

2021 TRANSMISSION

Transfer Case - MP 3025G (NQ6) - Canyon, Colorado

SPECIFICATIONS

APPROXIMATE FLUID CAPACITIES

Application	Specification	
	Metric	English
Transfer Case - MP 3025G (NQ6)		
DEXRONB® VI	1.9 liters	2.0 quarts

FASTENER SPECIFICATIONS

Single Use Non-Threaded Fasteners/Components

NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>	
Application	
Transfer Case Oil Pump Suction Pipe Seal	
Transfer Case Rear Output Shaft Bushing	
Transfer Case Vent	

Single Use Threaded Fastener/Component Tightening Specifications

NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>	
Application	Specification
	Metric (English)
Transfer Case Drain Plug	25 N.m (18 lb ft)
Transfer Case Fill Plug	25 N.m (18 lb ft)

Reusable Threaded Fastener Tightening Specifications

NOTE: <i>All fasteners listed in this table can be reused after removal.</i>	
Application	Specification
	Metric (English)
Transfer Case Actuator Shaft Position Sensor Bolt	10 N.m (89 lb in)
Transfer Case Adapter Bolt	58 N.m (43 lb ft)
Transfer Case Bolt [18x]	24 N.m (18 lb ft)

NOTE:

All fasteners listed in this table can be reused after removal.

Application	Specification
	Metric (English)
Transfer Case Front Output Flange Nut	176-271 N.m (130 - 200 lb ft)
Transfer Case Shield Bolt	32 N.m (24 lb ft)
Transfer Case Shift Detent Plunger Plug	24 N.m (18 lb ft)
Transfer Case Shift Fork Shaft Guide Screw	5 N.m (44 lb in)
Transfer Case Two/Four Wheel Drive Actuator Bolt/Screw [3x]	19 N.m (14 lb ft)
Vehicle Speed Sensor Bolt	12 N.m (106 lb in)

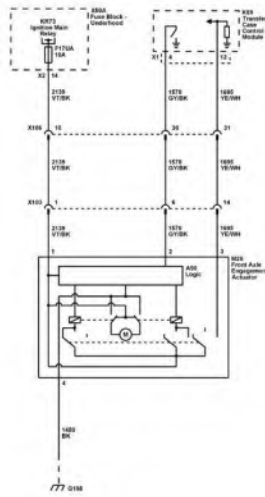
ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Application	Type of Material	GM Part Number	
		United States	Canada
Transfer Case	DEXRONB® VI	88865601	19367328
Transfer Case Input Shaft Splines and Input Shaft O-ring	Grease	19257121	992694
Transfer Case Oil Drain Plug	Sealant	19333512	10953480
Transfer Case Oil Fill Plug	Sealant	19333512	10953480
Transfer Case Rear Case Half-to-Transfer Case Front Half	Sealant	12378521	88901148
Transfer Case Shift Fork Service Pin	Threadlocker	19332211	10953488
Transfer Case Shift Fork Shaft Guide Screw	Threadlocker	19332211	10953488
Transfer Case Shift Detent Screw/Plug O-ring Seal	DEXRONB® VI	88865601	19264717
Transfer Case Vent	Sealant	12377901	10953504
Vehicle Speed Sensor O-ring Seal	DEXRONB® VI	88865601	19264717
Vehicle Speed Sensor Bolt	Threadlocker	89021297	10953488

SCHEMATIC WIRING DIAGRAMS**TRANSFER CASE CONTROL WIRING SCHEMATICS**

Power, Ground and Shift Controls





VISUAL IDENTIFICATION

TRANSFER CASE DISASSEMBLED VIEW

Case Half Components

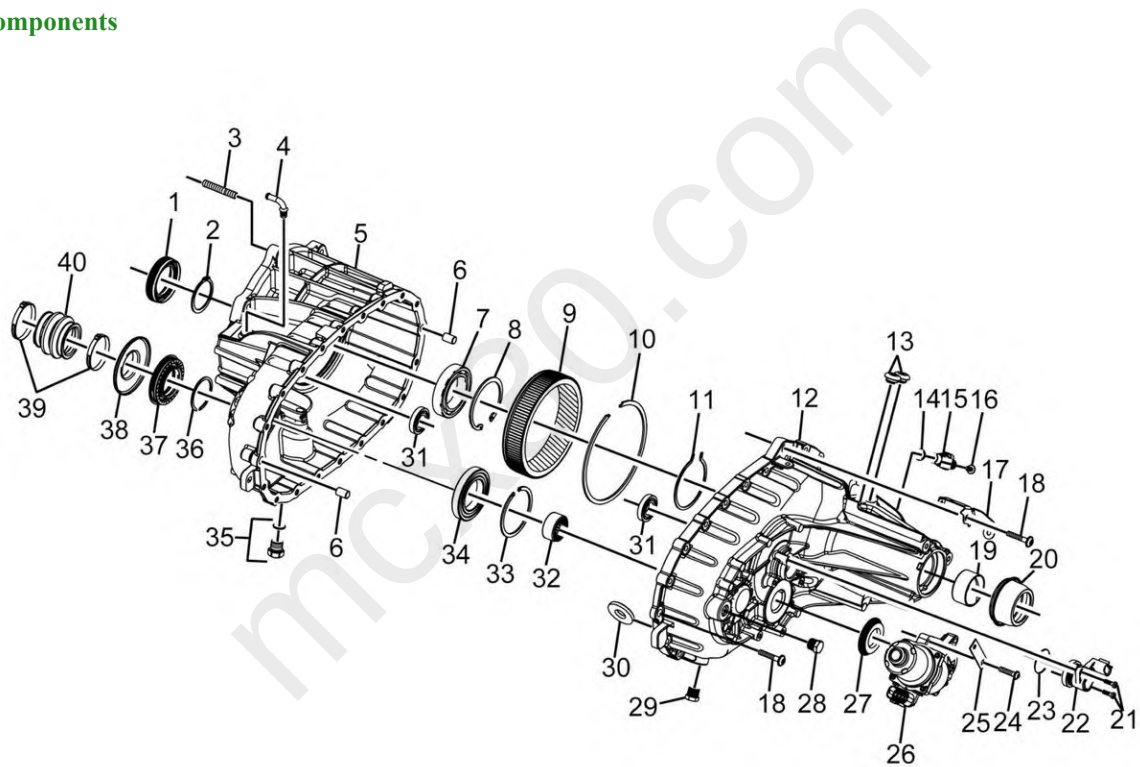


Fig. 1: Exploded View Of Transfer Case Case Half Components
 Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Transfer Case Input Shaft Seal
2	Transfer Case Input Shaft Inner Retaining Ring
3	Transfer Case Stud [7x]
4	Transfer Case Vent
5	Transfer Case Front Case Half
6	Transfer Case Half Locating Pin [2x]
7	Transfer Case Input Shaft Bearing

Callout	Component Name
8	Transfer Case Input Shaft Bearing Retaining Ring
9	Transfer Case High/Low Internal Gear
10	Transfer Case High/Low Internal Gear Retaining Ring
11	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
12	Transfer Case Rear Case Half
13	Transfer Case Access Hole Plug [2x]
14	Transfer Case Rear Output Shaft Speed Sensor O-ring Seal
15	Transfer Case Rear Output Shaft Speed Sensor
16	Transfer Case Rear Output Shaft Speed Sensor Bolt
17	Transfer Case Bracket
18	Transfer Case Half Bolt [20x]
19	Transfer Case Rear Output Shaft Bushing
20	Transfer Case Rear Output Shaft Seal
21	Transfer Case Two/Four Wheel Drive Actuator Position Sensor Bolt [2x]
22	Transfer Case Two/Four Wheel Drive Actuator Position Sensor
23	Transfer Case Two/Four Wheel Drive Actuator Position Sensor Seal
24	Transfer Case Two/Four Wheel Drive Actuator Bolt/Screw [3x]
25	Transfer Case Actuator Harness Bracket
26	Transfer Case Two/Four Wheel Drive Actuator
27	Transfer Case Two/Four Wheel Drive Actuator Seal
28	Transfer Case Oil Fill Plug
29	Transfer Case Oil Drain Plug
30	Transfer Case Chip Collector Magnet
31	Transfer Case Shift Cam Shaft Bearing [2x]
32	Transfer Case Front Output Shaft Rear Bearing
33	Transfer Case Front Output Shaft Bearing Retaining Ring
34	Transfer Case Front Output Shaft Front Bearing
35	Transfer Case Shift Detent Plunger
36	Transfer Case Front Output Shaft Retaining Ring
37	Transfer Case Front Output Shaft Seal
38	Transfer Case Front Output Shaft Oil Slinger
39	Transfer Case Front Output Shaft Boot
40	Transfer Case Front Output Shaft Boot Clamp [2x]

Internal Components

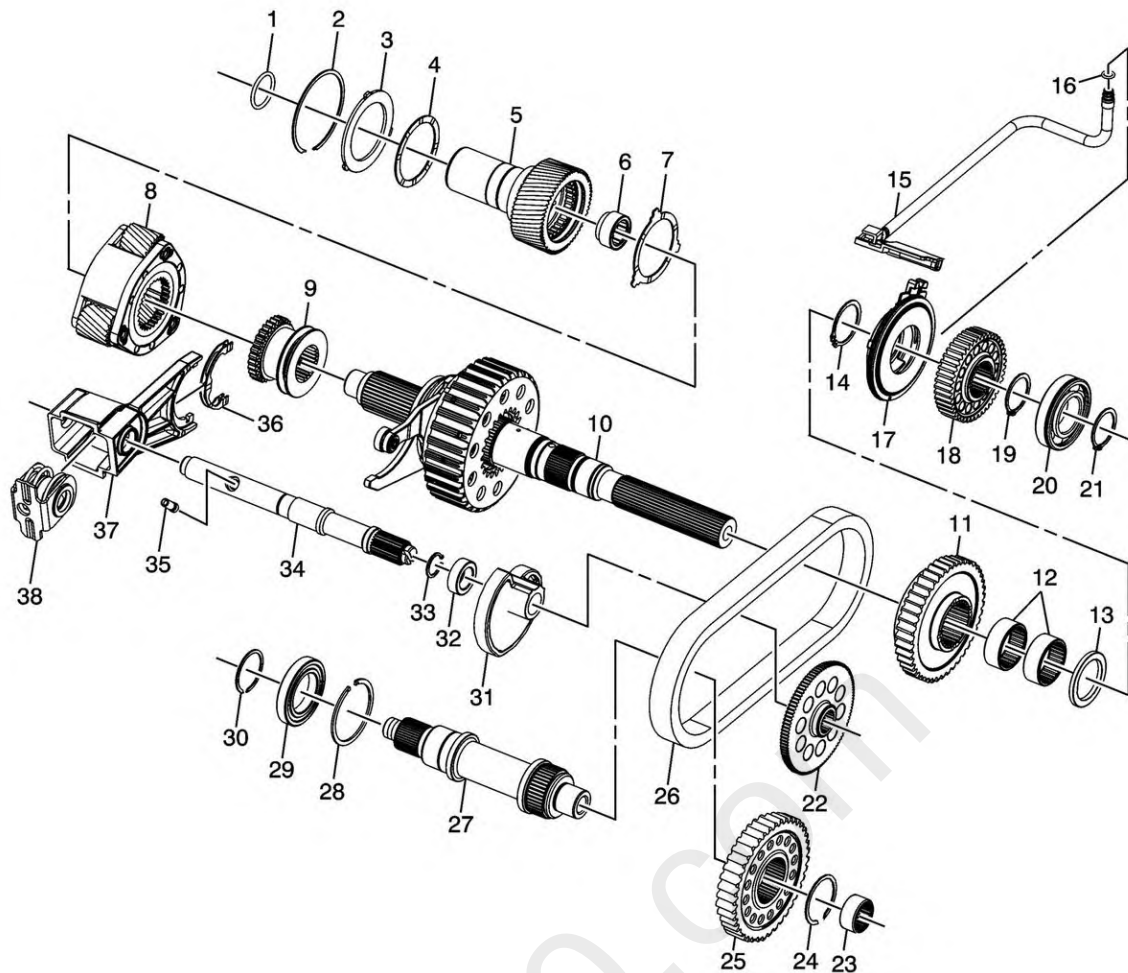


Fig. 2: Exploded View Of Transfer Case Internal Components
 Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Transfer Case Input Shaft Seal
2	Transfer Case Input Shaft Retaining Ring
3	Transfer Case High/Low Locking Plate
4	Transfer Case Input Shaft Washer
5	Transfer Case Input Shaft
6	Transfer Case Input Shaft Pilot Bearing
7	Transfer Case Planetary Carrier Sun Gear Thrust Washer
8	Transfer Case High/Low Planetary Carrier
9	Transfer Case High/Low Clutch
10	Transfer Case Rear Output Shaft and Clutch Assembly
11	Transfer Case Front Output Shaft Drive Sprocket
12	Transfer Case Front Output Shaft Drive Sprocket Bearing [2x]
13	Transfer Case Front Output Shaft Driven Sprocket Spacer
14	Transfer Case Front Output Shaft Drive Sprocket Retaining Ring
15	Transfer Case Oil Pump Suction Pipe
16	Transfer Case Oil Pump Suction Pipe Seal
17	Transfer Case Oil Pump
18	Transfer Case Rear Output Shaft Speed Reluctor Wheel
19	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
20	Transfer Case Rear Output Shaft Rear Bearing

Callout	Component Name
21	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
22	Transfer Case Actuator Shaft Gear
23	Transfer Case Front Output Shaft Rear Bearing
24	Transfer Case Front Output Shaft Driven Sprocket Retaining Ring
25	Transfer Case Front Output Shaft Driven Sprocket
26	Transfer Case Front Output Shaft Drive Chain Assembly
27	Transfer Case Front Output Shaft
28	Transfer Case Front Output Shaft Bearing Retaining Ring
29	Transfer Case Front Output Shaft Front Bearing
30	Transfer Case Front Output Shaft Bearing Retaining Ring
31	Transfer Case Two/Four Wheel Drive Actuator Cam
32	Transfer Case Two/Four Wheel Drive Actuator Cam Spacer
33	Transfer Case Two/Four Wheel Drive Actuator Cam Retaining Ring
34	Transfer Case High/Low Shift Fork Shaft
35	Transfer Case High/Low Shift Fork Pin
36	Transfer Case High/Low Shift Fork Insert [2x]
37	Transfer Case High/Low Shift Fork
38	Transfer Case High/Low Shift Fork Spring

Clutch Components

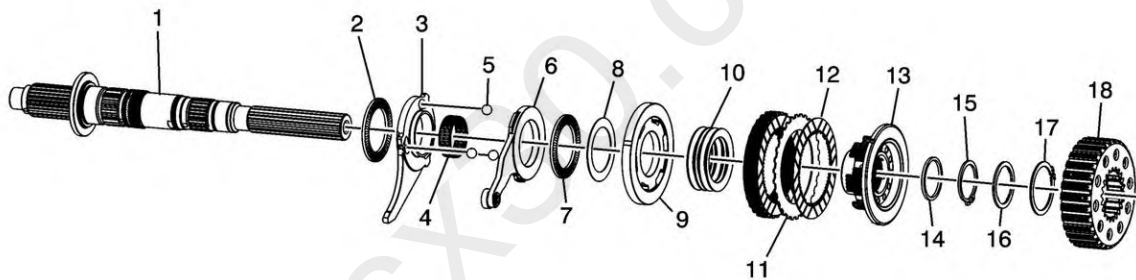


Fig. 3: Exploded View Of Clutch Components

Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Transfer Case Rear Output Shaft
2	Transfer Case Scissor Mechanism Thrust Bearing
3	Transfer Case Scissor Mechanism Lever
4	Transfer Case Scissor Mechanism Lever Bearing
5	Transfer Case Scissor Lever Ball [3x]
6	Transfer Case Scissor Mechanism Lever
7	Transfer Case Scissor Mechanism Thrust Bearing
8	Transfer Case Control Actuator Lever Washer
9	Transfer Case Four Wheel Drive Clutch Pressure Plate - Apply
10	Transfer Case Four Wheel Drive Clutch Pressure Plate Spring [4x]
11	Transfer Case Four Wheel Drive Clutch Pressure Plate - Steel [7x]
12	Transfer Case Four Wheel Drive Clutch Pressure Plate [8x]

Callout	Component Name
13	Transfer Case Four Wheel Drive Clutch Hub
14	Transfer Case Four Wheel Drive Clutch Shim
15	Transfer Case Two/Four Wheel Drive Clutch Retaining Ring
16	Transfer Case Rear Output Shaft Bearing Spacer
17	Transfer Case Four Wheel Drive Clutch Housing Retaining Ring
18	Transfer Case Four Wheel Drive Clutch Housing

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B0770

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 B0770 01

AWD Indicator Circuit Short to Battery

DTC B0770 06

AWD Indicator Circuit Short to Ground or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Indicator Dimming Control	B0770 06, B0775 06, B0780 06, B0785 06	B0770 06, B0775 06, B0780 06, B0785 06	-
AWD Indicator Control Circuit	B0770 06	B0770 06	B0770 01

Circuit/System Description

The all wheel drive (AWD/4WD Auto) indicator circuit consists of a light emitting diode (LED) feed circuit, a LED and a LED control circuit. The indicator dimming control circuit is the LED feed circuit and continuously supplies B+ to the 2WD HI, 4WD Auto, 4WD HI, and 4WD LO LEDs. When the AWD mode has been selected by the driver, the transfer case shift control module (TCCM) provides a ground through the AWD indicator control circuit illuminating the LED.

The TCCM tests the AWD indicator circuit for unexpected voltage by monitoring the B+ supplied by the BCM on the indicator dimming control circuit by grounding the AWD indicator control circuit for 2 seconds during the Bulb Test at key ON.

Conditions for Running the DTC

B0770 01

- Ignition ON
- System voltage 10 - 18 V
- Instrument panel lights not dimmed.
- Daylight running lights MUST be commanded ON.
- Circuit tested when the AWD indicator is commanded ON.

B0770 06

- Ignition ON
- System voltage 10 - 18 V
- Instrument panel lights not dimmed.
- Daylight running lights MUST be commanded ON.
- Circuit tested when the AWD indicator is commanded OFF.

Conditions for Setting the DTC

B0770 01

The TCCM detects 3.4 V or greater on the AWD indicator control circuit when the AWD indicator is commanded ON.

B0770 06

The TCCM detects 1.6 V or less for 1.5 seconds on the AWD indicator control circuit when the AWD indicator is commanded OFF.

Action Taken When the DTC Sets

Normal operation, the SERVICE 4WD indicator is not commanded ON. Driver is informed of fault via bulb inspection.

