clutch backing plate retaining ring (431).

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 is between channels.
 - The valve bushing clips are improperly installed.
 - The checkballs are misplaced.
- The TeflonB® 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 permanent damage to the transmission.

If antifreeze 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.

FLUID LEAK DIAGNOSIS

General Method

1. Verify that the leak is transmission fluid.

CAUTION: Do not clean using brake cleaner or other reactive solvents as these solvents can damage rubber gaskets, seals and bushings.

2. Thoroughly clean the suspected leak area using a rag.

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.

3. Operate the vehicle for 15 - 20 minutes under city driving conditions until normal operating temperatures are reached.
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

CAUTION: Do not clean using brake cleaner or other reactive solvents as these solvents can damage rubber gaskets, seals and bushings.

1. Thoroughly clean the suspected leak area using a rag.
2. Apply an aerosol type powder, such as foot powder, to the suspected leak area.

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.

3. Operate the vehicle for 15 - 20 minutes under city driving conditions until normal operating temperatures are reached.
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. Detect the leak with the black light.
3. 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 or output shaft surface is scratched, nicked, or damaged
- Loose or worn bearing causing excess seal wear

Possible Points of Fluid Leaks

Transmission Oil Pan

- Incorrectly tightened oil pan bolts
- Improperly installed or damaged oil pan gasket
- Damaged oil pan or mounting face
- Incorrect oil pan gasket

Case Leak

- Damaged vehicle speed sensor seal
- Damaged manual shaft seal
- Loose or damaged oil cooler connector fittings
- Worn or damaged propeller shaft oil seal
- Loose line pressure pipe plug
- Porous casting warped torque converter housing

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 transmission case or the oil pump

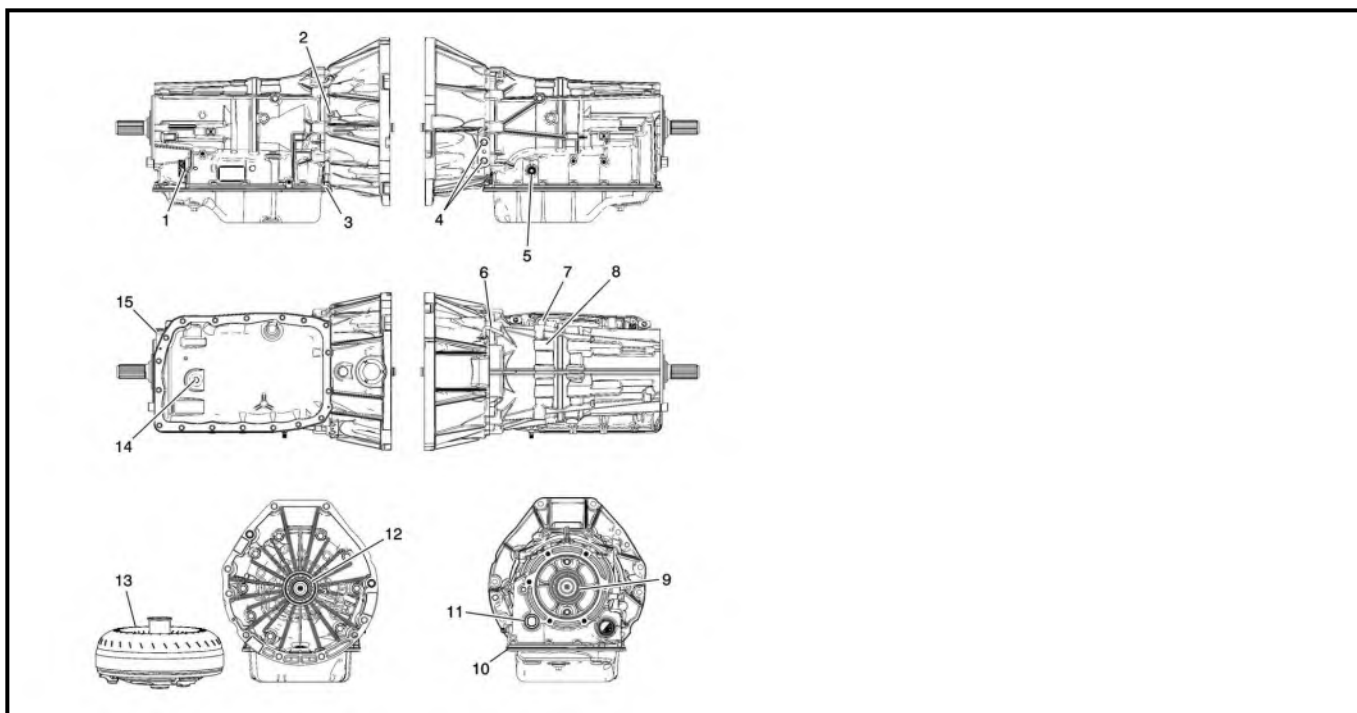
Leak at the Vent Pipe

- Overfilled system
- Water or coolant in the fluid; The fluid will appear milky
- Transmission case porous
- Incorrect fluid level indicator
- Plugged vent
- Drain-back holes plugged
- Mispositioned oil pump to case gasket, if equipped

Leak at Cooler Lines/Coolers

- Leak in the front radiator transmission oil cooler
- External coolers
- Rear differential coolers - external and internal to differential, if equipped

Leak Inspection Points



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Automatic Transmission Electrical Connector Passage Sleeve
2	Line Pressure Test Hole Plug
3	Converter Housing to Case Joint
4	Trans Fluid Cooler Pipe Fitting Seals
5	Manual Shift Shaft Seal
6	Automatic Transmission Vent Pipe
7	Fluid Fill Tube Plug Assembly
8	Transmission Case Assembly
9	Output Shaft Seal Assembly
10	A/Trans Fluid Pan Gasket
11	Actuator Guide - Park Pawl
12	Torque Converter Fluid Seal Assembly
13	Torque Converter Assembly
14	Trans Oil Level Check Plug
15	Case Extension to Case Joint

CASE POROSITY REPAIR

Some external leaks are caused by case porosity in non-pressurized areas. You can usually repair these leaks with the transmission in the vehicle.

1. Thoroughly clean the area to be repaired with a cleaning solvent. Air dry the area.

WARNING: Epoxy adhesive may cause skin irritations and eye damage. Read and follow all information on the container label as provided by the manufacturer.

2. Using instructions from the manufacturer, mix a sufficient amount of an epoxy to make the repair.
3. While the transmission case is still hot, apply the epoxy. You can use a clean, dry soldering acid brush 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 starting the engine.
5. Repeat the fluid leak diagnosis procedures.

AUTOMATIC TRANSMISSION FLUID LEAKS

Checks	Causes
Torque Converter (1)	Inspect for damage, cracks at the lug, hub and seal welds.
Torque Converter Housing (203)	• Verify leak is ATF and not oil from rear of engine. • Inspect for housing porosity or damage. • Inspect for worn or damaged torque converter seal (201). • Inspect for loose line pressure plug. • Inspect cooler line attachment for loose bolt, worn or damaged seal, or leak at line to boss joint. • Inspect vent pipe attachment to housing and hose. • Verify torque of housing to case bolts.
Automatic Transmission Fluid Pump Seal (5)	Inspect for cut, wear, or damage.
Automatic Transmission Case	• Inspect for porosity or damage. • Inspect manual shaft seal. • Inspect control wiring input sleeve seals. • Inspect rear case plugs (12) (4WD/AWD only, 4WD may also be cast over).
Automatic Transmission Case Extension	• Verify oil is from transmission and not transfer case assembly (4WD/AWD). • Inspect extension seal assembly (inner seal behind boot - 2WD only). • Inspect extension to case seal (2WD only).
Automatic Transmission Fluid Pan	• Inspect the pan assembly for damage. • Inspect gasket for damage or wear. • Inspect case and pan for damage and flatness at gasket interface area.
Cooler Lines/Coolers	• Inspect and follow cooler lines to front radiator and external coolers. • Some vehicles may have rear differential external and internal coolers.

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. • Verify proper shift cable adjustment.
Manual Shaft	• Verify shift lever is properly attached to the manual shaft. • Verify manual shaft is not twisted or damaged.
Manual Shift Detent Lever (505)	Verify proper operation. Refer to Transmission Internal Mode Switch Logic .

NO PARK OR DRIVE

Checks	Causes
Output Shaft Assembly (70)	Inspect for a broken or damaged output shaft. Inspect for worn splines.
Automatic Transmission Case	• Inspect for broken or damaged case. • Inspect for broken or bent park pawl actuator. • Inspect for broken or missing park pawl actuator guide pin or manual shaft pin. • Inspect for broken, loose or misaligned park pawl guide. • Inspect for binding or broken park pawl or actuator assembly.
Manual Shift Detent Lever (505)	Inspect for broken or disengaged manual valve detent.

HARSH GARAGE SHIFT

Checks	Causes
NOTE: On cold days, approximately 32B°F (0B°C) or colder, the transmission is designed to shift differently. The transmission uses a warm-up mode shift schedule until the engine reaches normal operating temperature. While the	

Checks	Causes
transmission is in warm-up mode, it is normal for transmission upshifts to be delayed or held longer. This feature improves heater performance by giving quicker vehicle warm-ups.	
Engine	Elevated engine RPM - Verify correct engine operating rpm per application. F
Automatic Transmission Fluid Pump Cover (219)	- Inspect for damaged, stuck, sticky pressure regulator valve (233) and springs (234 and 235). - Inspect for damaged, stuck, sticky isolator valve (236) and sleeve (237).
Control Valve Solenoid Body (314)	- Incorrect or inadequate adapt activity - Perform Reset Transmission Adapts procedure. - Incorrect TCM temperature reporting - Monitor TCM temperature using a scan tool. - Line pressure control solenoid incorrect pressure.
1-2-3-4 and 3-5-Reverse Clutch (51)	- Inspect for damaged 1-2-3-4 clutch piston (414), piston housing (417), spring (413), and dam assembly (412). - Inspect for cut, worn, or damaged 1-2-3-4 clutch piston seal (416), inner seal (423), and housing seals (424 and 425). - Inspect for improper selective 1-2-3-4 clutch backing plate retaining ring (429). - Inspect for damaged 3-5-R clutch piston (421), apply ring (405), and spring (420). - Inspect for cut, worn, or damaged 3-5-R clutch piston dam O-ring seal (418), inner seal (419), and outer seal (422). - Inspect for improper selective 3-5-R clutch backing plate retaining ring (400).