Conditions for Clearing the DTC

- The transfer case shift control module clears the DTC once the condition for setting the DTC is no longer present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Diagnostic Aids

- A TRUE B+ has enough current to light a test light.
- A DIAGNOSTIC B+ is a low current circuit that DOES NOT have enough current to light a test light.
- A short to ground on the AWD indicator control circuit will cause the AWD indicator to remain ON at all times.
- An open or high resistance on the AWD indicator control circuit will cause the AWD indicator to be inoperative during the 2 second bulb inspection.
- An open in the indicator dimming control circuit will cause the 2WD HI, AWD, 4WD HI and 4WD LO mode indicators to be inoperative during the 2 second bulb inspection.
- **EL-49741** harness is a good source for 9 V.
- **EL-49742** harness is a good source for B+ and ground.
- With key REMOVED - opening a door puts a true B+ on the indicator dimming control circuit, TCSCS X1 pin 4. Other possible voltages are listed below:
 - Door open, key removed - indicator dimming control circuit voltage = true B+.
 - Door open, key in, key OFF - indicator dimming control circuit voltage = true B+.
 - Door open, key ON, engine OFF - indicator dimming control circuit voltage = diagnostic B+.
 - All doors closed, key OFF - indicator dimming control circuit voltage = B+ (high current - enough to light a test light).
 - All doors closed, key ON, engine OFF - indicator dimming control circuit voltage = diagnostic B+.
 - Key ON, engine OFF. Place a shop light on the DRL sensor. When the DRL sensor commands the headlights OFF, the indicator dimming control circuit voltage, TCSCS X1 pin 4, will go from a diagnostic B+ to a true B+.

Reference Information

Schematic Reference

Transfer Case Control 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.

Special Tools

- **EL-49741** 9 V+ Power Source Harness
- **EL-49742** Battery Voltage B+ and Ground Source Harness
- **J-35616** GM-Approved Terminal Test Kit

Circuit/System Verification

NOTE: The TCCM runs a 2 second bulb test on all indicators of the S77 Transfer Case Shift Control Switch at Ignition ON.

1. Ignition ON.
2. Verify the AWD indicator illuminates during the bulb test.
 - **If the AWD indicator does not illuminate**
Refer to Circuit/System Testing
 - **Go to next step: If the AWD indicator does illuminate**
3. Verify DTC B0770 is not set.
 - **If the DTC is set**
Refer to Circuit/System Testing
 - **Go to next step: If the DTC is not set**
4. All OK.

Circuit/System Testing

NOTE: When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J-35616 GM terminal test kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.

1. Ignition OFF, disconnect the X1 connector at the S77 Transfer Case Shift Control Switch.
2. Connect a test lamp between the indicator dimming control circuit terminal 4 X1 and ground, Ignition ON.
3. Verify the test lamp turns ON.
 - **If the test lamp remains OFF**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the indicator dimming control circuit and ground.

- If less than infinite resistance, repair the short to ground.
 - Go to next step: If infinite resistance
3. Test for less than 2 Ω in the indicator dimming control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the K9 Body Control Module.
 - **Go to next step: If the test lamp turns ON**
 4. Ignition OFF, connect a test lamp between the indicator dimming control circuit terminal 4 X1 and the AWD indicator control circuit terminal 7 X1.
 5. Ignition ON, verify the test lamp turns ON and OFF when commanding the Transfer Case AWD Indicator ON and OFF from the scan tool.
 - **If the test lamp does not turn ON**
 1. Ignition OFF, disconnect the X2 harness connector at the K69 Transfer Case Control Module.
 2. Ignition ON, test for less than 1 V between the AWD indicator control circuit terminal 11 X2 at the control module harness and ground.
 - If 1 V or greater, repair the short to voltage.
 - Go to next step: If less than 1 V
 3. Ignition OFF, test for less than 2 Ω in the AWD indicator control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the K69 Transfer Case Control Module.
 - **If the test lamp does not turn OFF**
 1. Ignition OFF, disconnect the X2 harness connector at the K69 Transfer Case Control Module.
 2. Test for infinite resistance between the AWD indicator control circuit and ground.
 - If less than infinite resistance, repair the short to ground
 - If infinite resistance, replace the K69 Transfer Case Control Module.
 - **Go to next step: If the test lamp turns ON and OFF**
 6. Test or replace the S77 Transfer Case Shift Control Switch.

Component Testing

S77 Transfer Case Shift Control Switch

1. Using the L-BU probes J 35616-65B, connect the **EL-49741** 9 V+ power source harness to the S77 Transfer Case Shift Control Switch as specified below for the LED being tested. Connecting the harness in the opposite pins will not illuminate the LED.
2. Connect a 9 V battery to the **EL-49741** harness.
3. Verify that only the indicator being tested illuminates.
 - If the indicator does not illuminate when tested or the incorrect indicator illuminates, replace the S77 Transfer Case Shift Control Switch.

EL49741 Wire Color	2WD HI	4WD Auto	4WD HI	4WD LO	N
Red (pin)	4	4	4	4	2
Black (pin)	8	7	9	10	3

Repair Instructions

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

- [Transfer Case Selector Switch Replacement](#)
- [Control Module References](#) for TCCM replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#)

DTC B0775

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 B0775 01

4WD HI Indicator Circuit Short to Battery

DTC B0775 06

4WD HI Indicator Circuit Short to Ground or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Indicator Dimming Control	B0770 06, B0775 06, B0780 06, B0785 06	B0770 06, B0775 06, B0780 06, B0785 06	-
4WD HI Indicator Control Circuit	B0775 06	B0775 06	B0775 01

Circuit/System Description

The 4WD HI indicator circuit consists of a light emitting diode (LED) feed circuit, a LED and a LED control circuit. The indicator dimming control circuit is the LED feed circuit and continuously supplies B+ to the 2WD HI, 4WD Auto, 4WD HI and 4WD LO LEDs. When the 4WD HI mode has been selected by the driver, the transfer case shift control module (TCCM) provides a ground through the 4 HI indicator control circuit illuminating the LED.

The TCCM tests the 4WD HI indicator circuit for unexpected voltage by monitoring the B+ supplied by the BCM on the indicator dimming control circuit by grounding the 4WD HI indicator control circuit for 2 seconds during the Bulb Test at key ON.

Conditions for Running the DTC

B0775 01

- Ignition ON
- System voltage 10 - 18 V
- Instrument panel lights not dimmed.
- Daylight running lights MUST be commanded ON.
- Circuit tested when the 4WD HI indicator is commanded ON.

B0775 06

- Ignition ON
- System voltage 10 - 18 V
- Instrument panel lights not dimmed.
- Daylight running lights MUST be commanded ON.
- Circuit tested when the 4WD HI indicator is commanded OFF.

Conditions for Setting the DTC

B0775 01

The TCCM detects 3.4 V or greater on the 4WD HI indicator control circuit when the 4WD HI indicator is commanded ON.

B0775 06

The TCCM detects 1.6 V or less for 1.5 seconds on the 4WD HI indicator control circuit when the 4WD HI indicator is commanded OFF.

Action Taken When the DTC Sets

Normal operation, the SERVICE 4WD indicator is not commanded ON. Driver is informed of fault via bulb inspection.

Conditions for Clearing the DTC

- The TCCM clears the DTC once the condition for setting the DTC is no longer present.
- A history DTC clears after 40 consecutive warm-up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Diagnostic Aids

- A TRUE B+ has enough current to light a test light.
- A DIAGNOSTIC B+ is a low current circuit that DOES NOT have enough current to light a test light.
- A short to ground on the 4WD HI indicator control circuit will cause the 4WD HI indicator to remain ON at all times.
- An open or high resistance on the 4WD HI indicator control circuit will cause the 4WD HI indicator to be inoperative during the 2 second bulb inspection.
- An open in the indicator dimming control circuit will cause the 2WD HI, 4WD Auto, 4WD HI and 4WD LO mode indicators to be inoperative during the 2 second bulb inspection.
- **EL-49741** harness is a good source for 9 V.
- **EL-49742** harness is a good source for B+ and ground
- With key REMOVED - opening a door puts a true B+ on the indicator dimming control circuit, TCSCS X1 pin 4. Other possible voltages are listed below:
 - Door open, key removed - indicator dimming control circuit voltage = true B+.
 - Door open, key in, key OFF - indicator dimming control circuit voltage = true B+.
 - Door open, key ON, engine OFF - indicator dimming control circuit voltage = diagnostic B+.
 - All doors closed, key OFF - indicator dimming control circuit voltage = B+ (high current - enough to light a test light).
 - All doors closed, key ON, engine OFF - indicator dimming control circuit voltage = diagnostic B+.
 - Key ON, engine OFF. Place a shop light on the DRL sensor. When the DRL sensor commands the headlights OFF, the indicator dimming control circuit voltage, TCSCS X1 pin 4, will go from a diagnostic B+ to a true B+.

Reference Information

Schematic Reference

Transfer Case Control 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

Special Tools

- **EL-49741** 9 V+ Power Source Harness
- **EL-49742** Battery Voltage B+ and Ground Source Harness
- **J-35616** GM-Approved Terminal Test Kit

Circuit/System Verification

NOTE: The TCCM runs a 2 second bulb test on all indicators of the S77 Transfer Case Shift Control Switch at Ignition ON.

1. Ignition ON.
2. Verify the 4 High indicator illuminates during the bulb test.

- **If the 4 High indicator does not illuminate**

Refer to Circuit/System Testing

- **Go to next step: If the 4 High indicator does illuminate**

3. Verify DTC B0775 is not set.

- **If the DTC is set**

Refer to Circuit/System Testing

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

4. All OK.

Circuit/System Testing

NOTE: When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J-35616 GM terminal test kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.

1. Ignition OFF, disconnect the X1 connector at the S77 Transfer Case Shift Control Switch.
2. Connect a test lamp between the indicator dimming control circuit terminal 4 X1 and ground, Ignition ON.
3. Verify the test lamp turns ON.
 - **If the test lamp remains OFF**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the indicator dimming control circuit and ground.
 - If less than infinite resistance, repair the short to ground.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the indicator dimming control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the K9 Body Control Module.
 - **Go to next step: If the test lamp turns ON**
4. Ignition OFF, connect a test lamp between the indicator dimming control circuit terminal 4 X1 and the 4 High indicator control circuit terminal 9 X1.
5. Ignition ON, verify the test lamp turns ON and OFF when commanding the Transfer Case 4 High Indicator ON and OFF from the scan tool.
 - **If the test lamp does not turn ON**
 1. Ignition OFF, disconnect the X2 harness connector at the K69 Transfer Case Control Module.
 2. Ignition ON, test for less than 1 V between the 4 High indicator control circuit terminal 14 X2 at the control module harness and ground.

- If 1 V or greater, repair the short to voltage.
 - Go to next step: If less than 1 V
3. Ignition OFF, test for less than 2 Ω in the 4 High indicator control circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the K69 Transfer Case Control Module.
- **If the test lamp does not turn OFF**
1. Ignition OFF, disconnect the X2 harness connector at the K69 Transfer Case Control Module.
 2. Test for infinite resistance between the 4 High indicator control circuit and ground.
 - If less than infinite resistance, repair the short to ground
 - If infinite resistance, replace the K69 Transfer Case Control Module.
- **Go to next step: If the test lamp turns ON and OFF**
6. Test or replace the S77 Transfer Case Shift Control Switch.

Component Testing

S77 Transfer Case Shift Control Switch

1. Using the L-BU probes J 35616-65B, connect the **EL-49741** 9 V+ power source harness to the S77 Transfer Case Shift Control Switch as specified below for the LED being tested. Connecting the harness in the opposite pins will not illuminate the LED.
2. Connect a 9 V battery to the **EL-49741** harness.
3. Verify that only the indicator being tested illuminates.
 - If the indicator does not illuminate when tested or the incorrect indicator illuminates, replace the S77 Transfer Case Shift Control Switch.

EL49741 Wire Color	2WD HI	4WD Auto	4WD HI	4WD LO	N
Red (pin)	4	4	4	4	2
Black (pin)	8	7	9	10	3

Repair Instructions

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

- [Transfer Case Selector Switch Replacement](#)
- [Control Module References](#) for TCSCM replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#)

DTC B0780

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 B0780 01

4WD LO Indicator Circuit Short to Battery

DTC B0780 06

4WD LO Indicator Circuit Short to Ground or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Indicator Dimming Control	B0770 06, B0775 06, B0780 06, B0785 06	B0770 06, B0775 06, B0780 06, B0785 06	-
4WD LO Indicator Control Circuit	B0780 06	B0780 06	B0780 01

Circuit/System Description

The 4WD LO indicator circuit consists of a light emitting diode (LED) feed circuit, a LED and a LED control circuit. The indicator dimming control circuit is the LED feed circuit and continuously supplies B+ to the 2WD HI, 4WD Auto, 4WD HI and 4WD LO LEDs. When the 4WD LO mode has been selected by the driver, the transfer case shift control module (TCCM) provides a ground through the 4WD LO indicator control circuit illuminating the LED.

The TCCM tests the 4WD LO indicator circuit for unexpected voltage by monitoring the B+ supplied by the BCM on the indicator dimming control circuit by grounding the 4WD LO indicator control circuit for 2 seconds during the Bulb Test at key ON.

Conditions for Running the DTC

B0780 01

- Ignition ON
- System voltage 10 - 18 V
- Instrument panel lights not dimmed.
- Daylight running lights MUST be commanded ON.
- Circuit tested when the 4WD LO indicator is commanded ON.

B0780 06

- Ignition ON
- System voltage 10 - 18 V
- Instrument panel lights not dimmed.
- Daylight running lights MUST be commanded ON.
- Circuit tested when the 4WD LO indicator is commanded OFF.

Conditions for Setting the DTC

B0780 01

The TCCM detects 3.4 V or greater on the 4WD LO indicator control circuit when the 4WD LO indicator is commanded ON.

B0780 06

The TCCM detects 1.6 V or less for 1.5 seconds on the 4WD LO indicator control circuit when the 4WD LO indicator is commanded OFF.

Action Taken When the DTC Sets

Normal operation, the SERVICE 4WD indicator is not commanded ON. Driver is informed of fault via bulb inspection.

Conditions for Clearing the DTC

- The TCCM clears the DTC once the condition for setting the DTC is no longer present.
- A history DTC clears after 40 consecutive warm-up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Diagnostic Aids

- A TRUE B+ has enough current to light a test light.
- A DIAGNOSTIC B+ is a low current circuit that DOES NOT have enough current to light a test light.
- A short to ground on the 4WD LO indicator control circuit will cause the 4WD LO indicator to remain ON at all times.
- An open or high resistance will cause the 4WD LO indicator to be inoperative during the 2 second bulb inspection.
- An open in the indicator dimming control circuit will cause the 2WD HI, 4WD Auto, 4WD HI and 4WD LO mode indicators to be inoperative during the 2 second bulb inspection.
- **EL-49741** harness is a good source for 9 V.
- **EL-49742** harness is a good source for B+ and ground.
- With key REMOVED - opening a door puts a true B+ on the indicator dimming control circuit, TCSCS X1 pin 4. Other possible voltages are listed below:
 - Door open, key removed - indicator dimming control circuit voltage = true B+.
 - Door open, key in, key OFF - indicator dimming control circuit voltage = true B+.
 - Door open, key ON, engine OFF - indicator dimming control circuit voltage = diagnostic B+.
 - All doors closed, key OFF - indicator dimming control circuit voltage = B+ (high current - enough to light a test light).
 - All doors closed, key ON, engine OFF - indicator dimming control circuit voltage = diagnostic B+.
 - Key ON, engine OFF. Place a shop light on the DRL sensor. When the DRL sensor commands the headlights OFF, the indicator dimming control circuit voltage, TCSCS X1 pin 4, will go from a diagnostic B+ to a true B+.

Reference Information

Schematic Reference

Transfer Case Control 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

Special Tools

- **EL-49741** 9 V+ Power Source Harness
- **EL-49742** Battery Voltage B+ and Ground Source Harness
- **J-35616** GM-Approved Terminal Test Kit

Circuit/System Verification

NOTE: The TCCM runs a 2 second bulb test on all indicators of the S77 Transfer Case Shift Control Switch at Ignition ON.

1. Ignition ON.

2. Verify the 4 Low indicator illuminates during the bulb test.

- **If the 4 Low indicator does not illuminate**

Refer to Circuit/System Testing

- **Go to next step: If the 4 Low indicator does illuminate**

3. Verify DTC B0780 is not set.

- **If the DTC is set**

Refer to Circuit/System Testing

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

4. All OK.

Circuit/System Testing

NOTE: When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J-35616 GM terminal test kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.

1. Ignition OFF, disconnect the X1 connector at the S77 Transfer Case Shift Control Switch.

2. Connect a test lamp between the indicator dimming control circuit terminal 4 X1 and ground, Ignition ON.

3. Verify the test lamp turns ON.

- **If the test lamp remains OFF**

1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module.

2. Test for infinite resistance between the indicator dimming control circuit and ground.

- If less than infinite resistance, repair the short to ground.
- Go to next step: If infinite resistance

3. Test for less than 2 Ω in the indicator dimming control circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , test or replace the K9 Body Control Module.

- **Go to next step: If the test lamp turns ON**

4. Ignition OFF, connect a test lamp between the indicator dimming control circuit terminal 4 X1 and the 4 Low indicator control circuit terminal 10 X1.

5. Ignition ON, verify the test lamp turns ON and OFF when commanding the Transfer Case 4 Low Indicator ON and OFF from the scan tool.

- **If the test lamp does not turn ON**

1. Ignition OFF, disconnect the X2 harness connector at the K69 Transfer Case Control Module.

2. Ignition ON, test for less than 1 V between the 4 Low indicator control circuit terminal 3 X2 at the control module harness and ground.

- If 1 V or greater, repair the short to voltage.
- Go to next step: If less than 1 V

3. Ignition OFF, test for less than 2 Ω in the 4 Low indicator control circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , test or replace the K69 Transfer Case Control Module.

- **If the test lamp does not turn OFF**

1. Ignition OFF, disconnect the X2 harness connector at the K69 Transfer Case Control Module.

2. Test for infinite resistance between the 4 Low indicator control circuit and ground.

- If less than infinite resistance, repair the short to ground
- If infinite resistance, replace the K69 Transfer Case Control Module.

- **Go to next step: If the test lamp turns ON and OFF**

6. Test or replace the S77 Transfer Case Shift Control Switch.

Component Testing

S77 Transfer Case Shift Control Switch

1. Using the L-BU probes J 35616-65B, connect the **EL-49741** 9 V+ power source harness to the S77 Transfer Case Shift Control Switch as specified below for the LED being tested. Connecting the harness in the opposite pins will not illuminate the LED.
2. Connect a 9 V battery to the **EL-49741** harness.
3. Verify that only the indicator being tested illuminates.
 - If the indicator does not illuminate when tested or the incorrect indicator illuminates, replace the S77 Transfer Case Shift Control Switch.