NO DRIVE IN ALL RANGES

Checks	Causes
Automatic Transmission Fluid Pan (29)	Verify proper fluid level and condition, inspect transmission assembly for leaks.
Torque Converter Housing (2)	Inspect for damaged or scored pump housing (203), cover (219), rotor (217), slide (212), and vanes (216).

Checks	Causes
Automatic Transmission Fluid Filter (26)	- Inspect for damaged or restricted fluid filter assembly (26). - Inspect for damaged fluid filter seal assembly (25) or improper sealing interface, leaks, and fluid aeration.
Automatic Transmission Fluid Pump Seal (5)	Inspect for worn or damaged seal.
A/Trans Cooling/Lubrication System	Inspect transmission oil cooler (radiator) and cooler line seals for restrictions, damage, kinks, or leaks.
Torque Converter (1)	Inspect for overheating (blued), ballooning, leaks, or other damage.
1-2-3-4 and 3-5-R Clutch Assembly (51)	- Inspect clutch pack retaining rings (400 and 429) for proper installation. - Inspect housing and clutch pistons and seals for damage or leaks.
Control Valve Lower Body (351)	- Inspect for stuck, sticky or damaged clutch select valve (352). - Inspect for stuck checkballs.
Manual Valve (354)	Inspect the manual valve detent lever assembly (505) and connection to the manual valve (354).
Automatic Transmission Manual Shift Shaft Position Switch (308)	Inspect the switch assembly (308) and connection to the manual valve (354).
Automatic Transmission Manual Shift Shaft Position Switch (308)	Inspect PRNDL commands to and from vehicle using GDS 2.
Control Valve Solenoid Body (314)	Inspect PRNDL commands to and from vehicle using GDS 2.
Automatic Transmission Fluid Pump Seal (19)	Inspect for damage or leaks.
Output Shaft Assembly (499)	Inspect for spline wear or damage.
Output Carrier Assembly (490)	- Inspect the carrier assembly for damaged pinion gears, thrust washers, pins, and rollers. - Inspect for damaged thrust bearings (486 and 488). - Inspect for damaged sun gears (487 and 489). - Inspect the carrier assembly for damaged output carrier rear sun gear thrust bearing (captured).
Low Clutch Sprag (467)	Inspect for excessive wear or damage.
Input Carrier Assembly (52)	Inspect carrier assembly for damaged pinion gears, thrust washers, pins, and rollers.
Input Sun Gear (53)	Inspect for spline wear or damage.
Control Valve Upper Body Assembly (304)	Inspect for sticking, damaged, or worn 1 - 2 - 3 - 4 clutch regulator valve (337).

NO FIRST GEAR

Checks	Causes
Automatic Transmission Fluid Pan (29)	Verify proper fluid level and condition, inspect transmission assembly for leaks.
Center Support (67)	Inspect for damaged low clutch sprag assembly (467). Holding the sprag assembly with the retaining ring facing up,

Checks	Causes
	and the inner race of the sprag assembly fixed, the outer race should freewheel counterclockwise. - Inspect for damaged low and reverse clutch piston assembly (470), spring (469), spring retaining ring (466), and center support assembly (459). - Inspect for damaged or worn low and reverse clutch plates (463 - 465). - Inspect for damaged low and reverse clutch backing plate retaining ring (461). - Inspect for cut, worn, or damaged low clutch sprag seal (468).
Control Valve Upper Body Assembly (304)	- Inspect for sticking, damaged, or worn 1st/Rev and 4-5-6 clutch regulator valve (327) and spring (326). - Inspect for sticking, damaged, or worn #1 ball check valve. - Inspect for sticking, damaged, or worn #2 ball check valve. - Inspect for sticking, damaged, or worn #3 ball check valve. - Inspect for sticking, damaged, or worn 1 - 2 - 3 - 4 clutch regulator valve (337).
Control Valve Lower Body (307)	- Inspect for sticking, damaged, or worn clutch select valve 2 (352) and spring (353). - Inspect for sticking, damaged, or worn clutch select valve 3 (352) and spring (353).
Center Support Fluid Passage Seal (20)	- Inspect for worn, cut, or damaged seals. - Inspect for proper seal (20) size (6L45/50E MYA/MYB) vs (6L80/90E MYC/MYD).

NO FIRST AND REVERSE GEARS

Checks	Causes
Automatic Transmission Fluid Pan (29)	Verify proper fluid level and condition, inspect transmission assembly for leaks.
Control Valve Upper Body Assembly (304)	Inspect for sticking, damaged, or worn 1st/rev and 4-5-6 clutch regulator valve (327) and spring (326).
Control Valve Lower Body (307)	Inspect for sticking, damaged, or worn clutch select valve 3 (352) and spring (353).
Control Valve Lower Body (307)	Inspect for sticking, damaged, or worn clutch select valve 2 (352) and spring (353).
Control Valve Upper Body Assembly (304)	Inspect for sticking, damaged, or worn #2 ball check valve
Center Support (67)	- Inspect for damaged low and reverse clutch piston assembly (470), spring (469), spring retaining ring (466), and center support assembly (459). - Inspect for damaged or worn low and reverse clutch plates (463 - 465). - Inspect for damage low and reverse clutch backing plate retaining ring (461).