EL49741 Wire Color	2WD HI	4WD Auto	4WD HI	4WD LO	N
Red (pin)	4	4	4	4	2
Black (pin)	8	7	9	10	3

Repair Instructions

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

- [Transfer Case Selector Switch Replacement](#)
- [Control Module References](#) for TCSCM replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#)

DTC B0785

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 B0785 01

2WD HI Indicator Circuit Short to Battery

DTC B0785 06

2WD HI Indicator Circuit Short to Ground or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Indicator Dimming Control	B0770 06, B0775 06, B0780 06, B0785 06	B0770 06, B0775 06, B0780 06, B0785 06	-
2WD HI Indicator Control Circuit	B0785 06	B0785 06	B0785 01

Circuit/System Description

The 2WD HI indicator circuit consists of a light emitting diode (LED) feed circuit, a LED and a LED control circuit. The indicator dimming control circuit is the LED feed circuit and continuously supplies B+ to the 2WD HI, 4WD Auto, 4WD HI and 4WD LO LEDs. When the 2WD HI mode has been selected by the driver, the transfer case shift control module (TCCM) provides a ground through the 2WD HI indicator control circuit illuminating the LED.

The TCCM tests the 2WD HI indicator circuit for unexpected voltage by monitoring the B+ supplied by the BCM on the indicator dimming control circuit by grounding the 2WD HI indicator control circuit for 2 seconds during the

Bulb Test at key ON.

Conditions for Running the DTC

B0785 01

- Ignition ON
- System voltage 10 - 18 V
- Instrument panel lights not dimmed.
- Daylight running lights MUST be commanded ON.
- Circuit tested when the 2WD HI indicator is commanded ON.

B0785 06

- Ignition ON
- System voltage 10 - 18 V
- Instrument panel lights not dimmed.
- Daylight running lights MUST be commanded ON.
- Circuit tested when the 2WD HI indicator is commanded OFF.

Conditions for Setting the DTC

B0785 01

The TCCM detects 3.4 V or greater on the 2WD HI indicator control circuit when the 2WD HI indicator is commanded ON.

B0785 06

The TCCM detects 1.6 V or less for 1.5 seconds on the 2WD HI indicator control circuit when the 2WD HI indicator is commanded OFF.

Action Taken When the DTC Sets

Normal operation, the SERVICE 4WD indicator is not commanded ON. Driver is informed of fault via bulb inspection.

Conditions for Clearing the DTC

- The TCCM clears the DTC once the condition for setting the DTC is no longer present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Diagnostic Aids

- A TRUE B+ has enough current to light a test light.
- A DIAGNOSTIC B+ is a low current circuit that DOES NOT have enough current to light a test light.
- A short to ground on the 2WD HI indicator control circuit will cause the 2WD HI indicator to remain ON at all times.
- An open or high resistance will cause the 2WD HI indicator to be inoperative during the 2 second bulb inspection.
- An open in the indicator dimming control circuit will cause the 2WD HI, 4WD Auto, 4WD HI and 4WD LO mode indicators to be inoperative during the 2 second bulb inspection.
- EL-49741 harness is a good source for 9 V.
- EL-49742 harness is a good source for B+ and ground.
- With key REMOVED - opening a door puts a true B+ on the indicator dimming control circuit, TCSCS X1 pin 4. Other possible voltages are listed below:
 - Door open, key removed - indicator dimming control circuit voltage = true B+.

- Door open, key in, key OFF - indicator dimming control circuit voltage = true B+.
- Door open, key ON, engine OFF - indicator dimming control circuit voltage = diagnostic B+.
- All doors closed, key OFF - indicator dimming control circuit voltage = B+ (high current - enough to light a test light).
- All doors closed, key ON, engine OFF - indicator dimming control circuit voltage = diagnostic B+.
- Key ON, engine OFF. Place a shop light on the DRL sensor. When the DRL sensor commands the headlights OFF, the indicator dimming control circuit voltage, TCSCS X1 pin 4, will go from a diagnostic B+ to a true B+.

Reference Information

Schematic Reference

Transfer Case Control Wiring Schematics

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- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **EL-49741** 9 V+ Power Source Harness
- **EL-49742** Battery Voltage B+ and Ground Source Harness
- **J-35616** GM-Approved Terminal Test Kit

Circuit/System Verification

NOTE: The TCCM runs a 2 second bulb test on all indicators of the S77 Transfer Case Shift Control Switch at Ignition ON.

1. Ignition ON.
2. Verify the 2 High indicator illuminates during the bulb test.
 - **If the 2 High indicator does not illuminate**

Refer to Circuit/System Testing

- **Go to next step: If the 2 High indicator does illuminate**

3. Verify DTC B0785 is not set.

- **If the DTC is set**

Refer to Circuit/System Testing

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

4. All OK.

Circuit/System Testing

NOTE:

When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J-35616 GM terminal test kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.

1. Ignition OFF, disconnect the X1 connector at the S77 Transfer Case Shift Control Switch.
2. Connect a test lamp between the indicator dimming control circuit terminal 4 X1 and ground, Ignition ON.
3. Verify the test lamp turns ON.
 - **If the test lamp remains OFF**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the indicator dimming control circuit and ground.
 - If less than infinite resistance, repair the short to ground.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the indicator dimming control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the K9 Body Control Module.
 - **Go to next step: If the test lamp turns ON**
4. Ignition OFF, connect a test lamp between the indicator dimming control circuit terminal 4 X1 and the 2 High indicator control circuit terminal 8 X1.
5. Ignition ON, verify the test lamp turns ON and OFF when commanding the Transfer Case 2 High Indicator ON and OFF from the scan tool.
 - **If the test lamp does not turn ON**
 1. Ignition OFF, disconnect the X2 harness connector at the K69 Transfer Case Control Module.
 2. Ignition ON, test for less than 1 V between the 2 High indicator control circuit terminal 13 X2 at the control module harness and ground.
 - If 1 V or greater, repair the short to voltage.
 - Go to next step: If less than 1 V
 3. Ignition OFF, test for less than 2 Ω in the 2 High indicator control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the K69 Transfer Case Control Module.
 - **If the test lamp does not turn OFF**
 1. Ignition OFF, disconnect the X2 harness connector at the K69 Transfer Case Control Module.
 2. Test for infinite resistance between the 2 High indicator control circuit and ground.
 - If less than infinite resistance, repair the short to ground
 - If infinite resistance, replace the K69 Transfer Case Control Module.
 - **Go to next step: If the test lamp turns ON and OFF**
6. Test or replace the S77 Transfer Case Shift Control Switch.

Component Testing**S77 Transfer Case Shift Control Switch**

1. Using the L-BU probes J 35616-65B, connect the **EL-49741** 9 V+ power source harness to the S77 Transfer Case Shift Control Switch as specified below for the LED being tested. Connecting the harness in the opposite pins will not illuminate the LED.
2. Connect a 9 V battery to the **EL-49741** harness.
3. Verify that only the indicator being tested illuminates.
 - If the indicator does not illuminate when tested or the incorrect indicator illuminates, replace the S77 Transfer Case Shift Control Switch.

EL49741 Wire Color	2WD HI	4WD Auto	4WD HI	4WD LO	N
Red (pin)	4	4	4	4	2
Black (pin)	8	7	9	10	3

Repair Instructions

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

- [Transfer Case Selector Switch Replacement](#)
- [Control Module References](#) for TCSCM replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#)

DTC B0790

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 B0790 01

Neutral Indicator Circuit Short to Battery

DTC B0790 06

Neutral Indicator Circuit Short to Ground or Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Ignition Voltage	B0790 06	B0790 06	-
Neutral Indicator Control Circuit	B0790 06	B0790 06	B0790 01

Circuit/System Description

The Neutral indicator circuit consists of a light emitting diode (LED) feed circuit, a LED and a LED control circuit. The Ignition voltage circuit is the LED feed circuit and continuously supplies B+ to the Neutral LED. When the Neutral mode has been selected by the driver, the K69 Transfer Case Control Module (TCCM) provides a ground through the Neutral indicator control circuit illuminating the LED.

The TCCM tests the Neutral indicator circuit for unexpected voltage by monitoring the B+ supplied by the BCM on the Ignition voltage circuit by grounding the Neutral indicator control circuit for 2 seconds during the Bulb Test at key ON.

Conditions for Running the DTC

B0790 01

- Ignition ON
- System voltage 10 - 18 V
- Instrument panel lights not dimmed.
- Daylight running lights MUST be commanded ON.
- Circuit tested when the Neutral indicator is commanded ON.

B0790 06

- Ignition ON

- System voltage 10 - 18 V
- Instrument panel lights not dimmed.
- Daylight running lights MUST be commanded ON.
- Circuit tested when the Neutral indicator is commanded OFF.

Conditions for Setting the DTC

B0790 01

The TCCM detects 3.4 V or greater on the AWD/4WD Auto indicator control circuit when the Neutral indicator is commanded ON.

B0790 06

The TCCM detects 1.6 V or less for 1.5 seconds on the AWD/4WD Auto indicator control circuit when the Neutral indicator is commanded OFF.

Action Taken When the DTC Sets

Normal operation, the SERVICE 4WD indicator is commanded ON for the remainder of the ignition cycle. Driver is also informed of fault via bulb inspection.

Conditions for Clearing the DTC

- The TCCM clears the DTC once the condition for setting the DTC no longer present.
- A history DTC clears after 40 consecutive warm-up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Diagnostic Aids

- A TRUE B+ has enough current to light a test light.
- A DIAGNOSTIC B+ is a low current circuit that DOES NOT have enough current to light a test light.
- A short to ground on the Neutral indicator control circuit will cause the Neutral indicator to remain ON at all times.
- An open or high resistance will cause the Neutral indicator to be inoperative during the 2 second bulb inspection.
- **EL-49741** harness is a good source for 9 V.
- **EL-49742** harness is a good source for B+ and ground.
- With key REMOVED - opening a door puts a true B+ on the indicator dimming control circuit, TCSCS X1 pin 4. Other possible voltages are listed below:
 - Door open, key removed - indicator dimming control circuit voltage = true B+.
 - Door open, key in, key OFF - indicator dimming control circuit voltage = true B+.
 - Door open, key ON, engine OFF - indicator dimming control circuit voltage = diagnostic B+.
 - All doors closed, key OFF - indicator dimming control circuit voltage = B+ (high current - enough to light a test light).
 - All doors closed, key ON, engine OFF - indicator dimming control circuit voltage = diagnostic B+.
 - Key ON, engine OFF. Place a shop light on the DRL sensor. When the DRL sensor commands the headlights OFF, the indicator dimming control circuit voltage, TCSCS X1 pin 4, will go from a diagnostic B+ to a true B+.

Reference Information

Schematic Reference

Transfer Case Control Wiring Schematics

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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

Special Tools

- **EL-49741** 9 V+ Power Source Harness
- **EL-49742** Battery Voltage B+ and Ground Source Harness
- **J-35616** GM-Approved Terminal Test Kit

[Circuit/System Verification](#)

NOTE: The TCCM runs a 2 second bulb test on all indicators of the S77 Transfer Case Shift Control Switch at Ignition ON.

1. Ignition ON.
2. Verify the Neutral indicator illuminates during the bulb test.
 - **If the Neutral indicator does not illuminate**
Refer to Circuit/System Testing
 - **Go to next step: If the Neutral indicator does illuminate**
3. Verify DTC B0790 is not set.
 - **If the DTC is set**
Refer to Circuit/System Testing
 - **Go to next step: If the DTC is not set**
4. All OK.

[Circuit/System Testing](#)

NOTE: When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J-35616 GM terminal test kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.

1. Ignition OFF, disconnect the X1 connector at the S77 Transfer Case Shift Control Switch.
2. Connect a test lamp between the ignition voltage circuit terminal 2 X1 and ground, Ignition ON.
3. Verify the test lamp turns ON.
 - **If the test lamp remains OFF**
 1. Ignition OFF, disconnect the X5 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the ignition voltage circuit and ground.
 - If less than infinite resistance, repair the short to ground.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the ignition voltage circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , test or replace the K9 Body Control Module.

• **Go to next step: If the test lamp turns ON**

4. Ignition OFF, connect a test lamp between the ignition voltage circuit terminal 2 X1 and the neutral indicator control circuit terminal 3 X1.

5. Ignition ON, verify the test lamp turns ON and OFF when commanding the Transfer Case Neutral Indicator ON and OFF from the scan tool.

• **If the test lamp does not turn ON**

1. Ignition OFF, disconnect the X2 harness connector at the K69 Transfer Case Control Module.

2. Ignition ON, test for less than 1 V between the neutral indicator control circuit terminal 12 X2 at the control module harness and ground.

- If 1 V or greater, repair the short to voltage.
- Go to next step: If less than 1 V

3. Ignition OFF, test for less than 2 Ω in the neutral indicator control circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , test or replace the K69 Transfer Case Control Module.

• **If the test lamp does not turn OFF**

1. Ignition OFF, disconnect the X2 harness connector at the K69 Transfer Case Control Module.

2. Test for infinite resistance between the neutral indicator control circuit and ground.

- If less than infinite resistance, repair the short to ground
- If infinite resistance, replace the K69 Transfer Case Control Module.

• **Go to next step: If the test lamp turns ON and OFF**

6. Test or replace the S77 Transfer Case Shift Control Switch.

Component Testing

S77 Transfer Case Shift Control Switch

1. Using the L-BU probes J 35616-65B, connect the **EL-49741** 9 V+ power source harness to the S77 Transfer Case Shift Control Switch as specified below for the LED being tested. Connecting the harness in the opposite pins will not illuminate the LED.
2. Connect a 9 V battery to the **EL-49741** harness.
3. Verify that only the indicator being tested illuminates.
 - If the indicator does not illuminate when tested or the incorrect indicator illuminates, replace the S77 Transfer Case Shift Control Switch.

EL49741 Wire Color	2WD HI	4WD Auto	4WD HI	4WD LO	N
Red (pin)	4	4	4	4	2
Black (pin)	8	7	9	10	3

Repair Instructions

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

- **Transfer Case Selector Switch Replacement**
- **Control Module References** for K69 Transfer Case Control Module replacement, setup, and programming
- **Transfer Case High/Low Clutch Reset (NQ6)**

DTC B2725, P0698, OR P0699

Diagnostic Instructions

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

- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

DTC Descriptor

DTC B2725 03

Transfer Case Range Selection Switch Circuit Low Voltage

DTC B2725 07

Transfer Case Range Selection Switch Circuit High Voltage

DTC B2725 08

Transfer Case Range Selection Switch Circuit Performance - Signal Invalid

DTC P0698

5V Reference 3 Circuit Low Voltage

DTC P0699

5V Reference 3 Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
5-Volt Reference	B2725 03, B2725 08, or P0698	B2725 03, B2725 08, or P0698	B2725 07, B2725 08, or P0699	B2725 08, P0698, or P0699
Four Wheel Drive	B2725 03 or B2725 08	B2725 03 or B2725 08	B2725 07 or B2725 08	B2725 08

Circuit/System Description

The transfer case shift control switch allows the driver to select between 5 ranges. The transfer case control module supplies a regulated 5 volts to the switch through the 5-volt reference circuit. The current travels through the specific resistor of the currently selected range - each range has its own resistor. The current is then returned to the transfer case control module through the four wheel drive switch signal circuit.

The transfer case control module continuously monitors the switch signal circuit to determine whether a range change has been requested by the driver.

The NQ6 transfer case has the following 5 ranges:

- 2WD
- 4WD/AWD Automatic
- 4WD High/Locked
- 4WD Low
- Neutral

Conditions for Running the DTC

- Ignition ON.
- System voltage 10.5 - 18 V.
- No DTC P0562 or P0563.

Conditions for Setting the DTC

The transfer case control module monitors the voltage on 5V reference and 4WD switch signal circuits every 10 ms.

B2725 03

When the low side driver is ON, the transfer case control module measures less than 0.3 volts on the Four Wheel Drive Switch Signal circuit.

B2725 07

When the low side driver is ON, the transfer case control module measures greater than 4.65 volts on the Four Wheel Drive Switch Signal circuit.

B2725 08

When the low side driver is ON, the transfer case control module measures an invalid voltage on the Four Wheel Drive Switch Signal circuit.

P0698

When the ignition is ON, the transfer case control module measures less than 4.75 volts on the Transfer Case Sensor Reference Voltage 3 circuit.

P0698

When the ignition is ON, the transfer case control module measures greater than 5.25 volts on the Transfer Case Sensor Reference Voltage 3 circuit.

Action Taken When the DTC Sets

- DTC P0698 and P0699 are type A DTC's.
- All shifting is disabled.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.

Conditions for Clearing the DTC

- DTC P0698 and P0699 are type A DTC's.
- The transfer case control module clears the DTC once the condition for setting the DTC is no longer present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Diagnostic Aids

EL-49742 harness is a good source for B+ and ground.

Reference Information

Schematic Reference

Transfer Case Control 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.

Special Tools

- **EL-49742** Battery Voltage B+ and Ground Source Harness
- **J 35616** GM-Approved Terminal Test Kit

Circuit/System Verification

1. Verify that all range selections of the S77 transfer case shift control switch match the following parameters in the Data Display feature of the scan tool:
 - Transfer Case Commanded Position
 - Transfer Case Range
 - Transfer Case Range Selection Switch State
 - The corresponding Range Indicator light
 - ***If NOT all of the parameters match the S77 transfer case shift control switch position***

Refer to Circuit/System Testing.

- ***Go to next step: If ALL of the parameters match the S77 transfer case shift control switch position***

2. Verify that the sensor reference voltage 3 and transfer case range selection switch voltage fall within the below ranges for all range selections of the S77 transfer case shift control switch.

- ***If NOT all voltages match the specified ranges***

Refer to Circuit/System Testing.

- ***Go to next step: If ALL voltages match the specified ranges***

3. Verify DTC B2725, P0698, or P0699 is only set as a history DTC.

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

Refer to Circuit/System Testing.

- ***Go to next step: If any of the DTCs are only set as history***

NOTE: After inspection, apply Nyogel lubricant 760G to each connector terminal. Ensure each connector and CPA is correctly seated.

4. Visually inspect each connector terminal of the K69 transfer case control module X1 connector and the S77 transfer case shift control switch connector for damage or corrosion. Repair as necessary.
5. Clear DTC 2725, P0698, or P0699 from history.
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. The DTC should not set.
 - ***If any of the DTCs are set***

Refer to Circuit/System Testing.

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

7. All OK.

Transfer Case Range	Transfer Case Sensor Reference Voltage 3	Transfer Case Range Selection Switch (V)		Range Actuator Position Sensor (B°)	
		Range	Nominal	Range	Nominal
2WD	4.7 - 5.3 V	1.8 - 2.2 V	2.0 V	33 - 43B°	38B°
4WD/AWD Automatic	4.7 - 5.3 V	4.10 - 4.59 V	4.38 V	87 - 204B°	146B°
4WD High/Locked	4.7 - 5.3 V	2.8 - 3.2 V	3.0 V	110 - 204B°	146B°
4WD Low	4.7 - 5.3 V	1.3 - 1.7 V	1.5 V	-69B° to -140B°	-90B°

Transfer Case Range	Transfer Case Sensor Reference Voltage 3	Transfer Case Range Selection Switch (V)		Range Actuator Position Sensor (B°)	
		Range	Nominal	Range	Nominal
Neutral	4.7 - 5.3 V	2.3 - 2.7 V	2.5 V Held 1.5 V Released	-5B° to +5B°	0B°

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the S77 transfer case shift control switch.
2. ON, engine OFF.

NOTE:

- When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J 35616 GM terminal test kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.
- Testing for steps 3 - 5 is performed on the S77 transfer case shift control switch harness connector using the L-BU probes J 35616-64B.

3. Test for 4.75 - 5.25 V between the 5-Volt reference circuit, terminal 11 and a good ground, such as the ground terminal of the EL-49742 harness, black terminal.

• If less than the specified range

1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module.
2. Test for less than 10 Ω in the 5-Volt reference circuit end to end.
 - If 10 Ω or greater, repair the open/high resistance in the circuit.
 - Go to next step: If less than 10 Ω
3. Test for infinite resistance between 5-Volt reference circuit terminal 11 and a good ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - Go to next step: If infinite resistance
4. Test for greater than 10 Ω between the 5-Volt reference circuit terminal 11 and all other terminals of the S77 transfer case shift control switch harness connector.
 - If 10 Ω or less, repair the shorted together condition in the affected circuits.
 - If greater than 10 Ω , replace the K69 transfer case control module and perform the Range Actuator Learn procedure.

• If greater than the specified range

1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module. Ignition ON, Engine OFF.
2. Test for less than 1 V between the 5-Volt reference circuit terminal 11 and a good ground.
 - If 1 V or greater, repair the short to voltage in the circuit.
 - Go to next step: If less than 1 V
3. Test for greater than 10 Ω between the 5-Volt reference circuit, terminal 11 and all other terminals of the S77 transfer case shift control switch harness connector.
 - If 10 Ω or less, repair the shorted together condition in the affected circuits.
 - If greater than 10 Ω , replace the K69 transfer case control module and perform the Range Actuator Learn procedure.

• Go to next step: If within the specified range

4. 5-Volt reference circuit and K69 transfer case control module OK.
5. Test for 4.75 - 5.25 V between the 5-Volt reference circuit, terminal 11, and the switch signal circuit, terminal 12.

• If less than the specified range

1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module.
2. Test for less than 10 Ω in the switch signal circuit end to end.
 - If 10 Ω or greater, repair the open/high resistance in the circuit.

- Go to next step: If less than 10 Ω
3. Test for infinite resistance between switch signal circuit and a good ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - Go to next step: If infinite resistance
 4. Test for greater than 10 Ω between the switch signal circuit, terminal 12 and all other terminals of the S77 transfer case shift control switch harness connector.
 - If 10 Ω or less, repair the shorted together condition in the affected circuits.
 - If greater than 10 Ω , replace the K69 transfer case control module and perform the Range Actuator Learn procedure.
- ***If greater than the specified range***
 1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module. Ignition ON, Engine OFF.
 2. Test for less than 1 V between the switch signal circuit, terminal 12 and a good ground.
 - If 1 V or greater, repair the short to voltage in the circuit.
 - Go to next step: If less than 1 V
 3. Test for greater than 10 Ω between the switch signal circuit, terminal 12 and all other terminals of the S77 transfer case shift control switch harness connector.
 - If 10 Ω or less, repair the shorted together condition in the affected circuits.
 - If greater than 10 Ω , replace the K69 transfer case control module and perform the Range Actuator Learn procedure.
 - ***Go to next step: If within the specified range***
6. Switch signal circuit and K69 transfer case control module OK.

Component Testing

S77 Transfer Case Shift Control Switch

1. Ignition OFF. Remove the S77 transfer case shift control switch.

NOTE: Testing for Step 2 is performed on the component using the L-BU probe J 35616-65B.

2. Measure the resistance for each of the range positions of the S77 transfer case shift control switch between the 5-volt reference circuit, terminal 11, and the switch signal circuit terminal 12.

- ***If the resistance is outside the specified ranges***

Replace the S77 transfer case shift control switch.

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

3. S77 transfer case shift control switch OK.

S77 Transfer Case Range Selection Switch	Range	Nominal
2WD	1475 - 1550 Ω	1515 Ω
4WD/AWD Automatic	110 - 175 Ω	140 Ω
4WD High/Locked	625 - 700 Ω	665 Ω
4WD Low	2230 - 2400 Ω	2345 Ω
Neutral	990-1050 Ω	1020 Ω

Repair Instructions

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

- **Transfer Case Selector Switch Replacement** for S77 transfer case shift control switch replacement
- **Transfer Case High/Low Clutch Reset (NQ6)** for Range Actuator Learn procedure

- [Control Module References](#) for K69 transfer case control module replacement, setup, and programming

DTC C0306 OR C0381

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 C0306

Range Actuator Control Circuit

DTC C0381

Range Actuator System Performance

For symptom byte information refer to [Symptom Byte List](#)

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Performance
Transfer Case Motor Clockwise Control	C0306 02	C0306 04	C0306 01	C0306 54 or C0381 54
Transfer Case Motor Counter-Clockwise Control	C0306 02	C0306 04	C0306 01	C0306 54 or C0381 54

Circuit/System Description

The A16 Transfer Case Motor, also known as the transfer case range actuator, is a bi-directional, permanent magnet, DC motor. When energized, through the transfer case clockwise circuit or transfer case counter-clockwise circuit, the ground is provided by the opposing motor control circuit which becomes grounded through the transfer case control module ground circuit. The transfer case range actuator, through a series of gears, rotates the transfer case control actuator shaft which moves the transfer case two/four wheel drive actuator cam and transfer case high/low shift fork in order to shift the transfer case between the following modes or ranges:

- 2WD
- 4WD/AWD Automatic
- 4WD High/Locked
- 4WD Low
- Neutral

Conditions for Running the DTC

- Ignition ON.
- System voltage 10.5 - 18 V.
- No DTC P0562 or P0563.
- Transfer case range actuator not performing a requested range change (C0306 01, C0306 02, and C0306 04 only).
- DTC C0306 and C0381 run continuously within the enabling conditions.

Conditions for Setting the DTC

C0306 01

Voltage on the transfer case clockwise circuit or the transfer case counter-clockwise circuit is greater than 5.60 V.

C0306 02

Voltage on the transfer case clockwise circuit or the transfer case counter-clockwise circuit is less than 1.9 V.

C0306 04

Voltage on the transfer case clockwise circuit is 2.7 - 4.5 V, and the voltage on the transfer case counter-clockwise circuit is 0.5 - 4.5 V.

C0306 54

The calculated temperature of the transfer case range actuator H-bridge in the transfer case control module is greater than a predetermined value.

C0381 54

The calculated temperature of the transfer case range actuator is greater than a predetermined value.

Action Taken When the DTC Sets

- All shifting disabled.
- Front axle disengages if thermal model exceeded.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.

Conditions for Clearing the DTC

- The transfer case control module clears the DTC once the conditions for setting the DTC are no longer present.
- A history DTC clears after 40 consecutive warm-up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Diagnostic Aids

- It is possible to have windings inside the motor shorted to the case resulting in a short to ground causing this DTC to set.
- The default actions for C0321 may set C0306.
- **EL-49741** harness is a good source for 9 V.
- **EL-49742** harness is a good source for B+ and ground.
- The transfer case drain plug is a good source for ground.

Reference Information

Schematic Reference

Transfer Case Control 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

Special Tools

- **EL-49741** 9 V+ Power Source Harness
- **EL-49742** Battery Voltage B+ and Ground Source Harness
- **J-35616** GM-Approved Terminal Test Kit

Circuit/System Verification

1. Verify DTC C0321 in NOT set.

- **If DTC C0321 is set**

diagnose it first. Refer to **DTC C0321 or C0326**.

- **Go to next step: If DTC C0321 is NOT set**

2. Verify that all of the following scan tool parameters display OK.

- Range Actuator Control Circuit High Voltage Test Status
- Range Actuator Control Circuit Low Voltage Test Status
- Range Actuator Control Circuit Open Voltage Test Status
- Range Actuator Control Circuit Shorted Test Status
- **If any of the parameters do NOT display OK**

Refer to Circuit/System Testing.

- **Go to next step: If all of the parameters display OK**

3. Verify that for all range selections of the S77 Transfer Case Shift Control Switch, the Range Actuator Current parameter increases or decreases during the shift and then returns to 0.0 A after shifting.

- **If the Range Actuator Current parameter does NOT perform as described**

Refer to Circuit/System Testing.

- **Go to next step: If the Range Actuator Current parameter DOES perform as described**

4. Verify DTC C0306 or C0381 is only set as a history DTC.

- **If C0306 or C0381 is set as current**

Refer to Circuit/System Testing.

- **Go to next step: If C0306 or C0381 is only set as history**

NOTE: After inspection, apply Nyogel lubricant 760G to each connector terminal. Ensure each connector and CPA is correctly seated.

5. Visually inspect each connector terminal of the K69 Transfer Case Control Module X3 connector and the A16 Transfer Case Motor connector for damage or corrosion. Repair as necessary.

6. Clear DTC C0306 or C0381 from history.

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 either DTC does not set.

- **If DTC C0306 or C0381 sets**

Refer to Circuit/System Testing.

- **Go to next step: If DTC C0306 or C0381 does not set**

8. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the A16 Transfer Case Motor.
2. Ignition ON, Engine OFF.
3. Test for 1.0 - 2.5 V between the transfer case motor counter-clockwise control circuit terminal D and ground.
 - ***If less than the specified range***
 1. Ignition OFF, disconnect the X3 harness connector at the K69 Transfer Case Control Module.
 2. Test for infinite resistance between transfer case motor counter-clockwise control circuit terminal D 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 10 Ω in the transfer case motor counter-clockwise control circuit end to end.
 - If 10 Ω or greater, repair the open/high resistance in the circuit.
 - Go to next step: If less than 10 Ω
 4. Test for greater than 10 Ω between the transfer case motor counter-clockwise control circuit terminal D and transfer case motor clockwise control circuit terminal A of the A16 Transfer Case Motor harness connector.
 - If 10 Ω or less, repair the circuits shorted together.
 - If greater than 10 Ω , replace the K69 Transfer Case Control Module and perform the Transfer Case High/Low Clutch Reset procedure.
 - ***If greater than the specified range***
 1. Ignition OFF, disconnect the X3 harness connector at the K69 Transfer Case Control Module. Ignition ON, Engine OFF.
 2. Test for less than 1 V between the transfer case motor counter-clockwise control circuit terminal D and ground.
 - If 1 V or greater, repair the short to voltage in the circuit.
 - Go to next step: If less than 1 V
 3. Test for greater than 10 Ω between the transfer case motor counter-clockwise control circuit, terminal D and transfer case motor clockwise control circuit terminal A of the A16 Transfer Case Motor harness connector.
 - If 10 Ω or less, repair the circuits shorted together.
 - If greater than 10 Ω , replace the K69 Transfer Case Control Module and perform the Transfer Case High/Low Clutch Reset procedure.
 - ***Go to next step: If within the specified range***
4. Test for 3.0 - 4.5 V between the transfer case motor clockwise control circuit terminal A, and ground.
 - ***If less than the specified range***
 1. Ignition OFF, disconnect the X3 harness connector at the K69 Transfer Case Control Module.
 2. Test for infinite resistance between transfer case motor clockwise control circuit terminal A 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 10 Ω in the transfer case motor clockwise control circuit end to end.
 - If 10 Ω or greater, repair the open/high resistance in the circuit.
 - Go to next step: If less than 10 Ω
 4. Test for greater than 10 Ω between the transfer case motor clockwise control circuit terminal A and transfer case motor counter-clockwise control circuit terminal D of the A16 Transfer Case Motor harness connector.
 - If 10 Ω or less, repair the circuits shorted together.
 - If greater than 10 Ω , replace the K69 Transfer Case Control Module and perform the Transfer Case High/Low Clutch Reset procedure.
 - ***If greater than the specified range***
 1. Ignition OFF, disconnect the X3 harness connector at the K69 Transfer Case Control Module. Ignition ON, Engine OFF.

2. Test for less than 1 V between the transfer case motor clockwise control circuit terminal A and ground.
 - If 1 V or greater, repair the short to voltage in the circuit.
 - Go to next step: If less than 1 V
3. Test for greater than 10 Ω between the transfer case motor clockwise control circuit terminal A and transfer case motor counter-clockwise control circuit terminal D of the A16 Transfer Case Motor harness connector.
 - If 10 Ω or less, repair the circuits shorted together.
 - If greater than 10 Ω , replace the K69 Transfer Case Control Module and perform the Transfer Case High/Low Clutch Reset procedure.
- **Go to next step: If within the specified range**
5. Test or replace the A16 Transfer Case Motor.

Component Testing

A16 Transfer Case Motor

1. Remove the A16 Transfer Case Motor from transfer case. Using a paint pen or marker, place indexing marks on the A16 Transfer Case Motor drive gear and the mounting surface of the A16 Transfer Case Motor.
2. Attach the red lead from one of the **EL-49741** harnesses to the battery positive voltage terminal of the A16 Transfer Case Motor, terminal B.
3. Attach the black lead from this same jumper harness to the transfer case lock solenoid control terminal of the A16 Transfer Case Motor, terminal C.
4. Attach a 9-volt battery to this harness (not included). You should hear the A16 Transfer Case Motor unlock.
 - ***If you do NOT hear the A16 Transfer Case Motor unlock***

Replace the A16 Transfer Case Motor and perform the Transfer Case High/Low Clutch Reset procedure.
 - ***Go to next step: If you DO hear the A16 Transfer Case Motor unlock***
5. Attach the red lead from the other **EL-49741** jumper harness to the transfer case motor clockwise control circuit of the A16 Transfer Case Motor, terminal A.
6. Attach the black lead from this same jumper harness to the transfer case motor counter-clockwise control circuit of the A16 Transfer Case Motor, terminal D.
7. Touch the battery terminals of the 9-volt battery to the battery terminals of the jumper harness. This should rotate the A16 Transfer Case Motor drive gear in either a clockwise or counter-clockwise rotation depending on battery orientation.
 - ***If the A16 Transfer Case Motor drive gear does not perform as described***

Replace the A16 Transfer Case Motor and perform the Transfer Case High/Low Clutch Reset procedure.
 - ***Go to next step: If The A16 Transfer Case Motor drive gear performs as described***
8. Verify 0.3 - 40 Ω resistance between the transfer case motor clockwise control circuit of the A16 Transfer Case Motor, terminal A and the transfer case motor counter-clockwise control circuit of the A16 Transfer Case Motor, terminal D.
 - ***If NOT 0.3 - 40 Ω***

Replace the A16 Transfer Case Motor and perform the Transfer Case High/Low Clutch Reset procedure.
 - ***Go to next step: If 0.3 - 40 Ω***
9. Test for infinite resistance between the following circuits and the A16 Transfer Case Motor case:
 - Transfer case motor clockwise control circuit terminal A of the A16 Transfer Case Motor
 - Transfer case motor counter-clockwise control circuit terminal D of the A16 Transfer Case Motor
 - ***If less than infinite resistance***

Replace the A16 Transfer Case Motor and perform the Transfer Case High/Low Clutch Reset procedure.
 - ***Go to next step: If infinite resistance***

10. Test for infinite resistance between the transfer case motor clockwise control circuit of the A16 Transfer Case Motor, terminal A and all other terminals on the A16 Transfer Case Motor harness X1 connector except the transfer case motor counter-clockwise control circuit, terminal D.
 - ***If less than infinite resistance***
 Replace the A16 Transfer Case Motor and perform the Transfer Case High/Low Clutch Reset procedure.
 - ***Go to next step: If infinite resistance***
11. Test for infinite resistance between the transfer case motor counter-clockwise control circuit of the A16 Transfer Case Motor, terminal D. and all other terminals on the A16 Transfer Case Motor harness X1 connector except the transfer case motor clockwise control circuit, terminal A.
 - ***If less than infinite resistance***
 Replace the A16 Transfer Case Motor and perform the Transfer Case High/Low Clutch Reset procedure.
 - ***Go to next step: If infinite resistance***
12. A16 Transfer Case Motor, OK.

Repair Instructions

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

- **Control Module References** for K69 Transfer Case Control Module replacement, setup, and programming
- **Transfer Case High/Low Clutch Reset (NQ6)**
- **Transfer Case Four Wheel Drive Actuator Replacement**

DTC C0321 OR C0326

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 C0321 01

Range Actuator Lock Control Circuit Short to Battery

DTC C0321 02

Range Actuator Lock Control Circuit Short to Ground

DTC C0321 04

Range Actuator Lock Control Circuit Open

DTC C0326 58

Range Actuator Lock Control System Performance

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Performance
Battery Positive Voltage	-	DTC C0321 04	-	-
Transfer Case Lock Solenoid Control	DTC C0321 02	DTC C0321 04	DTC C0321 01	DTC C0326 58

Circuit/System Description

The transfer case range actuator is also known as the transfer case motor, transfer case encoder motor, or transfer case two/four wheel drive actuator assembly.

The transfer case range actuator lock solenoid is part of the transfer case range actuator and cannot be serviced separately.

The transfer case control module controls the transfer case range actuator lock solenoid. The transfer case range actuator lock solenoid is released by being energized. This is accomplished by grounding the transfer case lock solenoid control circuit during range changes, and 4WD/AWD Automatic mode. Locking action is applied when power or ground are taken away from the lock solenoid, preventing the transfer case range actuator from moving. The system is capable of providing 2WD, 4WD High/Locked, 4WD Low, and Neutral without the need of additional vehicle power to hold the transfer case in these positions.

Conditions for Running the DTC

- Ignition ON.
- System voltage 10.5 - 18 V.
- A state change from lock solenoid engaged to lock solenoid disengaged, or lock solenoid disengaged to lock solenoid engaged, has occurred more than 10 times - DTC C0321 only.
- DTC C0321 and C0326 run continuously within the enabling conditions.

Conditions for Setting the DTC

C0321 01

When the low side driver is ON, the transfer case control module measures greater than 8.5 volts on the Transfer Case Lock Solenoid Control circuit.

C0321 02

When the low side driver is OFF, the transfer case control module measures less than 2.0 volts on the Transfer Case Lock Solenoid Control circuit.

C0321 04

When the low side driver is OFF, the transfer case control module measures between 2.5 - 5.5 volts on the Transfer Case Lock Solenoid Control circuit.

C0326 58

Transfer case range actuator position correction after a brake slipping event was unsuccessful 10 times. A slipping event is defined as a torque error between the torque requested and the actual torque calculated from motor position being greater than a predetermined amount.

Action Taken When the DTC Sets

C0321

- Lock does not disengage.
- All shifting disabled.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.

C0326 58

- Normal operation/slip correction unless thermal limits of transfer case four wheel drive clutch, transmission control module or transfer case range actuator have been exceeded.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.

Conditions for Clearing the DTC

- The transfer case control module clears the DTC once the conditions for setting the DTC are no longer present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Diagnostic Aids

- The underhood fuse block supplies B+ on the battery positive voltage circuit and reads the voltage back on the transfer case lock solenoid control circuit.
- The system tests the transfer case lock solenoid circuits by checking for unwanted voltage. If the transfer case control module detects a low voltage return when a high voltage is expected, or a high voltage return when a low voltage is expected, the DTC is logged.
- The default actions for C0321 may set C0306.
- **EL-49741** harness is a good source for 9 V.
- **EL-49742** harness is a good source for B+ and ground.
- The transfer case drain plug is a good source for ground.