Checks	Causes
	- Inspect for damaged low clutch sprag assembly (467). Holding the sprag assembly with the retaining ring facing up, and the inner race of the sprag assembly fixed, the outer race should freewheel counterclockwise. - Inspect for cut, worn, or damaged low clutch sprag seal (468).
Center Support Fluid Passage Seal (20)	- Inspect for worn, cut, or damaged seals. - Inspect for proper seal (20) size (6L45/50E MYA/MYB) vs (6L80/90E MYC/MYD).
Automatic Transmission Fluid Pump Cover (219)	Inspect for sticking or damaged TCC control valve (227).

HARSH, SOFT, DELAYED OR SLIPPING FIRST OR REVERSE GEAR

Checks	Causes
NOTE: On cold days, approximately 32B°F (0B°C) or colder, the transmission is designed to shift differently. The transmission uses a warm-up mode shift schedule until the engine reaches normal operating temperature. While the transmission is in warm-up mode, it is normal for transmission upshifts to be delayed or held longer. This feature improves heater performance by giving quicker vehicle warm-ups.	
Automatic Transmission Fluid Pan	Verify proper fluid level and condition, inspect transmission

Checks	Causes
(29)	assembly for leaks.
Control Valve Upper Body (304)	- Inspect for sticking, damaged, or worn 1-R/4-5-6 clutch regulator valve (327) and spring (326). - Inspect for damaged or sticking #2 ball check valve.
Control Valve Lower Body (307)	Inspect for sticking, damaged, or worn clutch select valve 3 (352) and spring (353).
Control Valve Lower Body (307)	Inspect for sticking, damaged, or worn clutch select valve 2 (352) and spring (353).
Center Support (67)	- Inspect for damaged low and reverse clutch piston assembly (470), spring (469), spring retaining ring (466), and center support assembly (459). - Inspect for damaged or worn low and reverse clutch plates (463 and 465). - Inspect for damaged low and reverse clutch backing plate retaining ring (461). - Inspect for damaged low clutch sprag assembly (467). Holding the sprag assembly with the retaining ring facing up, and the inner race of the sprag assembly fixed, the outer race should freewheel counterclockwise. - Inspect for cut, worn, or damaged low clutch sprag seal (468).
Control Valve Solenoid Body (314)	- Perform solenoid valve assembly function test. Refer to <u>Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test</u>. - Incorrect or inadequate adapt activity - Perform <u>Reset Transmission Adapts</u> procedure.
Automatic Transmission Fluid Pump Cover (219)	- Inspect for damaged, stuck, sticky pressure regulator valve (233) and spring (234 and 235). - Inspect for damaged, stuck, sticky isolator valve (236) and sleeve (237).
Center Support Fluid Passage Seal (20)	- Inspect for worn, cut, or damaged seals. - Inspect for proper seal (20) size (6L45/50E MYA/MYB) vs (6L80.90E MYC/MYD).

NO FIRST, SECOND, THIRD, AND FOURTH GEAR

Checks	Causes
Automatic Transmission Fluid Pan (29)	Verify proper fluid level and condition, inspect transmission assembly for leaks.
Control Valve Upper Body (304)	Inspect for sticking, damaged, or worn 1-2-3-4 clutch regulator valve (337) and spring (326).
Control Valve Solenoid Body (314)	- Inspect for contamination or debris. - Pressure control solenoid 5 commanded/failed LOW (off) or leaking - Perform solenoid valve assembly function test. Refer to Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test.
1-2-3-4 and 3-5-Reverse Clutch (51)	- Inspect clutch pack retaining ring (429) for proper installation. If the retaining ring is out of the groove the following parts must be replaced: 1-2-3-4 and 3-5-R clutch housing (427), 1-2-3-4 and 3-5-R clutch bearing assembly (428) and the 1-2-3-4 clutch backing plate retaining ring. - Inspect for a cracked or damaged 1-2-3-4 clutch piston (414), piston housing (417), spring (413), and dam assembly (412). - Inspect for cut, worn, or damaged 1-2-3-4 clutch piston seal (416), inner seal (423), and housing seals (424 and 425). - Inspect for improper selective 1-2-3-4 clutch backing plate retaining ring (429).
Automatic Transmission Fluid Filter (26)	- Inspect for damaged or restricted fluid filter assembly (26). - Inspect for damaged fluid filter seal assembly (25) or improper sealing interface, leaks, and fluid aeration.
Torque Converter Housing (2)	Inspect for damaged or scored pump housing (203), cover (219), rotor (217), slide (212) and vanes (216).
Torque Converter Housing (2)	Inspect for damaged or leaking 1-2-3-4 and 3-5-R clutch fluid seal rings (230).
Center Support (67)	Inspect for worn or damaged low clutch sprag assembly (467).
Automatic Transmission Fluid Pump Seal (19)	Inspect for damage or leaks.
1-2-3-4 Clutch Hub (61)	Inspect for damaged splines on the hub assembly.