Reference Information

Schematic Reference

Transfer Case Control 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.

Special Tools

- **EL-49741** 9 V+ Power Source Harness
- **EL-49742** Battery Voltage B+ and Ground Source Harness
- **J-35616** GM-Approved Terminal Test Kit

Circuit/System Verification

1. Verify that all of the following scan tool parameters display OK.
 - Range Actuator Lock Control Circuit High Voltage Test Status
 - Range Actuator Lock Control Circuit Low Voltage Test Status
 - Range Actuator Lock Control Circuit Open Test Status
 - ***If any of the parameters do NOT display OK***

Refer to Circuit/System Testing.

- ***Go to next step: If all of the parameters display OK***

2. Using the transfer case Range Actuator Lock function of the Control Functions feature of the scan tool, command the transfer case range actuator lock ON and OFF. You should be able to hear the range actuator lock engage and disengage.

- ***If you are unable to hear the range actuator lock engaging and disengaging***

Refer to Circuit/System Testing.

- ***Go to next step: If you are able to hear the range actuator lock engaging and disengaging***

3. Verify DTC P0321 or P0326 is only set as a history DTC.

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

Refer to Circuit/System Testing.

- ***Go to next step: If any of the DTCs are only set as history***

NOTE: After inspection, apply Nyogel lubricant 760G to each connector terminal. Ensure each connector and CPA is correctly seated.

4. Visually inspect each connector terminal of the K69 transfer case control module X1 connector and the A16 transfer case motor connector for damage or corrosion. Repair as necessary.
5. Clear DTC P0321 or P0326 from history.
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. The DTC should not set.

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

Refer to Circuit/System Testing.

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

7. All OK.

Circuit/System Testing

1. Verify that the 4WD TREC fuse, X50A Fuse Block - Underhood fuse 25, and the Accessory/Run Crank fuse, X51L Fuse Block - Instrument Panel Left - fuse 29, are not open.

- ***If the 4WD TREC fuse is open***

Test the battery positive voltage, K69 transfer case control module harness X3 terminal C, for a short to ground.

- ***If the Accessory/Run Crank fuse is open***

Test the Accessory/Run Crank voltage circuit, K69 transfer case control module harness X2 terminal 4, for a short to ground.

- ***Go to next step: If neither fuse is open***

2. Ignition ON, engine OFF.

3. Disconnect the harness connector at the A16 transfer case range actuator.

NOTE:

- **When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J-35616 Kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.**
- **Testing for steps 3 - 5 is performed on the A16 transfer case motor harness connector using the PU probes J-35616-4A.**

4. Test for B+ (+0.0/-1.0 V) between the battery positive voltage circuit, A16 transfer case range actuator harness terminal B, and a good ground.

- ***If the voltage is less than B+ (+0.0/-1.0 V)***

1. Ignition OFF, disconnect the X2 harness connector at the X50A Fuse Block - Underhood.
2. Test for less than 10 Ω in battery positive voltage circuit end to end.
 - If 10 Ω or greater, repair the open/high resistance in the circuit.
 - ***Go to next step: If less than 10 Ω***
3. Test for infinite resistance between battery positive voltage circuit and a good ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - Go to next step: If infinite resistance
4. Test for infinite resistance between the battery positive voltage circuit, A16 transfer case motor harness terminal B, and all other terminals of the A16 transfer case motor harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 transfer case control module and perform the Range Actuator Learn procedure. The Range Actuator Learn procedure is also known as the Transfer Case High/Low Clutch Reset procedure.

Refer to [**Transfer Case Control Module Replacement.**](#)

- ***Go to next step: If the voltage is B+ (+0.0/-1.0 V)***

5. Test for a 4.0 - 5.0 V diagnostic voltage between the transfer case lock solenoid control circuit, A16 Transfer Case Motor terminal C, and a good ground.
 - ***If the voltage is greater than the specified range***
 1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module.
 2. Ignition ON, engine OFF.
 3. Test for less than 1 V between the transfer case lock solenoid control circuit and a good ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - Go to next step: If less than 1 V
 4. Test for infinite resistance between the transfer case lock solenoid control circuit, A16 transfer case motor harness connector terminal C and all other terminals of the A16 transfer case motor harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 transfer case control module and perform the Range Actuator Learn procedure. The Range Actuator Learn procedure is also known as the Transfer Case High/Low Clutch Reset procedure.

Refer to [**Transfer Case Control Module Replacement.**](#)

- ***If the voltage is less than the specified range***

1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module.
2. Test for less than 10 Ω in the transfer case lock solenoid control circuit end to end.
 - If 10 Ω or greater, repair the open/high resistance in the circuit.
 - Go to next step: If less than 10 Ω
3. Test for infinite resistance transfer case lock solenoid control circuit, A16 transfer case motor harness connector terminal C and a good ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - Go to next step: If infinite resistance
4. Test for infinite resistance between the transfer case lock solenoid control circuit, A16 transfer case motor harness connector terminal C and all other terminals of the A16 transfer case motor harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 transfer case control module and perform the Range Actuator Learn procedure. The Range Actuator Learn procedure is also known as the Transfer Case High/Low Clutch Reset procedure.

Refer to [Transfer Case Control Module Replacement](#).

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

6. Battery Positive Voltage circuit and Transfer Case Lock Solenoid Control circuit OK.

Component Testing

A16 Transfer Case Motor (Transfer Case Range Actuator)

NOTE: **Circuit/System Testing must be performed first.**

1. Remove the A16 transfer case motor from transfer case. Using a paint pen or marker, place indexing marks on the A16 transfer case motor drive gear and the mounting surface of the A16 transfer case motor.
2. Install the **EL-49742** harness.
3. Using a PU probe J-35616-5, attach the red lead of the **EL-49742** jumper harness to the transfer case motor clockwise control circuit of the A16 transfer case motor, terminal A. The transfer case motor clockwise control circuit is also known as the motor control A circuit.
4. Using a PU probe J-35616-5, touch the black lead of the **EL-49742** jumper harness to the transfer case motor counter clockwise control circuit of the A16 transfer case motor, terminal D. The transfer case motor counter clockwise control circuit is also known as the motor control B circuit. The A16 transfer case motor drive gear should not rotate.

- ***If the A16 transfer case motor drive gear rotates***

Replace the A1 transfer case motor. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#).

- ***Go to next step: If the A16 transfer case motor drive gear does NOT rotate***

5. Using a PU probe J-35616-5, attach the red lead of the **EL-49741** harness to the battery positive voltage terminal of the A16 transfer case motor, terminal B.
6. Using a PU probe J-35616-5, attach the black lead of the **EL-49741** jumper harness to the transfer case lock solenoid control terminal of the A16 transfer case motor, terminal C.
7. Attach a 9-volt battery to the **EL-49741** harness (not included). You should hear the A16 transfer case motor unlock.

- ***If you do not hear the A16 transfer case motor unlock***

Replace the A16 transfer case motor. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#).

- ***Go to next step: If you do hear the A16 transfer case motor unlock***

8. Touch the black lead of the **EL-49742** jumper harness to the transfer case motor counter clockwise control circuit of the A16 transfer case motor, terminal D. The A16 transfer case motor drive gear should rotate.

- ***If the A16 transfer case motor drive gear does NOT rotate***

Replace the A16 transfer case motor. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#).

- ***Go to next step: If the A16 transfer case motor drive gear does rotate***

9. Using the PU probes J-35616-5, test for between 10 - 30 Ω between the battery positive voltage circuit A16 transfer case motor, terminal B and the transfer case lock solenoid control circuit A16 transfer case motor terminal C.

- ***If outside the specified range***

Replace the A16 transfer case motor. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#).

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

10. Using the PU probes J-35616 - 5, test for infinite resistance between the following circuits and the A16 transfer case motor case.

- Battery positive voltage circuit A16 transfer case motor, terminal B.
- Transfer case lock solenoid control circuit A16 transfer case motor, terminal C.
- *If less than infinite resistance*

Replace the A16 transfer case motor. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#).

- *Go to next step: If infinite resistance*

11. Using the PU probes J-35616-5, test for infinite resistance between the battery positive voltage circuit A16 transfer case motor, terminal B and all other terminals on the A16 transfer case motor except the transfer case lock solenoid control circuit, terminal C.

- *If less than the infinite resistance*

Replace the A16 transfer case motor. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#).

- *Go to next step: If infinite resistance*

12. Using the PU probes J-35616-5, test for infinite resistance between the transfer case lock solenoid control circuit A16 transfer case motor, terminal C and all other terminals of the TCEM X1 except the battery positive voltage circuit A16 transfer case motor, terminal B.

- *If less than infinite resistance*

Replace the A16 transfer case motor. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#).

- *Go to next step: If infinite resistance*

13. A16 transfer case motor OK.

K69 Transfer Case Control Module

NOTE:

- **Circuit/System Testing must be performed first.**
- **Transfer case control module's need to be programmed when replaced. If after programming the K69 transfer case control module comes back as "NO COMM", try reprogramming again. (Internet/vehicle bandwidth load may cause the programming activity to fail.)**

1. Ignition OFF. Disconnect the harness connector at the A16 transfer case motor.
2. Ignition ON, engine OFF. Install **EL-49742** harness.
3. Block wheels. Parking brake engaged. Transmission in Neutral.
4. Using the PU probes J-35616-4A, connect a test lamp between the battery positive voltage circuit, A16 transfer case motor harness terminal B and the ground terminal of **EL-49742** harness, black terminal. The test light should illuminate.

- *If the test light does not illuminate*

1. Ignition OFF, disconnect the X2 harness connector at the X50A Fuse Block - Underhood.
2. Test for less than 10 Ω in battery positive voltage circuit end to end.
 - If 10 Ω or greater, repair the open/high resistance in the circuit.
 - Go to next step: If less than 10 Ω
3. Test for infinite resistance between battery positive voltage circuit, A16 transfer case motor harness terminal B, and a good ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - Go to next step: If infinite resistance
4. Test for infinite resistance between the battery positive voltage circuit, A16 transfer case motor harness terminal B, and all other terminals of the A16 transfer case motor harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.

- If infinite resistance, replace the K69 transfer case control module and perform the Range Actuator Learn procedure. The Range Actuator Learn procedure is also known as the Transfer Case High/Low Clutch Reset procedure. Refer to [Transfer Case Control Module Replacement](#).
 - ***Go to next step: If the test light does illuminate***
5. Using the PU probes J-35616-4A, connect a test lamp between the battery positive voltage circuit, A16 transfer case motor harness terminal B and the transfer case lock solenoid control circuit, A16 transfer case motor harness terminal C. The test light should not illuminate.
- ***If the test light illuminates***
 1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module.
 2. Test for infinite resistance between the transfer case lock solenoid control circuit, A16 transfer case motor harness terminal C, and a good ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - Go to next step: If infinite resistance
 3. Test for infinite resistance between the transfer case lock solenoid control circuit, A16 transfer case motor harness terminal C, and all other terminals of the A16 transfer case motor harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 transfer case control module and perform the Range Actuator Learn procedure. The Range Actuator Learn procedure is also known as the Transfer Case High/Low Clutch Reset procedure. Refer to [Transfer Case Control Module Replacement](#).
 - ***Go to next step: If the test light does not illuminate***
6. Using the Transfer Case Lock function of the Control Function feature of the scan tool, command the transfer case lock ON and OFF. When the lock is commanded ON, release solenoid de-energized, the test light should not illuminate. When the lock is commanded OFF, release solenoid energized, the test light should illuminate.
- ***If the test light stays ON when the lock is commanded ON***
 1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module.
 2. Test for infinite resistance between the transfer case lock solenoid control circuit, A16 transfer case motor harness terminal C, and a good ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - Go to next step: If infinite resistance
 3. Test for infinite resistance between the transfer case lock solenoid control circuit, A16 transfer case motor harness terminal C, and all other terminals of the A16 transfer case motor harness connector.
 - If less than infinite resistance, repair the shorted together condition in the affected circuits.
 - If infinite resistance, replace the K69 transfer case control module and perform the Range Actuator Learn procedure. The Range Actuator Learn procedure is also known as the Transfer Case High/Low Clutch Reset procedure. Refer to [Transfer Case Control Module Replacement](#).
 - ***If the test light does not illuminate when the lock is commanded OFF***
 1. Ignition OFF, disconnect the X harness connector at the K69 transfer case control module.
 2. Test for less than 10 Ω in the transfer case lock solenoid control circuit, end to end.
 - If 10 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 10 Ω , replace the K69 transfer case control module and perform the Range Actuator Learn procedure. The Range Actuator Learn procedure is also known as the Transfer Case High/Low Clutch Reset procedure. Refer to [Transfer Case Control Module Replacement](#).
 - ***Go to next step: If the test light illuminates when the lock is commanded OFF and turns OFF when the lock is commanded ON***
7. K69 transfer case motor OK.

Repair Instructions

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

- [Control Module References](#) for transfer case control module replacement, setup, and programming.
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#) for Range Actuator Learn procedure.

- **Transfer Case Four Wheel Drive Actuator Replacement** for transfer case motor/transfer case range actuator replacement.

DTC C0364 OR C0379

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 C0364

Front Axle Engagement Actuator Control Circuit

DTC C0379

Front Axle Engagement System

For symptom byte information, refer to **Symptom Byte List**.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
Ignition	C0364 04*, C0379 08**	C0364 04*, C0379 08**	-	-
Signal	C0379 08 or C0379 58	C0364 04, C0379 08, or C0379 58	C0379 58	-
Control	C0364 02	C0364 04*, C0379 08**	C0364 01	-
Ground	-	C0364 04*, C0379 08**	-	-
* - DTC set with front axle engagement actuator disengaged				
** - DTC set with front axle engagement actuator engaged				

Circuit/System Description

The front axle contains an electric motor actuator which engages and disengages the front axle. The front axle engagement actuator consists of a permanent magnetic motor, a worm gear controlled plunger, a front axle engagement feedback switch, and an electronic control circuit within the actuator assembly.

The front axle engagement actuator is powered when the ignition is on by ignition voltage and a constant ground. When a shift to 4WD Auto, 4WD High, or 4WD Low is requested, the transfer case control module engages the front axle by grounding the front axle actuator control circuit through a current limiting driver. The front axle engagement feedback switch provides a signal to the transfer case control module to indicate when the front axle is engaged. The switch is open when the axle is not engaged and closed when the axle is engaged.

Conditions for Running the DTC

- Ignition ON.
- System voltage 10.5 - 18 V.
- DTC P0562 or P0563 is not set
- DTC C0364 and C0379 run continuously within the enabling conditions.

Conditions for Setting the DTC

C0364 01

Voltage on the front axle actuator control circuit is greater than 8.5 V.

C0364 02

Voltage on the front axle actuator control circuit is less than 0.2 V.

C0364 04

Voltage on the front axle actuator control circuit is between 2.5 - 5.5 V.

C0379 08

The transfer case control module detects a change in voltage on the four wheel drive wheel lock indicator circuit and no change in voltage on the front axle actuator control circuit.

C0379 58

5 s after a range change, the transfer case control module compares the commanded state of the front axle (Front Axle Engagement Actuator Command parameter) to the monitored state of the front axle (Front Axle Feedback Switch parameter). If the command state differs from the monitored state for more than a predetermined amount of time, the DTC sets.

Action Taken When the DTC Sets

C0364 01 and C0364 04

- The front axle remains disengaged at all times.
- Transfer case normal operation.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.
- The range indicator for the current range shall illuminate.

C0364 02

- The front axle remains engaged at all times.
- Transfer case normal operation.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.
- The range indicator for the current range shall illuminate.

C0379 08

- The front axle remains in current mode.
- Transfer case normal operation.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.
- The range indicator for the current range shall illuminate.

C0379 58

- The front axle remains in current mode.
- Transfer case normal operation.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.
- The range indicator for the current range shall illuminate.

Conditions for Clearing the DTC

- The DTC is cleared once the conditions for setting the DTC are no longer present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.

Reference Information

Schematic Reference

[Transfer Case Control 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.

[Circuit/System Verification](#)

1. Ignition ON, shift the vehicle from 2WD to 4WD High.
2. Verify that the following scan tool parameters transition from Disengaged while in 2WD to Engaged when in 4WD.
 - Front Axle Engagement Actuator Command
 - Front Axle Feedback Switch
 - ***If the parameters do not transition***
Refer to Circuit/System Testing.
 - ***Go to next step: If the parameters transition***
3. Verify that for all range selections of the S77 Transfer Case Shift Control Switch, the scan tool Range Actuator Current parameter increases or decreases during the shift and then returns to 0.0 A after shifting.
 - ***If the Range Actuator Current parameter does not perform as described***
Refer to Circuit/System Testing.
 - ***Go to next step: If the Range Actuator Current parameter performs as described***
4. Verify DTC C0364 or C0379 is only set as a history DTC.
 - ***If DTC C0364 or C0379 is set as current***
Refer to Circuit/System Testing.
 - ***Go to next step: If DTC C0364 or C0379 is set as history***
5. Verify there is not connector or terminal damage at the following component connectors. This may include a physically damaged connector housing, physically damaged terminals, corrosion, water intrusion, or poor terminal tension:
 - K69 Transfer Case Control Module X1
 - M26 Front Axle Engagement Actuator
 - ***If any connector or terminal damage is found***
Repair or replace the connector or terminals as necessary.
 - ***Go to next step: If no connector or terminal damage is found***
6. Apply Nyogel 760G or equivalent, meeting GM specification 9986087, to each connector terminal. Connect each connector, ensuring each connector is secure and the CPA is correctly seated.

7. Clear DTC C0364 or C0379 from history.
8. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
 - ***If DTC C0364 or C0379 sets***

Refer to Circuit/System Testing.
 - ***Go to next step: If DTC C0364 or C0379 does not set***
9. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the M26 Front Axle Engagement Actuator.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **Go to next step: If less than 10 Ω**
3. Ignition ON.
4. Verify a test lamp illuminates between the ignition circuit terminal 1 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A Fuse Block - Underhood.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, test or replace the M26 Front Axle Engagement Actuator.
 - **If the test lamp does not illuminate and the circuit fuse is OK**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A Fuse Block - Underhood.
 2. Test for less than 2 Ω in the ignition circuit end to end.
 - If 2 Ω or greater, repair the open or high resistance on the circuit.
 - If less than 2 Ω , replace the X50A Fuse Block - Underhood.
 - **Go to next step: If the test lamp illuminates**
5. Verify the scan tool Front Axle Engagement Feedback Switch parameter is Disengaged.
 - **If not Disengaged**
 1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module, ignition ON.
 2. Test for less than 1 V between the M26 Front Axle Engagement Actuator signal circuit terminal 3 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K69 Transfer Case Control Module.
 - **Go to next step: If Disengaged**
6. Install a 3 A fused jumper wire between the signal circuit terminal 3 and B+.
7. Verify the scan tool Front Axle Engagement Feedback Switch parameter is Engaged.
 - **If not Engaged**
 1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
 2. Test for infinite resistance between the signal circuit terminal and ground.
 - If less than infinite resistance, repair the short to ground on 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 K69 Transfer Case Control Module.

• **Go to next step: If Engaged**

8. Connect a test lamp between the control circuit terminal 2 and the ignition circuit terminal 1.

9. Verify the test lamp turns ON and OFF when commanding the Front Axle Engagement Actuator to Engage and Disengage with a scan tool.

• **If the test lamp is always OFF**

1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module, ignition ON.

2. Test for less than 1 V between the control circuit terminal and ground.

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

3. Ignition OFF.

4. Test for less than 2 Ω in the control circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K69 Transfer Case Control Module.

• **If the test lamp is always ON**

1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.

2. Test for infinite resistance between the control circuit terminal and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K69 Transfer Case Control Module.

• **Go to next step: If the test lamp turns ON and OFF**

10. Test or replace the M26 Front Axle Engagement Actuator.

Repair Instructions

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

- [Front Drive Axle Actuator Replacement](#)
- [Control Module References](#) for transfer case control module replacement, programming, and setup

DTC C0387

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 C0387 00

Unable to Complete Shift

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Performance
Unable to Complete Shift	-	-	-	DTC C0387 00
Control circuit terminal D - Transfer Case Motor Clockwise Control	C0306 02	C0306 04	C0306 01	C0306 54 or C0381 54

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Performance
Control circuit terminal A - Transfer Case Motor Counter Clockwise Control	C0306 02	C0306 04	C0306 01	C0306 54 or C0381 54

Circuit/System Description

The A16 Transfer Case Motor, also known as the transfer case range actuator, is a bi-directional, permanent magnet, DC motor. When energized, through the transfer case clockwise circuit or transfer case counter-clockwise circuit, the ground is provided by the opposing motor control circuit which becomes grounded through the transfer case control module ground circuit. The transfer case motor, through a series of gears, rotates the transfer case control actuator shaft which moves the transfer case two/four wheel drive actuator cam and transfer case high/low shift fork in order to shift the transfer case between the following modes or ranges:

- 2WD
- 4WD/AWD Automatic
- 4WD High/Locked
- 4WD Low
- Neutral

The transfer case control module monitors actuator current and incremental sensor output in order to shift the transfer case and verify that the proper position has been obtained. Deviations in current and position from expected values will cause this DTC to set.

If the shift lever detent shaft were to bind, or there was a mechanical failure, or the transfer case clockwise circuit and the transfer case counter-clockwise circuit were shorted together, the shift would not be completed. This will cause the DTC to set in order to protect system components from damage.

Conditions for Running the DTC

- Ignition On
- System Voltage = 10.5 to 18 V.
- DTC P0562, P0563 = Not set No DTC P0562 or P0563.
- Frequency the DTC runs - Continuously

Conditions for Setting the DTC

A shift request was received but could not be completed within 15 seconds.

Action Taken When the DTC Sets

- All shifting disabled.
- The mode light shall flash upon a requested mode change and then return to the current mode.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.
- DTC C0569 4B is set.

Conditions for Clearing the DTC

- A current DTC will clear when the diagnostic runs and passes.
- A history DTC will clear after 40 consecutive malfunction-free ignition cycles.
- History DTCs can be cleared using a scan tool.

Diagnostic Aids

- An incomplete shift is one that cannot reach the desired mode or range and cannot return to the original mode or range.
- The transfer case clockwise circuit shorting to the transfer case counter-clockwise circuit could cause this DTC to set.

- It is possible to have windings inside the motor shorted to the case, resulting in a short to ground, causing this DTC to set.
- If the shift lever detent shaft were to bind, or there was a mechanical failure, or motor A control and motor B control were shorted together, the shift would not be completed. This will cause the DTC to set in order to protect the system components from damage.
- The NQF transfer case uses a detent plunger that can bind, causing the shift shaft not to move. This can be corrected without removing or disassembling the transfer case.
- A faulty transfer case shift control module can cause incorrect incremental sensor or motor current measurements which would also result in this DTC setting.
- The default actions for C0321 may set C0306.
- **EL-49741** Harness is a good source for 9 V.
- **EL-49742** Harness is a good source for B+ and ground.
- The transfer case fill and drain plugs are a good source for ground.

Reference Information

Schematic Reference

Transfer Case Control 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.

Special Tools

- **EL-49741** 9 V+ Power Source Harness
- **EL-49742** Battery Voltage B+ and Ground Source Harness

Circuit/System Verification

1. Verify the fuse is not open: TREC25 Fuse - X50A Fuse Block - Underhood

- **If the fuse is open**

The Battery Positive Voltage circuit supplies voltage to other components. Test all circuits for a short to ground or test all components for being shorted.

- **Go to next step: If the fuse is not open**

2. Verify the fuse is not open: Run/Crank Ignition 1 Voltage F29 Fuse - X51A Fuse Block - Instrument Panel

- **If the fuse is open**

The ignition circuit supplies voltage to other components. Test all circuits for a short to ground or test all components for being shorted.

- **Go to next step: If the fuse is not open**

3. Ignition On - Engine Off

4. Verify no other DTCs are set. If any other DTCs are set Diagnose other DTCs first. If any other DTC's are set, diagnose them first.
 - **If any other DTCs are set - Diagnose other DTCs first.**
 - **Go to next step: If no other DTCs are set**
5. Verify DTC C0387 is only set as a history DTC.
 - **If set as a current DTC - Refer to: Circuit/System Testing**
 - **Go to next step: If the DTC is set as history**
6. Perform the following procedure/test: **Testing for Intermittent Conditions and Poor Connections**
7. Clear DTCs
8. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data. The DTC should not set.
9. Verify DTC C0387 is not set.
 - **If the DTC sets - Refer to: Circuit/System Testing**
 - **Go to next step: If the DTC does not set**
10. All OK.

Circuit/System Testing

1. Ignition Off Disconnect the component: A16 Transfer Case Motor, also known as the transfer case range actuator.
2. Ignition On - Engine Off

NOTE:

- **When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J-35616 GM-Approved Terminal Test Kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.**
- **Testing for steps 3 - 5 is performed on the A16 transfer case motor harness connector using the PU probes J-35616-4A.**

3. Test for 1.0 to 2.5 V between the test points: Control circuit terminal D & Chassis Ground
 - **If less than 1.0 V**
 1. Ignition Off Disconnect the component: K69 Transfer Case Control Module
 2. Test for less than 10 Ω in the transfer case motor counter-clockwise control circuit end to end.
 - If 10 ohms or greater - Repair the open/high resistance in the circuit.
 - Go to next step: If less than 10
 3. Test for infinite resistance between the test points: Control circuit terminal D & Chassis Ground
 - If less than infinite resistance - Repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 4. Test for infinite resistance between the test points: Control circuit terminal D & all other terminals of the A16 transfer case motor harness connector.
 - If less than infinite resistance - Repair the short between the circuits.
 - If infinite resistance - Replace the component: K69 Transfer Case Control Module & Perform the following learn procedure: Range Actuator Learn

Refer to: Refer to **Transfer Case Control Module Replacement**, & **Transfer Case High/Low Clutch Reset (NQ6)**.

- **If greater than 2.5 V**
 1. Ignition Off, disconnect the X3 harness connector at the K69 transfer case control module.
 2. Ignition On - Engine Off
 3. Test for less than 1 V between the transfer case motor counter-clockwise control circuit terminal D and a good ground.

- If 1 V or greater, repair the short to voltage in the circuit.
 - Go to next step: If less than 1 V
4. Test for greater than 10 Ω between the transfer case motor counter-clockwise control circuit, terminal D and all other terminals of the A16 transfer case motor harness connector.
 - If 10 Ω or less, repair the shorted together condition in the affected circuits.
 - If greater than 10 Ω , replace the K69 transfer case control module and perform the Range Actuator Learn procedure.

Refer to [Transfer Case Control Module Replacement](#), or [Transfer Case High/Low Clutch Reset \(NQ6\)](#).

- **Go to next step: If between 1.0 and 2.5 V**

4. Transfer case motor counter-clockwise control circuit and K69 transfer case control module OK.

5. Test for 3.0 to 4.5 V between the test points: Control circuit terminal A & Chassis Ground

- **If less than 3.0 V**

1. Ignition OFF, disconnect the X3 harness connector at the K69 transfer case control module.
2. Test for less than 10 Ω in the transfer case motor clockwise control circuit end to end.
 - If 10 Ω or greater, repair the open/high resistance in the circuit.
 - Go to next step: If less than 10 Ω
3. Test for infinite resistance between transfer case motor clockwise control circuit terminal A and a good ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - Go to next step: If infinite resistance
4. Test for greater than 10 Ω between the transfer case motor clockwise control circuit terminal A and all other terminals of the A16 transfer case motor harness connector.
 - If 10 Ω or less, repair the shorted together condition in the affected circuits.
 - If greater than 10, replace the K69 transfer case control module and perform the Range Actuator Learn procedure.

Refer to [Transfer Case Control Module Replacement](#), or [Transfer Case High/Low Clutch Reset \(NQ6\)](#).

- **If greater than 4.5 V**

1. Ignition OFF, disconnect the X3 harness connector at the K69 transfer case control module. Ignition ON, Engine OFF.
2. Test for less than 1 V between the transfer case motor clockwise control circuit terminal A and a good ground.
 - If 1 V or greater, repair the short to voltage in the circuit.
 - Go to next step: If less than 1 V
3. Test for greater than 10 Ω between the transfer case motor clockwise control circuit, terminal A and all other terminals of the A16 transfer case motor harness connector.
 - If 10 Ω or less, repair the shorted together condition in the affected circuits.
 - If greater than 10 Ω , replace the K69 transfer case control module and perform the Range Actuator Learn procedure.

Refer to [Transfer Case Control Module Replacement](#), or [Transfer Case High/Low Clutch Reset \(NQ6\)](#).

- **Go to next step: If between 3.0 and 4.5 V**

6. All OK.

Component Testing

A16 Transfer Case Motor (Transfer Case Range Actuator)

1. Remove the A16 transfer case motor from transfer case. Using a paint pen or marker, place indexing marks on the A16 transfer case motor drive gear and the mounting surface of the A16 transfer case motor.

NOTE:

- **When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J-35616 GM-Approved Terminal Test Kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.**
- **Testing for steps 2 - 11 is performed on the A16 transfer case motor harness connector using the PU probes J-35616-5.**

2. Attach the red lead from one of the **EL-49741** harnesses to the battery positive voltage terminal of the A16 transfer case motor, terminal B.
3. Attach the black lead from this same jumper harness to the transfer case lock solenoid control terminal of the A16 transfer case motor, terminal C.
4. Attach a 9-volt battery to this harness (not included). You should hear the A16 transfer case motor unlock.

- **If you do NOT hear the A16 transfer case motor unlock**

Replace the A16 transfer case motor and perform the Range Actuator Learn procedure. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#) , and [Transfer Case High/Low Clutch Reset \(NQ6\)](#).

- **Go to next step: If you DO hear the A16 transfer case motor unlock**

5. Attach the red lead from the other **EL-49741** jumper harness to the transfer case motor clockwise control circuit of the A16 transfer case motor, terminal A.
6. Attach the black lead from this same jumper harness to the transfer case motor counter-clockwise control circuit of the A16 transfer case motor, terminal D.
7. Touch the battery terminals of the 9-volt battery to the battery terminals of the jumper harness. This should rotate the A16 transfer case motor drive gear in either a clockwise or counter-clockwise rotation depending on battery orientation.

- **If the A16 transfer case motor drive gear does not perform as described**

Replace the A16 transfer case motor and perform the Range Actuator Learn Procedure. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#) , and [Transfer Case High/Low Clutch Reset \(NQ6\)](#).

- **Go to next step: If The A16 transfer case motor drive gear performs as described**

8. Verify 0.3 - 40 Ω resistance between the transfer case motor clockwise control circuit of the A16 transfer case motor, terminal A and the transfer case motor counter-clockwise control circuit of the A16 transfer case motor, terminal D.

- **If NOT 0.3 - 40 Ω**

Replace the A16 transfer case motor and perform the Range Actuator Learn Procedure. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#) , and [Transfer Case High/Low Clutch Reset \(NQ6\)](#).

- **Go to next step: If 0.3 - 40 Ω**

9. Test for infinite resistance between the following circuits and the A16 transfer case motor case:

- Transfer case motor clockwise control circuit of the A16 transfer case motor, terminal A
- Transfer case motor counter-clockwise control circuit of the A16 transfer case motor, terminal D
- **If less than infinite resistance**

Replace the A16 transfer case motor and perform the Range Actuator Learn Procedure. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#) , and [Transfer Case High/Low Clutch Reset \(NQ6\)](#).

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

10. Test for infinite resistance between the transfer case motor clockwise control circuit of the A16 transfer case motor, terminal A and all other terminals on the A16 transfer case motor harness except the transfer case motor counter-clockwise control circuit of the A16 Transfer Case Motor, terminal D.

- **If less than infinite resistance**

Replace the A16 transfer case motor and perform the Range Actuator Learn Procedure. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#) , and [Transfer Case High/Low Clutch Reset \(NQ6\)](#).

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

11. Test for infinite resistance between the transfer case motor counter-clockwise control circuit of the A16 transfer case motor, terminal D. and all other terminals on the transfer case range actuator harness except the transfer case motor clockwise control circuit of the A16 transfer case motor, terminal A.

- **If less than infinite resistance**

Replace the A16 transfer case motor and perform the Range Actuator Learn Procedure. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#) , and [Transfer Case High/Low Clutch Reset \(NQ6\)](#).

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

12. A16 transfer case motor OK.

13. Inspect the transfer case shift detent lever shaft for a binding condition.

- **If binding**

Remove the transfer case and repair the binding condition. Refer to [Transfer Case Shudder or Binding](#).

- **Go to next step: If not binding**

14. Refer to [Symptoms - Transfer Case](#), or [Transfer Case Will Not Shift](#).

Repair Instructions

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

- [Transfer Case Four Wheel Drive Actuator Replacement](#)
- [Transfer Case Disassemble](#)
- For control module replacement, programming, and setup refer to: [Control Module References](#)

DTC C038D

Diagnostic Instructions

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

DTC Descriptor

DTC C038D 00

Range Actuator - Position Not Learned

Circuit/System Description

- This is an internal programming fault detection of the transfer case control module. No external circuits are involved.
- This DTC is set anytime a transfer case control module is replaced or reprogrammed.
- The Range Actuator Learn procedure must be performed in order for the transfer case control module to learn current clutch tolerance based on clutch stackup and accumulated clutch wear.

Conditions for Running the DTC

- Ignition ON.
- System voltage 10.5 - 18 V.

Conditions for Setting the DTC

The Range Actuator Learn procedure for a new or reprogrammed transfer case control module has not been performed.

Action Taken When the DTC Sets

- All shifting disabled until the Range Actuator Learn procedure has been performed.
- The SERVICE 4WD indicator illuminates.
- No mode position LED's illuminated.

Conditions for Clearing the DTC

The transfer case control module only clears the DTC once the Range Actuator Learn procedure has been successfully performed.

Diagnostic Aids

The default actions for other transfer case DTC's can cause C038D to set.

Reference Information

Schematic Reference

Transfer Case Control Wiring Schematics

Connector End View Reference

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

Description and Operation

Transfer Case Description and Operation

Electrical Information Reference

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

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information.

Circuit/System Verification

1. Engine ON. Let engine run for at least 1 minute.
2. Ignition OFF for at least 30 seconds to allow for the complete shutdown of the K69 Transfer Case Control Module.
3. Ignition ON.

4. Verify that no other transfer case DTC's are set.

- *If any other transfer case DTC's are set*

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

- *Go to next step: If no other transfer case DTC's are set*

5. Verify that DTC C038D is not set.

- *If DTC C038D is set*

NOTE: Range Actuator Learn procedure may need to be performed twice.

1. Perform the Range Actuator Learn procedure. Refer to [Transfer Case High/Low Clutch Reset \(NQ6\)](#).

2. Verify that the Range Actuator Learn procedure completed successfully.

- If Range Actuator Learn procedure completed successfully, All OK.
- Go to next step: If Range Actuator Learn procedure completed unsuccessfully, Test or replace A 16 Transfer Case Motor.

- *Go to next step: If DTC C038D is NOT set*

6. All OK.

Repair Instructions

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

[Transfer Case High/Low Clutch Reset \(NQ6\)](#) for Range Actuator Learn Procedure

[Transfer Case Four Wheel Drive Actuator Replacement](#) for A 16 Transfer Case Motor replacement

DTC C0392, P0642, OR P0643

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 C0392 08

Transfer Case Range Position Sensor Circuit Performance - Signal Invalid

DTC C0392 28

Transfer Case Range Position Sensor Circuit - Incorrect Frequency

DTC P0642 00

5V Reference 1 Low Voltage

DTC P0643 00

5V Reference 1 High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
Rotational Position Sensor Circuit (Rotary Position Sensor Signal)	C0392 08	C0392 08	C0392 08	C0392 08 or C0392 28

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
5-Volt Reference (Rotary Position Sensor Supply 5V/Sensor Reference Voltage 1)	P0642	P0643	P0643	C0392 08 or C0392 28
Low Reference (Rotary Position Sensor Return)	-	C0392 08	-	C0392 08 or C0392 28

Circuit/System Description

The transfer case control module receives input from the transfer case B227 Gear Position Sensor, also known as the range position sensor or the rotational position sensor. The gear position sensor receives a 5-volt reference signal from the transfer case control module. In return the gear position sensor sends the transfer case control module a variable pulse width modulated signal indicating the position of the transfer case. The gear position sensor works in conjunction with the range actuator position sensor, inside the A16 Transfer Case Motor, also known as the transfer case range actuator, to confirm transfer case position. The gear position sensor is more sensitive than the range actuator position sensor and is able to indicate to the transfer case control module the exact position of the transfer case between range changes. It is also able to show how much clutch activation is being commanded at any time.

Conditions for Running the DTC

- Ignition ON.
- System voltage 10.5 - 18 V.
- No DTC P0562 or P0563.
- No DTC P0652, P0653, or C0397 - C0392 only.
- DTC C0392, P0642 and P0643 run continuously within the enabling conditions.

Conditions for Setting the DTC

C0392 08

- The transfer case control module detects a transfer case range position sensor voltage that does not constantly change, but remains low, <0.25 V, indicating a short to ground.

Or

- The transfer case control module detects a gear position sensor voltage that does not constantly change, but remains high, >6.0 V, indicating a short to voltage.

C0392 28

The transfer case control module does not receive a sensor reference voltage 1 circuit, also known as the 5V reference 1 circuit, of 4.8 - 5.2 volts.

P0642

The transfer case control module detects less than 4.8 V on the transfer case reference voltage 1 circuit, also known as the 5V reference 1 circuit.

P0643

The transfer case control module detects greater than 5.2 V on the transfer case sensor reference voltage 1 circuit, also known as the 5V reference 1 circuit.

Action Taken When the DTC Sets

- DTC C398 disabled.
- All shifting disabled.
- Clutch torque increased to maximum torque.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.