HARSH, SOFT, DELAYED OR SLIPPING 1-2-3-4 SHIFT

Checks	Causes
NOTE: On cold days, approximately 32B°F (0B°C) or colder, the transmission is designed to shift differently. The transmission uses a warm-up mode shift schedule until	

Checks	Causes
the engine reaches normal operating temperature. While the transmission is in warm-up mode, it is normal for transmission upshifts to be delayed or held longer. This feature improves heater performance by giving quicker vehicle warm-ups.	
Automatic Transmission Fluid Pan (29)	Verify proper fluid level and condition, inspect transmission assembly for leaks.
Control Valve Upper Body (304)	• Inspect for sticking, damaged, or worn 1-2-3-4 clutch regulator valve (337) and spring (326). • Inspect for damaged or stuck #1 ball check valve.
Control Valve Solenoid Body (314)	• Inspect for contamination or debris. • Pressure control solenoid 5 commanded/failed LOW (off) or leaking - Perform solenoid valve assembly function test. Refer to Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test. • Incorrect or inadequate adapt activity - Perform Reset Transmission Adapts procedure. • Line pressure control solenoid incorrect pressure.
1-2-3-4 and 3-5-Reverse Clutch (51)	• Inspect for damaged 1-2-3-4 clutch piston (414), piston housing (417), spring (413), and dam assembly (412). • Inspect for cut, worn, or damaged 1-2-3-4 clutch piston seal (416), inner seal (423), and housing seals (424 and 425). • Inspect 3-5 reverse clutch housing for cracked weld. • Inspect for improper selective 1-2-3-4 clutch backing plate retaining ring (429). • Inspect for damaged 3-5-R clutch piston (421), apply ring (405), and spring (420). • Inspect for cut, worn, or damaged 3-5-R clutch piston dam O-ring seal (418), inner seal (419), and outer seal (422). • Inspect for improper selective 3-5-R clutch backing plate retaining ring (400).

Checks	Causes
Torque Converter Housing (2)	Inspect for damaged or leaking 1-2-3-4 and 3-5-R clutch fluid seal rings (230).
Automatic Transmission Fluid Pump Cover (219)	- Inspect for damaged, stuck, sticky pressure regulator valve (233) and springs (234 and 235). - Inspect for damaged, stuck, sticky isolator valve (236) and sleeve (237).
Torque Converter Housing (2)	Inspect for damaged or scored pump housing (203), cover (219), rotor (217), slide (212) and vanes (216).
Automatic Transmission Fluid Filter (26)	- Inspect for damaged or restricted fluid filter assembly (26). - Inspect for damaged fluid filter seal assembly (25) or improper sealing interface, leaks, and fluid aeration.
Automatic Transmission Fluid Pump Seal (19)	Inspect for damage or leaks.

NO SECOND AND SIXTH GEAR

Checks	Causes
Automatic Transmission Fluid Pan (29)	Verify proper fluid level and condition, inspect transmission assembly for leaks.
Control Valve Upper Body (304)	Inspect for sticking, damaged, or worn 2-6 clutch regulator valve (334) and spring (326).
Control Valve Solenoid Body (314)	Pressure control solenoid 4 commanded/failed LOW (off) or leaking - Perform solenoid valve assembly function test. Refer to Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test .
Center Support (67)	- Inspect for proper installation of the 2-6 clutch return spring retaining ring (455). - Inspect for damaged 2-6 clutch piston assembly (457), spring (456), retaining ring (455), and center support housing (459). - Inspect for worn or damaged 2-6 clutch plates (451 - 453).
Center Support Fluid Passage Seal (20)	- Inspect for worn, cut, or damaged seals. - Inspect for proper seal (20) size (6L45/50E MYA/MYB) vs (6L80/90E MYC/MYD).

HARSH, SOFT, DELAYED OR SLIPPING SECOND OR SIXTH GEAR

Checks	Causes
NOTE: On cold days, approximately 32B°F (0B°C) or colder, the transmission is designed to shift differently. The transmission	

Checks	Causes
uses a warm-up mode shift schedule until the engine reaches normal operating temperature. While the transmission is in warm-up mode, it is normal for transmission upshifts to be delayed or held longer. This feature improves heater performance by giving quicker vehicle warm-ups.	
Automatic Transmission Fluid Pan (29)	Verify proper fluid level and condition, inspect transmission assembly for leaks.
Control Valve Upper Body (304)	• Inspect for sticking, damaged or worn 2-6 clutch regulator valve (334) and spring (326). • Inspect for damaged or sticking #6 ball check valve.
Control Valve Solenoid Body (314)	• Pressure Control Solenoid 4 commanded/failed LOW (off) or leaking - Perform solenoid valve assembly function test. Refer to Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test. • Incorrect or inadequate adapt activity - Perform Reset Transmission Adapts procedure.
Center Support (67)	• Inspect for proper installation of the 2-6 clutch return spring retaining ring (455). • Inspect for damaged 2-6 clutch piston assembly (457), spring (456), retaining ring (455), and center support assembly (459). • Inspect for worn or damaged 2-6 clutch plates (451 - 453).
Automatic Transmission Fluid Pump Cover (219)	• Inspect for damaged, stuck, sticky pressure regulator valve (233) and springs (234 and 235). • Inspect for damaged, stuck, sticky isolator valve (236) and sleeve (237).
Center Support Fluid Passage Seal (20)	• Inspect for worn, cut, or damaged seals. • Inspect for proper seal (20) size (6L45/50E MYA/MYB) vs (6L80/90E MYC/MYD).

Checks	Causes
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NO THIRD, FIFTH, AND REVERSE GEAR

Checks	Causes
Automatic Transmission Fluid Pan (29)	Verify proper fluid level and condition, inspect transmission assembly for leaks.
Control Valve Upper Body (304)	- Inspect for sticking, damaged, or worn 3-5-R regulator valve (336) and valve spring (326). - Inspect for damaged or stuck #7 ball check valve.
Control Valve Lower Body (307)	Inspect for worn, damaged, or sticking clutch select solenoid valve 3 (352) and valve spring (353).
1-2-3-4 and 3-5-Reverse Clutch (51)	- Inspect for proper installation of 3-5-R clutch backing plate retaining ring (400). - Inspect for worn, damaged, or leaking clutch bearing seal assembly (428). - Inspect for damaged or worn 3-5-R clutch plates (401 - 404). - Inspect for damaged 3-5-R clutch piston (421), apply ring (405), and spring (420). - Inspect for cut, worn, or damaged 3-5-R clutch piston dam O-ring seal (418), inner seal (419), and outer seal (422). - Inspect for improper selective 3-5-R clutch backing plate retaining ring (400).
Control Valve Solenoid Body (314)	Pressure control solenoid 2 commanded/failed HIGH (off) or leaking - Perform solenoid valve assembly function test. Refer to <u>Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test</u> .
Automatic Transmission Fluid Pump Seal (19)	Inspect for damage or leaks.

HARSH, SOFT, DELAYED OR SLIPPING THIRD, FIFTH, OR REVERSE GEAR

Checks	Causes
NOTE: On cold days, approximately 32B°F (0B°C) or colder, the transmission is designed to shift differently. The transmission uses a warm-up mode shift schedule until the engine reaches normal operating temperature.	

Checks	Causes
While the transmission is in warm-up mode, it is normal for transmission upshifts to be delayed or held longer. This feature improves heater performance by giving quicker vehicle warm-ups.	
Automatic Transmission Fluid Pan (29)	Verify proper fluid level and condition, inspect transmission assembly for leaks.
Control Valve Upper Body (304)	- Inspect for sticking, damaged, or worn 3-5-R regulator valve (336) and valve spring (326). - Inspect for damaged or stuck #7 ball check valve.
Control Valve Lower Body (307)	Inspect for worn, damaged, or sticking clutch select solenoid valve 3 (352) and valve spring (353).
Control Valve Solenoid Body (314)	- Pressure control solenoid 2 commanded/failed HIGH (off) or leaking - Perform solenoid valve assembly function test. Refer to Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test. - Incorrect or inadequate adapt activity - Perform Reset Transmission Adapts procedure.
1-2-3-4 and 3-5-Reverse Clutch (51)	- Inspect for proper installation of 3-5-R clutch backing plate retaining ring (400). - Inspect for worn, damaged, or leaking clutch bearing seal assembly (428). - Inspect for damaged or worn 3-5-R clutch plates (401 - 404). - Inspect for damaged 3-5-R clutch piston (421), apply ring (405), and spring (420). - Inspect 3-5 reverse clutch housing for cracked weld. - Inspect for cut, worn, or damaged 3-5-R clutch piston dam O-ring seal (418), inner seal (419), and outer seal (422). - Inspect for improper selective 3-5-R clutch backing plate retaining ring (400).
Automatic Transmission Fluid Pump Cover (219)	- Inspect for damaged, stuck, sticky pressure regulator valve (233) and springs (234 and 235). - Inspect for damaged, stuck, sticky isolator valve (236) and sleeve (237).
Automatic Transmission Fluid Pump Seal (19)	Inspect for damage or leaks.