Conditions for Clearing the DTC

- The transfer case control module clears the DTC once the conditions for setting the DTC are no longer present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Diagnostic Aids

- **EL-49742** harness is a good source for B+ and ground.
- The transfer case drain plug is a good source for ground.
- Typical Gear Position Sensor parameter values:
 - 2WD = 33 - 43B°
 - 4WD/AWD Automatic = 87 - 204B°
 - 4WD High/Locked = 110 - 204B°
 - 4WD Low = -140B° to -69B°
 - Neutral = -5B° to +5B°

Reference Information

Schematic Reference

Transfer Case Control 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.

Special Tools

- **EL-49741** 9 V+ Power Source Harness
- **EL-49742** Battery Voltage B+ and Ground Source Harness
- **J 35616** GM-Approved Terminal Test Kit

Circuit/System Verification

1. Verify that all range selections of the S77 transfer case shift control switch match the following parameters in the Data Display feature of the scan tool:

- Range Actuator Position
- Transfer Case Commanded Position
- Transfer Case Range
- ***If NOT all of the parameters match the S77 transfer case shift control switch position***

Refer to Circuit/System Testing.

- ***Go to next step: If ALL of the parameters match the S77 transfer case shift control switch position***

2. Verify that for all range selections of the S77 transfer case shift control switch, the Transfer Case Range Position Sensor parameter and the Range Actuator Position Sensor parameter track within 5 degrees of each other.

- ***If the parameters do NOT track within 5 degrees of each other***

Refer to Circuit/System Testing.

- ***Go to next step: If the parameters DO track within 5 degrees of each other***

3. Verify DTC C0392, P0642, or P0643 is only set as a history DTC.

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

Refer to Circuit/System Testing.

- ***Go to next step: If any of the DTCs are only set as history***

NOTE: After inspection, apply Nyogel lubricant 760G to each connector terminal. Ensure each connector and CPA is correctly seated.

4. Visually inspect each connector terminal of the K69 transfer case control module X1 connector and the B227 gear position sensor connector for damage or corrosion. Repair as necessary.

5. Clear DTC C0392, P0642, or P0643 from history.

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. The DTC should not set.

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

Refer to Circuit/System Testing.

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

7. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the B227 gear position sensor, also known as the rotational position sensor.

2. Ignition ON, engine OFF.

- NOTE:**
- **When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J 35616 Kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.**
 - **Testing for steps 3 - 7 is performed on the B227 gear position sensor harness connector using the GY probes J 35616-2A.**

3. Test for 4.8 - 5.2 V between the 5-Volt reference circuit, terminal B and a good ground, such as the ground terminal of the EL-49742 harness, black terminal.

- ***If less than the specified range***

1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module.

2. Test for less than 10 Ω in the 5-Volt reference circuit end to end.

- If 10 Ω or greater, repair the open/high resistance in the circuit.
- Go to next step: If less than 10 Ω

3. Test for infinite resistance between 5-Volt reference circuit terminal B and a good ground.

- If less than infinite resistance, repair the short to ground in the circuit.
- Go to next step: If infinite resistance

4. Test for greater than 10 Ω between the 5-Volt reference circuit terminal B and all other terminals of the B227 gear position sensor harness connector.

- If 10 Ω or less, repair the shorted together condition in the affected circuits.
- If greater than 10 Ω , replace the K69 transfer case control module and perform the Range Actuator Learn procedure.

• ***If greater than the specified range***

1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module. Ignition ON, Engine OFF.
2. Test for less than 1 V between the 5-Volt reference circuit terminal B and a good ground.
 - If 1 V or greater, repair the short to voltage in the circuit.
 - Go to next step: If less than 1 V
3. Test for greater than 10 Ω between the 5-Volt reference circuit, terminal B and all other terminals of the B227 gear position sensor harness connector.
 - If 10 Ω or less, repair the shorted together condition in the affected circuits.
 - If greater than 10 Ω , replace the K69 transfer case control module and perform the Range Actuator Learn procedure.

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

4. 5-Volt reference circuit and K69 transfer case control module OK.
5. Test for 4.8 - 5.2 V between the 5-Volt reference circuit, terminal B, and the low reference circuit, terminal A.

• ***If less than the specified range***

1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module.
2. Test for less than 10 Ω in the low reference circuit end to end.
 - If 10 Ω or greater, repair the open/high resistance in the circuit.
 - Go to next step: If less than 10 Ω
3. Test for infinite resistance between low reference circuit and a good ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - Go to next step: If infinite resistance
4. Test for greater than 10 Ω between the low reference circuit, terminal A and all other terminals of the B227 gear position sensor harness connector.
 - If 10 Ω or less, repair the shorted together condition in the affected circuits.
 - If greater than 10 Ω , replace the K69 transfer case control module and perform the Range Actuator Learn procedure.

• ***If greater than the specified range***

1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module. Ignition ON, Engine OFF.
2. Test for less than 1 V between the switch signal circuit, terminal A and a good ground.
 - If 1 V or greater, repair the short to voltage in the circuit.
 - Go to next step: If less than 1 V
3. Test for greater than 10 Ω between the switch signal circuit, terminal A and all other terminals of the B227 gear position sensor harness connector.
 - If 10 Ω or less, repair the shorted together condition in the affected circuits.
 - If greater than 10 Ω , replace the K69 transfer case control module and perform the Range Actuator Learn procedure.

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

6. Low reference circuit and K69 transfer case control module OK.
7. Test for 4.8 - 5.2 V between the rotational position sensor circuit, terminal C and a good ground, such as the ground terminal of the **EL-49742** harness, black terminal.

• ***If less than the specified range***

1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module.
2. Test for less than 10 Ω in the rotational position sensor circuit end to end.
 - If 10 Ω or greater, repair the open/high resistance in the circuit.

- Go to next step: If less than 10 Ω
- 3. Test for infinite resistance between rotational position sensor circuit terminal C and a good ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - Go to next step: If infinite resistance
- 4. Test for greater than 10 Ω between the rotational position sensor circuit terminal C and all other terminals of the B227 gear position sensor harness connector.
 - If 10 Ω or less, repair the shorted together condition in the affected circuits.
 - If greater than 10 Ω , replace the K69 transfer case control module and perform the Range Actuator Learn procedure.
- ***If greater than the specified range***
 1. Ignition OFF, disconnect the X1 harness connector at the K69 transfer case control module. Ignition ON, Engine OFF.
 2. Test for less than 1 V between the rotational position sensor circuit terminal C and a good ground.
 - If 1 V or greater, repair the short to voltage in the circuit.
 - Go to next step: If less than 1 V
 3. Test for greater than 10 Ω between the rotational position sensor circuit, terminal C and all other terminals of the B227 gear position sensor harness connector.
 - If 10 Ω or less, repair the shorted together condition in the affected circuits.
 - If greater than 10 Ω , replace the K69 transfer case control module and perform the Range Actuator Learn procedure.
- ***Go to next step: If within the specified range***
- 8. Rotational position sensor circuit and K69 transfer case control module OK.

Component Testing

B227 Gear Position Sensor

1. Ignition OFF and all vehicle systems OFF, disconnect the connector at the B227 Gear Position Sensor. It may take up to 2 min for all vehicle systems to power down.
2. Remove the B227 gear position sensor from the transfer case.
3. Reconnect the connector to B227 gear position sensor.
4. Ignition ON, engine OFF.
5. Verify that the Transfer Case Range Position Sensor parameter sweeps between -146B° and 204B° while rotating the center locating tab of the B227 gear position sensor.

NOTE: If DTC C0392 is set you won't be able to perform the sweep.

- ***If the Transfer Case Range Position Sensor parameter does NOT sweep between -146B° and 204B°***
Replace the B227 gear position sensor.
 - ***Go to next step: If the Transfer Case Range Position Sensor parameter DOES sweep between -146B° and 204B°***
6. B227 gear position sensor OK.

Repair Instructions

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

- [Control Module References](#) for K69 transfer case control module replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#)
- [Transfer Case Two/Four Wheel Drive Actuator Position Sensor Replacement](#)

DTC C0396, C039E, P0652, OR P0653

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 C0396 03

Range Actuator Position Sensor Circuit Low Voltage

DTC C0396 07

Range Actuator Position Sensor Circuit High Voltage

DTC C0396 08

Range Actuator Position Sensor Circuit Performance - Signal Invalid

DTC C039E 03

Range Actuator Position Sensor Direction Signal Circuit Low Voltage

DTC C039E 07

Range Actuator Position Sensor Direction Signal Circuit High Voltage

DTC P0652

5V Reference 2 Circuit Low Voltage

DTC P0653

5V Reference 2 Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Invalid
Incremental Encoder Sensor 8 V Reference	P0652	C0387 58 or C038D 00 (C0398 when shifting between ranges)	P0653	-
Incremental Encoder Impulse Signal	C0396 03	C0396 07	C0396 07	C0396 08
Incremental Encoder Direction Signal	C039E 03	C039E 07	C039E 07	C0396 08
Incremental Encoder Sensor Low Reference	-	C0396 03	-	-

Typical Scan Tool Data

Range Actuator/Incremental Position Sensor	2WD High	4WD Auto	4WD High	4WD Low	Neutral
NQ6 (B°)	33B° to 40B°	90B° to 180B°	110B° to 180B°	-150B° to -55B°	-5B° to +5B°
NQ7 (B°)	198 to 225B°	-	100B° to 118B°	-110B° to -80B°	-5B° to +5B°

Circuit/System Description

The transfer case control module receives input from the range actuator position sensor and the transfer case range position sensor. Both sensors send this information as voltage signals which are converted to degrees and rotational direction by the transfer case control module software. If the two sensors disagree by greater than a predetermined amount the DTC will set.

The range actuator position sensor receives an 8 volt reference signal from the transfer case control module. In return the range actuator position sensor sends the transfer case control module a variable pulse width modulated signal indicating the position of the transfer case and a range actuator position direction signal. The range actuator position sensor, inside the A16 transfer case motor, also known as the transfer case range actuator, works in conjunction with the range position sensor to confirm transfer case position. The range actuator position sensor is more sensitive than the transfer case range position sensor and is able to indicate to the transfer case control module the exact position of the transfer case between range changes. It is also able to show how much clutch activation is being commanded at any time.

The transfer case range position sensor, also known as the transfer case two/four wheel drive actuator position sensor, receives a 5 volt reference signal from the K69 transfer case control module and sends back a continuously variable pulse width modulated signal to the K69 transfer case control module. This continuously variable signal indicates the position of the transfer case actuator.

The range actuator position sensor is more sensitive than the transfer case range position sensor, but needs to reference the transfer case range position sensor value at ignition ON and mode changes. The transfer case range position sensor is an absolute sensor. The K69 transfer case control module synchronizes the range actuator position sensor with the transfer case range position sensor at ignition ON and mode changes.

The range actuator position sensor is an integral part of the A16 Transfer Case Motor and cannot be replaced independently.

The transfer case range position sensor, also known as the B227 gear position sensor, is an independently replaceable part.

Conditions for Running the DTC

- DTC check will run in any power mode.
- System voltage 10.5 - 18.5 V.
- Only applicable to DTC C0396 and C039E.
- DTC C0396, C039E, P0652 and P0653 run continuously within the enabling conditions.

Conditions for Setting the DTC

C0396 03

Voltage on the sensor reference voltage 2 circuit, also known as the incremental encoder sensor (8 V) supply circuit, is 7.2 - 8.5 V, and voltage received by incremental encoder impulse signal circuit less than 0.35 V.

C0396 07

Voltage on the sensor reference voltage 2 circuit is 7.2 - 8.5 V, and voltage on incremental encoder impulse signal circuit greater than 4.6 V.

C0396 08

Incremental encoder impulse signal detected missing pulse during shifting.

C039E 03

Voltage on the sensor reference voltage 2 circuit is 1.5 - 9.0 V, and voltage received by incremental encoder direction signal circuit less than 0.35 V.

C039E 07

Voltage on the sensor reference voltage 2 circuit is 1.5 - 9.0 V, and voltage on incremental encoder direction circuit greater than 4.5 V.

P0652

Voltage on sensor reference voltage 2 circuit less than 7.2 V.

P0653

Voltage on sensor reference voltage 2 circuit greater than 8.5 V.

Action Taken When the DTC Sets

The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.

C0396 03, C0396 08 and C039E 03

- All shifting disabled.
- Clutch torque increased to maximum torque capacity during range shift from AWD, 4WD Low, and 4WD High only.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.

C0396 07 and C039E 07

- All shifting disabled.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.
- Sensor reference voltage 2 circuit shut OFF.

P0652

- All shifting disabled.
- Clutch torque increased to maximum torque capacity during range shift from AWD, 4WD Low, and 4WD High only.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.

P0653

- All shifting disabled.
- Clutch torque increased to maximum torque capacity during range shift from AWD, 4WD Low, and 4WD High only.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.

Conditions for Clearing the DTC

- The transfer case shift control module clears the DTC once the conditions for setting the DTC are no longer present.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Diagnostic Aids

- The range actuator position sensor and the transfer case range position sensor both show position in degrees, and should track each other. Monitor these sensors for erratic or unreasonable readings.
- If the range actuator position sensor is determined to be bad, the entire transfer case range actuator (transfer case motor) will have to be replaced as the range actuator position sensor is part of the transfer case range actuator and cannot be replaced independently.
- The transfer case fill and drain plugs are good sources for ground.
- The ground terminal of the **EL-49742** harness can be used as an optional source for ground.
- When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the **J 35616** GM-Approved Terminal Test Kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.

Reference Information

Schematic Reference

Transfer Case Control 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.

Special Tools

- **EL-49741** 9 V+ Power Source Harness
- **EL-49742** Battery Voltage B+ and Ground Source Harness
- **J-35616** GM-Approved Terminal Test Kit
- For equivalent regional tools, refer to Special Tools.

Circuit/System Verification

1. Verify that all range selections of the S77 transfer case shift control switch match the following parameters in the Data Display feature of the scan tool:
 - Range Actuator Position
 - Transfer Case Commanded Position
 - Transfer Case Range Selection Switch State
 - ***If NOT all of the parameters match the S77 transfer case shift control switch position***

Refer to Circuit/System Testing.

- ***Go to next step: If ALL of the parameters match the S77 transfer case shift control switch position***

2. Verify that for all range selections of the S77 transfer case shift control switch, the Transfer Case Range Position Sensor parameter and the Range Actuator Position Sensor parameter track within 7 degrees of each other.

- ***If the parameters do NOT track within 7 degrees of each other***

Refer to Circuit/System Testing.

- ***Go to next step: If the parameters DO track within 7 degrees of each other***

3. Verify DTC C0396, C039E, P0652, or P0653 is only set as a history DTC.

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

Refer to Circuit/System Testing.

- ***Go to next step: If any of the DTCs are only set as history***

NOTE: After inspection, apply Nyogel lubricant 760G to each connector terminal. Ensure each connector and CPA is correctly seated.

4. Visually inspect each connector terminal of the K69 transfer case control module X1 connector and the A16 transfer case motor connector for damage or corrosion. Repair as necessary.
5. Clear DTC C0396, C039E, P0652, or P0653 from history.
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. The DTC should not set.
 - ***If any of the DTCs are set***

Refer to Circuit/System Testing.

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

7. All OK.

Circuit/System Testing

NOTE:

- **When test probing harness terminals, it is imperative to use the proper test probe from the most current version of the J-35616 GM-Approved Terminal Test Kit. Use of an improper test probe may deform the terminal, resulting in intermittent open conditions.**
- **While performing circuit testing, visually inspect each connector terminal for damage or corrosion and repair as necessary.**

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the A16 Transfer Case Motor. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal H and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K69 Transfer Case Control Module.
 - **Go to next step: If less than 10 Ω**
3. Ignition ON.
4. Test for 7.2 - 8.5 V between the 8 V reference circuit terminal G and ground.
 - **If less than 7.2 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
 2. Test for infinite resistance between the 8 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the 8 V reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K69 Transfer Case Control Module.
 - **If greater than 8.5 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module, ignition ON.
 2. Test for less than 1 V between the 8 V reference circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K69 Transfer Case Control Module.
 - **Go to next step: If between 7.2 - 8.5 V**
5. Verify the scan tool Range Actuator Position Sensor parameter is greater than 6 V.
 - **If less than 6 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.

2. Test for infinite resistance between the signal circuit terminal E and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K69 Transfer Case Control Module.
- **Go to next step: If greater than 6 V**
6. Connect a 3 A fused jumper wire between the Signal circuit terminal E and the low reference circuit terminal H.
7. Verify the scan tool Range Actuator Position Sensor parameter is less than 1 V.
 - **If greater than 1 V**
 1. Ignition OFF, remove the jumper wire, disconnect the X1 harness connector at the K69 Transfer Case Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal E and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - Go to next step: If less than 1 V
 3. Ignition OFF
 4. 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 K69 Transfer Case Control Module.
 - **Go to next step: If less than 1 V**
8. Verify the scan tool Range Actuator Position Sensor Direction Signal parameter is greater than 6 V.
 - **If less than 6 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K69 Transfer Case Control Module.
 2. Test for infinite resistance between the signal circuit terminal F and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K69 Transfer Case Control Module.
 - **Go to next step: If greater than 6 V**
9. Connect a 3 A fused jumper wire between the Signal circuit terminal F and the low reference circuit terminal H.
10. Verify the scan tool Range Actuator Position Sensor Direction Signal parameter is less than 1 V.
 - **Go to next step: If greater than 1 V**
 1. Ignition OFF, remove the jumper wire, disconnect the X1 harness connector at the K69 Transfer Case Control Module, ignition ON.
 2. Test for less than 1 V between the Signal circuit terminal F and ground.
 - If 1 V or greater, repair the short to voltage in the circuit.
 - Go to next step: If less than 1 V
 3. Ignition OFF
 4. 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 K69 Transfer Case Control Module.
 - **Go to next step: If less than 1 V**
11. Reconnect the A16 Transfer Case Motor.
12. Clear DTC C0396, C039E, P0652, or P0653 from history.
13. 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. The DTC should not set.
 - ***If any of the DTCs are set***

Test or replace the A16 Transfer Case Motor
 - ***Go to next step: If none of the DTCs set***
14. All OK.

Repair Instructions

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

- [Control Module References](#) for K69 transfer case control module replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#) for Range Actuator Learn procedure
- [Transfer Case Four Wheel Drive Actuator Replacement](#) for A16 transfer case motor replacement

DTC C0397

Diagnostic Instructions

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

DTC Descriptor

DTC C0397 54

Transfer Case Clutch High Temperature

DTC C0397 58

Transfer Case Clutch Performance

DTC C0397 4B (if equipped)

Transfer Case Clutch Calibration Not Learned

DTC C0397 F3

Transfer Case Clutch Worn Out Clutch

DTC C0397 F4

Transfer Case Range Position Sensor Over Travel

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Performance
Transfer Case Clutch Performance	-	-	-	C0397 54, C0397 58, C0397 4B, C0397 F3, or C0397 F4

Circuit/System Description

In 4WD/AWD Automatic range, the transfer case control module monitors the front and rear wheel speed sensors for slip. If the transfer case control module detects slip, and is unable to correct for a difference between the front and rear speed sensors, it will command the transfer case to apply the clutch. In addition, the transfer case control module tests for clutch pack wear by performing a high side kiss point check at power down and comparing it to the transfer case range actuator position sensor reading.