NO FOURTH, FIFTH, AND SIXTH GEAR

Checks	Causes
Automatic Transmission Fluid Pan (29)	Verify proper fluid level and condition, inspect transmission assembly for leaks.
Control Valve Upper Body (304)	Inspect for sticking, damaged, or worn R-1/4-5-6 clutch regulator valve (327) and spring (326).
4-5-6 Clutch (56)	- Inspect for cut, worn, or damaged turbine shaft fluid seal rings (442). - Inspect for damaged piston (439), piston dam (437), dam retaining ring (436), and clutch spring (438). - Inspect for worn or damaged 4-5-6 clutch plates (432 - 435). - Inspect for damaged or leaking clutch housing (441). - Inspect for improper selective 4-5-6 clutch backing plate retaining ring (431). - Inspect for damaged or distorted turbine shaft.
Automatic Transmission Fluid Pump Seal (18)	Inspect for cut, leaking, or damaged seal.
4-5-6 Clutch Hub (58)	- Inspect the shaft for damage or wear. - Inspect the hub assembly (475), dampener (476), and apply plate (477) for wear or damage.
A/Trans Cooling/Lubrication System	Inspect transmission oil cooler (radiator) and cooler lines/seals for restrictions, damage, kinks or leaks.
Control Valve Solenoid Body (314)	Pressure control solenoid 3 commanded/failed HIGH (off) or leaking - Perform solenoid valve assembly function test. Refer to Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test .
Torque Converter Housing (2)	- Inspect for damaged or scored pump housing (203), cover (219), rotor (217), slide (212), and vanes (216). - Inspect for damaged or porous pump cover assembly (219). Inspect pump surfaces for flatness. - Inspect for excessive fluid pump rotor (217) clearance or damage. Ensure proper selective rotor is being utilized.
Output Shaft Assembly (70)	Inspect for damaged or stripped splines on the output shaft.

HARSH, SOFT, DELAYED OR SLIPPING 4-5-6 SHIFT

Checks	Causes
NOTE: On cold days, approximately 32B°F (0B°C) or colder, the transmission is designed to shift differently. The transmission	

Checks	Causes
uses a warm-up mode shift schedule until the engine reaches normal operating temperature. While the transmission is in warm-up mode, it is normal for transmission upshifts to be delayed or held longer. This feature improves heater performance by giving quicker vehicle warm-ups.	
Automatic Transmission Fluid Pan (29)	Verify proper fluid level and condition, inspect transmission assembly for leaks.
Control Valve Upper Body (304)	• Inspect for sticking, damaged, or worn 1-R/4-5-6 clutch regulator valve (327) and spring (326). • Inspect for damaged or sticking #3 and #4 ball check valves.
Control Valve Lower Body (307)	Inspect for worn, damaged, or sticking clutch select solenoid valve 2 (352) and valve spring (353).
Control Valve Solenoid Body (314)	• Pressure Control Solenoid 3 commanded/failed HIGH (off) or leaking - Perform solenoid valve assembly function test. Refer to Control Solenoid Valve and Transmission Control Module Assembly Solenoid Performance Test. • Incorrect or inadequate adapt activity - Perform Reset Transmission Adapts procedure.
4-5-6 Clutch (56)	• Inspect for cut, worn, or damaged turbine shaft fluid seal rings (442). • Inspect for damaged piston (439), piston dam (437), dam retaining ring (436), and clutch spring (438). • Inspect for damaged or worn 4-5-6 clutch plates (432 - 435). • Inspect for damage or leaking clutch housing (441). • Inspect for improper selective 4-5-6 clutch backing plate retaining ring (431). • Inspect for damaged or distorted turbine shaft.
Automatic Transmission Fluid Pump Seal (18)	Inspect for cut, leaking, or damaged seal.

Checks	Causes
4-5-6 Clutch Hub (58)	- Inspect shaft for damage or wear. - Inspect hub assembly (475), dampener (476), and apply plate (477) for wear or damage.
Automatic Transmission Fluid Pump Cover (219)	- Inspect for damaged, stuck, sticky pressure regulator valve (233) and springs (234 and 235). - Inspect for damaged, stuck, sticky isolator valve (236) and sleeve (237).

NO TORQUE CONVERTER CLUTCH APPLY

Checks	Causes
Torque Converter (1)	Diagnose torque converter for possible internal damage. Refer to Torque Converter Diagnosis .
Automatic Transmission Fluid Pump Cover (219)	- Inspect for worn, damaged, or sticking converter feed limit valve (220) and spring (221). - Inspect for worn, damaged, or sticking TCC control valve (227) and spring (226). - Inspect for damaged stator shaft.
Control Valve Lower Body (307)	Inspect for worn, damaged, or sticking torque converter clutch (TCC) regulator apply valve (355). Refer to Control Solenoid Valve and Transmission Control Module Assembly Inspection .
4-5-6 Clutch (56)	- Inspect for damaged turbine shaft. - Inspect for damaged turbine shaft O-ring seal.
Torque Converter Housing (2)	Inspect for leaking or damaged torque converter fluid seal assembly (201), torque converter bushing (206), turbine shaft o-ring seal (443) and torque converter (with fluid pump) housing assembly (2).

NO TORQUE CONVERTER CLUTCH RELEASE

Checks	Causes
Torque Converter (1)	Diagnose torque converter for possible internal damage. Refer to Torque Converter Diagnosis .
Automatic Transmission Fluid Pump Cover (219)	- Inspect for worn, damaged, or sticking converter feed limit valve (220) and spring (221). - Inspect for worn, damaged, or sticking torque converter clutch (TCC) control valve (227) and spring (226).
Control Valve Lower Body (307)	Inspect for worn, damaged, or sticking TCC regulator apply valve (355).

HARSH TORQUE CONVERTER CLUTCH APPLY, OR INOPERATIVE OR NO ELECTRONICALLY CONTROLLED CAPACITY CLUTCH CONTROL

Checks	Causes
NOTE: On cold days, approximately	

Checks	Causes
32B°F (0B°C) or colder, the transmission is designed to shift differently. The transmission uses a warm-up mode shift schedule until the engine reaches normal operating temperature. While the transmission is in warm-up mode, it is normal for transmission upshifts to be delayed or held longer. This feature improves heater performance by giving quicker vehicle warm-ups.	
Torque Converter Assembly (1)	- Inspect for leaking or damaged torque converter clutch hub seal. - Diagnose torque converter assembly for possible internal damage. Refer to Torque Converter Diagnosis.
Clutch Select Solenoid Valve Spring (353)	Inspect for broken spring within the lower valve body in the torque converter clutch regulator apply valve line up (355).

NO REVERSE GEAR

Checks	Causes
Automatic Transmission Fluid Pan (29)	Verify proper fluid level and condition, inspect transmission assembly for leaks.
Control Valve Upper Body (304)	- Inspect for sticking, damaged, or worn 3-5-R regulator valve (336) and valve spring (326). - Inspect for damaged or missing #5 ball check valve.
Control Valve Lower Body (307)	Inspect for worn, damaged, or sticking clutch select solenoid valve 3 (352) and valve spring (353).
1-2-3-4 and 3-5-Reverse Clutch (51)	Inspect for proper installation of 3-5-R clutch backing plate retaining ring (400).

Checks	Causes
	- Inspect for worn, damaged, or leaking clutch bearing seal assembly (428). - Inspect for damaged or worn 3-5-R clutch plates (401 - 404). - Inspect for damaged 3-5-R clutch piston (421), apply ring (405), and spring (420). - Inspect for cut, worn, or damaged 3-5-R clutch piston dam O-ring seal (418), inner seal (419), and outer seal (422). - Inspect for improper selective 3-5-R clutch backing plate retaining ring (400).
Torque Converter Housing (2)	- Inspect for worn or damaged 1-2-3-4 and 3-5-R clutch fluid seal rings (230). - Inspect for damaged or scored pump housing (203), cover (219), rotor (217), slide (212), and vanes (216). - Inspect for damaged or porous pump cover assembly (219). Inspect pump surfaces for flatness. - Inspect for excessive fluid pump rotor (217) clearance or damage. Ensure proper selective rotor is being utilized.
Center Support Fluid Passage Seal (20) Automatic Transmission Fluid Pump Seal (18 and 19)	- Inspect for worn, cut, or damaged seals. - Inspect for proper seal (20) size (6L45/50E MYA/MYB) vs (6L80/90E MYC/MYD).
Center Support (67)	- Inspect for damaged or leaking low and reverse clutch piston assembly (470). - Inspect for damaged or worn low and reverse clutch plates (462 - 465). - Inspect for damaged low clutch sprag assembly (467). Holding the sprag assembly with the retaining ring facing up, and the inner race of the sprag assembly fixed, the outer race should freewheel counterclockwise.
2-6 and 3-5-Reverse Clutch Hub (64)	Inspect for damaged or distorted shaft on hub assembly.
Output Shaft Assembly (70)	Inspect for damaged or stripped splines on the output shaft.

FLUID PRESSURE HIGH OR LOW

Checks	Causes
Torque Converter Housing (2)	- Inspect for worn, sticking, or damaged pressure regulator valve (233). - Inspect for worn, sticking, or damaged pressure regulator valve outer spring (234). - Inspect for worn, sticking, or damaged pressure regulator valve inner spring (235). - Inspect for worn, sticking, or damaged isolator valve (236) and sleeve (237). - Inspect for worn, sticking, or damaged pressure relief ball valve (225). - Inspect for worn, sticking, or damaged pressure relief ball valve spring (224).

Checks	Causes
	• Inspect for damaged or porous pump cover assembly (219). Inspect for pump surfaces not flat. • Inspect for excessive fluid pump rotor (217) clearance or damage. Ensure proper selective rotor is being utilized. • Inspect for damaged fluid pump slide (212). Ensure proper selective slide is being utilized. • Inspect for worn, sticking, or damaged fluid pump slide outer spring (211). • Inspect for worn or damaged fluid pump slide seal (213), seal support (214), pivot pin (215), fluid seal ring (209), and O-ring seal (210). • Inspect for worn or damaged fluid pump vane rings (207) and rotor guide (208). • Inspect fluid filter assembly (26) for torque converter friction material.
Control Valve Upper Body (321)	• Inspect for worn, sticking, or damaged actuator feed limit valve (325) and spring (324). • Inspect for worn, sticking, or damaged clutch boost valve (329) and spring (330).
Control Valve Solenoid Body (314)	Inspect for leaking or damaged filter plate assembly seals (16). Verify line pressure control solenoid operation is not stuck high or low.
Automatic Transmission Fluid Filter (26)	• Inspect for damaged or restricted fluid filter assembly (26). • Inspect for damaged fluid filter seal assembly (25).

NO TORQUE CONVERTER CLUTCH SLIP WITH TORQUE CONVERTER CLUTCH ENGAGED

Checks	Causes
Torque Converter Clutch Regulator Apply Valve Spring (353)	Inspect for broken spring within the lower valve body in the torque converter clutch regulator apply valve line up (355).