Conditions for Running the DTC

- Ignition ON.
- System voltage 10.5 - 8 V.
- No DTC P0562 or P0563.

C0397 54

- No C0379 01, C0379 04 or C0379 08 for thermal model.
- Vehicle speed greater than 5 km/h (3 MPH) and all wheel speeds at same speed.
- DTC C0397 54 runs continuously.

C0397 58

- Transfer case control module is NOT in shutdown mode due to thermal protection.
- DTC C0397 58 runs continuously.

C0397 4B

- Transfer case range: must begin in 4WD High/Locked and then be requested to shift to 4WD/AWD Automatic or 2WD.
- Only run during power down kiss point learn request.

C0397 F3

Only run during power down kiss point learn request.

C0397 F4

Only run during power down kiss point learn request.

Conditions for Setting the DTC

C0397 54

The transfer case control module has determined that the transfer case calculated clutch temperature model has exceeded the maximum allowable temperature for the second time.

C0397 58

The transfer case control module has detected that the transfer case clutch has failed to reach the desired output torque after three attempts.

C0397 4B

The transfer case control module has determined that the power down kiss point learn has failed 20 times in a row.

C0397 F3

The transfer case control module has determined that the maximum clutch wear out limit has been exceeded.

C0397 F4

The transfer case control module has detected that the transfer case range actuator position sensor, or the transfer case range position sensor has exceeded the upper/lower over travel limits.

Action Taken When the DTC Sets

- Shifting is still possible but in a reduced capacity which may cause undesirable slip correction events.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.

C0397 54

Front axle disengaged.

C0397 58

Shifting disabled.

C0397 4B

- Max torque commanded for 4WD/AWD Automatic.
- The default actions for C0397 4B will cause DCT C038D to set.

C0397 F3

- Shifting disabled.
- Front axle disengaged.

C0397 F4

- Shifting disabled.
- Front axle disengaged.

Conditions for Clearing the DTC

- The transfer case control module clears the DTC once the condition for setting the DTC no longer exists.
- A history DTC clears after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.
- Only cleared by a successful kiss point learn. (DTC C0397 F3).
- Only cleared by the successful execution of the [Transfer Case High/Low Clutch Reset \(NQ6\)](#) procedure. (DTC C0397 F4).

Diagnostic Aids

- A stuck transfer case motor lock can cause C0397 58 to set.
- Faulty wheel speed sensors can cause DTC C0397 58 or C0397 F3 to set. When driving at a steady speed, the scan tool should display the same values for the following data parameters in the electronic brake control module:
 - Left and right front wheel speed sensors
 - Left and right rear wheel speed sensors

Reference Information

Schematic Reference

[Transfer Case Control 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.

Circuit/System Verification

1. Ignition ON, engine OFF.
2. Install a scan tool.

3. Verify no other K17 Electronic Brake Control Module or K69 Transfer Case Control Module DTCs are set.
 - ***If any other K17 Electronic Brake Control Module Or K69 Transfer Case Control Module DTC's are set***

diagnose them first.
 - ***Go to next step: If no other K17 Electronic Brake Control Module Or K69 Transfer Case Control Module DTC's are set***
4. Verify DTC C0397 is only set as a history DTC.
 - ***If DTC C0397 is set as current***

refer to Circuit/System Testing.
 - ***Go to next step: If DTC C0397 is set as history***
5. Clear DTC C0397 from history.
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. The DTC should not set.
 - ***If DTC C0397 sets***

Refer to Circuit/System Testing.
 - ***Go to next step: If DTC C0397 does not set***
7. All OK.

Circuit/System Testing

1. Install scan tool.
2. Wheel speed sensors:
 1. Take the vehicle on a short test drive on a smooth and level road.
 2. Verify that, when at a steady speed, all of the front and rear speed sensors parameters do not vary or become intermittent.
 - ***If while driving at a steady speed the RPM values vary or become intermittent***

check the K17 Electronic Brake Control Module for wheel speed DTC's. Wheel speed DTC diagnostics are in antilock brake systems.
 - ***Go to next step: If all of the front and rear speed sensors parameters do not vary or become intermittent***
3. Transfer case clutch integrity:
 1. Shift the vehicle into 4WD High/Locked and take it for a test drive. Clear the DTC if possible.
 2. Verify that while under heavy acceleration that the front and rear wheel speeds are similar.
 - ***If the front wheel speeds are much lower***

this indicates a weak clutch and a transfer case disassembly and inspection will be required. Refer to [**Transfer Case Disassemble.**](#)
 - ***Go to next step: If the front and rear wheel speeds are similar***
4. A16 transfer case motor - brake/lock:
 1. Clear DTC's. Using the S77 Transfer Case Shift Control Switch function of the scan tool, shift the vehicle to 2WD range.
 2. Monitor the Transfer Case Motor Amperage parameter in the Data Display feature of the scan tool.
 3. Using the S77 Transfer Case Shift Control Switch function of the scan tool, command the transfer case to the 4WD High/Locked range.
 4. Verify that the Transfer Case Motor Amperage parameter increases while the motor is shifting, and then returns to 0 amps within 5 seconds or less.
 - ***If the amperage stays high longer than 5 seconds***

this indicates the brake is not holding. Replace the A16 Transfer Case Motor. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#).

- ***Go to next step: If the amperage increases while the motor is shifting, and then return to 0 amps within 5 seconds or less***

5. Mechanical binding:

1. Engage parking brake.
 2. Block rear wheels.
 3. Lift front wheels.
 4. Ignition ON, engine OFF. Install scan tool.
 5. Transfer case in 2WD. Transmission in Neutral.
 6. Using the Front Axle Engagement Actuator control function, engage the front axle.
 7. Verify that the front prop shaft turns while holding one front tire stationary and spinning the other tire.
- ***If the front prop shaft does not turn***

inspect the front axle clutch fork for mechanical binding. Refer to [Four-Wheel Drive Does Not Disengage](#).

- ***Go to next step: If the front prop shaft turns***

6. If all prior evaluations test normal:

1. Reprogram the K69 Transfer Case Control Module. Refer to [Control Module References](#).
2. Perform the Range Actuator Learn procedure in the Control Functions feature of the scan tool. Refer to [Transfer Case High/Low Clutch Reset \(NQ6\)](#).

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. The DTC should not set.

- ***If DTC C0397 sets***

replace the K69 Transfer Case Control Module and perform the Range Actuator Learn procedure. Refer to [Transfer Case Control Module Replacement](#), or [Transfer Case High/Low Clutch Reset \(NQ6\)](#).

- ***Go to next step: If DTC C0397 does not set***

8. All OK.

Repair Instructions

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

- [Control Module References](#) for K69 Transfer Case Control Module replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#) for Range Actuator Learn Procedure
- [Four-Wheel Drive Does Not Engage](#)

DTC C0398

Diagnostic Instructions

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

DTC Descriptor

DTC C0398 00

Range Actuator Position - Range Position Correlation

Typical Scan Tool Data

Range/Parameter	2WD	4WD/AWD Automatic	4WD High/Locked	4WD Low	Neutral
Range Actuator Position Sensor (B°)	33B° to 43B°	87B° to 204B°	110B° to 204B°	-69B° to -140B°	-19B° to +23B°
Sensor Reference Voltage 2 (V)	7.75 - 8.25 V	7.75 - 8.25 V	7.75 - 8.25 V	7.75 - 8.25 V	7.75 - 8.25 V
Range Actuator Position Sensor (V)	0.6 - 0.8 V or 3.7 - 4.1 V	0.6 - 0.8 V or 3.7 - 4.1 V	3.7 - 4.1 V	3.7 - 4.1 V	0.6 - 0.8 V or 3.7 - 4.1 V
Transfer Case Range Position Sensor (B°)	33B° to 43B°	87B° to 204B°	110B° to 204B°	-69B° to -140B°	-19B° to +23B°

Circuit/System Description

The transfer case control module monitors the gear position sensor signal circuit and the transfer case range actuator position sensor signal circuit at all times. The signal voltage values are converted to degrees to determine the position of the transfer case. The transfer case control module continuously compares the position of the transfer case range actuator position sensor to that of the gear position sensor. If the positions do not match within a predetermined range, it is considered an error and a fault is set. The transfer case range actuator position sensor is a higher resolution sensor and is more accurate, but requires the gear position sensor for correlation check at ignition ON and during transfer case range changes.

The components involved are:

- A16 Transfer Case Motor, also known as the transfer case range actuator
 - Transfer Case Range Actuator Position Sensor, also known as the incremental position sensor - Part of the A16 Transfer Case Motor
- B227 Gear Position Sensor, also known as the transfer case range position sensor, the two/four wheel drive actuator position sensor, or the rotational position sensor

Conditions for Running the DTC

- DTC C0398 check will run in any power mode
- System voltage 10.5 - 18 V
- DTC P0562 or P0563 is not set
- DTC C0398 runs continuously

Conditions for Setting the DTC

The range actuator position sensor and the range position sensor are both showing valid positions, but differ by greater than a predetermined amount when no range change is in progress.

Action Taken When the DTC Sets

- Transfer case range shifting is disabled
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle
- Maximum clutch torque commanded when in 4WD High/Locked, 4WD/AWD Automatic, or 4WD Low, and during range shifts

Conditions for Clearing the DTC

DTC C0398 can only be cleared by using a scan tool

NOTE: If the Transfer Case Control Module has the latest software version, it requires clearing code command only once. If the Transfer Case Control Module does not have the latest software version, then clearing code command needs to be sent twice.

Diagnostic Aids

- When attempting to diagnose an intermittent concern, it may be helpful to determine if the DTC last set during vehicle wake-up or after extended operation:
 - A DTC set at vehicle wake-up, sometimes called a start-up error, is a correlation error that is identified immediately after the transfer case control module wakes up and the two position sensor values do not match within an acceptable range. This condition can be replicated by turning the ignition ON and OFF in an attempt to set the DTC. The condition can be identified by the freeze frame/failure records:
 - Engine RPM = 0 RPM
 - Ignition Counter = 0 or 1
 - IPS and RPS values should be almost the same, within 1B°
 - A DTC set after extended operation, sometimes called a runtime error, is a correlation error that is identified after an extended period of vehicle operation in which the two position sensor values have "drifted" outside of their acceptable range. This condition can be replicated by road testing the vehicle. The condition can be identified by the freeze frame/failure records:
 - There should be a clear difference between the IPS and RPS values. The difference should be greater than 6B°
- The range actuator position sensor and the range position sensor both show position in degrees. Monitor these parameters for erratic or unreasonable readings.
- An ignition ON, engine OFF sequence with transfer case motor removed, but still attached to the harness may cause DTC C0398 to set.
- Repeatedly commanding the transfer case range actuator clockwise or counterclockwise without pressing the exit button between commands, to return to the "none" state, can result in incorrect readings.
- DTC C0398 is a latching DTC. The DTC will remain current even with cycling the ignition ON & OFF. DTC C0398 can only be cleared by using a scan tool to clear DTCs twice consecutively. The first command to clear the DTC unlatches the DTC. The second command to clear the DTC will actually clear the DTC.

Reference Information

Schematic Reference

Transfer Case Control 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.

Circuit/System Verification

1. Ignition ON.
2. Verify DTC C0392, P0642, or P0643 is not set.
 - **If any of the DTCs are set**
Refer to DTC C0392, P0642, or P0643
 - **Go to next step: If none of the DTCs are set**
3. Verify DTC C0396, C039E, P0652, or P0653 is not set.

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

Refer to [DTC C0396, C039E, P0652, or P0653](#)

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

4. Verify the K69 Transfer Case Control Module has the most up-to-date calibration software installed. When checking the current software in SPS, the installed software should be "Version 9.2" or newer, as identified in the software description.

- **If the installed software is not "Version 9.2" or newer, as identified in the software description**

Program the K69 Transfer Case Control Module with the most up-to-date software. Refer to [Control Module References](#).

- **If the installed software is not "Version 9.2" or newer, as identified in the software description, and "Version 9.2" is not an available software version**

Replace the K69 Transfer Case Control Module.

- **Go to next step: If the installed software is "Version 9.2" or newer, as identified in the software description**

5. Verify DTC C0398 is set as a current DTC.

- **If DTC C0398 is set as history**

Utilizing the freeze frame/failure records, determine if the DTC set during vehicle wake-up or after extended operation and attempt to set the DTC by recreating the conditions present in the freeze frame/failure records. Refer to Diagnostic aids.

- **Go to next step: If DTC C0398 is set as current**

6. Monitor the Range Actuator Position Sensor and Transfer Case Range Position Sensor parameters on the scan tool. Using the S77 Transfer Case Shift Control Switch, shift the transfer case into all ranges. The Range Actuator Position Sensor parameter and Transfer Case Range Position Sensor parameter should track each other.

- **If the Range Actuator Position Sensor parameter and Range Position Sensor parameter do NOT track each other within 7 degrees**

Refer to Circuit/System Testing.

- **Go to next step: If the Range Actuator Position Sensor parameter and Range Position Sensor parameter DO track each other within 7 degrees**

7. All OK.

Circuit/System Testing

1. Ignition ON, transfer case selector in 2WD.
2. Ignition OFF, disconnect the harness connector at the B227 Gear Position Sensor.
3. Remove the B227 Gear Position Sensor. Refer to [Transfer Case Two/Four Wheel Drive Actuator Position Sensor Replacement](#).

4. Verify there is no damage to the B227 Gear Position Sensor mating surface.

- **If damage is found**

Replace the B227 Gear Position Sensor.

- **Go to next step: If no damage is found**

5. Rotate the B227 Gear Position Sensor tab to the lock position.

6. Connect the harness connector at the B227 Gear Position Sensor, ignition ON.

7. While monitoring the scan tool Range Position Sensor parameter, push in the locking tab and rotate the B227 Gear Position Sensor tab. Verify the scan tool Range Position Sensor parameter is 30 - 43B° In the lock position and sweeps from -145 to +204 degrees as the tab is rotated.

- **If the Range Position Sensor parameter does not respond as specified**

Replace the B227 Gear Position Sensor.

- **Go to next step: If the Range Position Sensor parameter responds as specified**

8. Using a wide, flat blade screwdriver in the B227 Gear Position Sensor mounting slot, attempt to rotate the transfer case control actuator shaft. Verify the shaft cannot be turned.

- **If the shaft can be turned**

Internal damage has occurred to the transfer case control actuator shaft or mating gears. Refer to [Transfer Case Disassemble](#) and inspect and repair as necessary.

- **Go to next step: If the shaft cannot be turned**

9. Ignition OFF, reinstall the B227 Gear Position Sensor. Refer to [Transfer Case Two/Four Wheel Drive Actuator Position Sensor Replacement](#).

10. Disconnect the harness connector at the A16 Transfer Case Motor.

11. Using a paint pen or marker, place indexing marks on the A16 Transfer Case Motor and the transfer case.

12. Remove the A16 Transfer Case Motor. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#).

13. Connect the harness connector at the A16 Transfer Case Motor, ignition ON.

NOTE:

You must press the Exit button and completely exit the control function when the "Device Limit Exceeded" message is displayed on the scan tool. When commanding the Range Actuator control function Clockwise and Counterclockwise, the device control limit will time out. This is normal. Press the Exit button and fully exit the control function, then re-enter the control function and command the Range Actuator Clockwise or Counterclockwise until the identified parameter value is reached (+360B° or -360B°). This may need to be repeated multiple times to obtain the value.

14. While monitoring the scan tool Range Actuator Position Sensor parameter, command the Range Actuator fully Clockwise using the scan tool. The scan tool Range Actuator Position Sensor parameter should be -360B° or +360B°. Command the Range Actuator fully Counterclockwise using the scan tool. The scan tool Range Actuator Position Sensor parameter should be -360B° or +360B°.

- **If the Range Actuator Position Sensor parameter does not respond as specified**

1. Perform Step 14 a second time.

2. Verify the Range Actuator Position Sensor parameter does not respond as specified

- If the Range Actuator Position Sensor parameter does not respond as specified, replace the A16 Transfer Case Motor.

- Go to next step: If the Range Actuator Position Sensor parameter responds as specified

3. All OK.

- **Go to next step: If the Range Actuator Position Sensor parameter responds as specified**

15. Ignition off for at least 3 min.

16. Install the A16 Transfer Case Motor. Refer to [Transfer Case Four Wheel Drive Actuator Replacement](#).

17. Ignition ON.

18. Verify the K69 Transfer Case Control Module learns the transfer case range actuator position and the scan tool Transfer Case Position parameter should display a valid range.

- **If the scan tool Transfer Case Position parameter does not display a valid range**

1. Perform the Range Actuator Learn procedure. Refer to [Transfer Case High/Low Clutch Reset \(NQ6\)](#).

- **Go to next step: If the scan tool Transfer Case Position parameter displays a valid range**

19. All OK.

Repair Instructions

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

- [Transfer Case Disassemble](#)
- [Transfer Case Four Wheel Drive Actuator Replacement](#) for A16 Transfer Case Motor replacement
- [Transfer Case Two/Four Wheel Drive Actuator Position Sensor Replacement](#) for B227 Gear Position Sensor replacement

DTC P062F OR P064F

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 P062F

Control Module Long Term Memory Performance

DTC P064F

Unauthorized Calibration Detected

Circuit/System Description

This is an internal fault detection of the transfer case control module. This fault is handled inside the transfer case control module. No external circuits are involved.

At each power-up, the transfer case control module runs a self-test on the following:

- EEPROM Checksum
- ROM Checksum
- RAM Checksum
- RAM Malfunction
- Missing, incorrect or invalid software

Conditions for Running the DTC

- Ignition ON.
- System voltage 10.5 - 18.0 V
- Diagnostic runs continuously

Conditions for Setting the DTC

The transmission control module has detected an internal malfunction.

P062F

The critical operational parameters stored in the EEPROM of the transfer case control module have failed the Checksum test indicating invalid data.

P064F

The transfer case control module has detected an invalid calibration.

Action Taken When the DTC Sets

- The encoder motor will be deactivated for the remainder of the current ignition cycle.
- The transfer case shift control switch will illuminate the current mode position LED.
- No further mode changes shall be allowed.

- The transfer case control module will store freeze frame data.
- The SERVICE 4WD indicator remains illuminated for the remainder of the current ignition cycle.
- The SERVICE AWD indicator will not illuminate - P062F only.
- Default Long Term Memory Values will be used - P062F only.

Conditions for Clearing the DTC

- DTCs P062F and P064F are Type C DTCs.
- The transfer case control module will clear the DTC once the conditions for setting the DTC no longer exist.
- A history DTC will clear after 40 consecutive warm up cycles without a fault present.
- History DTCs can be cleared using a scan tool.

Diagnostic Aids

- DTC P062F detects a corruption of the EPROM/Flash memory.
- DTC P064F detects an invalid calibration.
- Low voltage or a momentary loss of power or ground to the transfer case control module may cause a DTC to set. Verify the following:
 - The battery cables are clean and tight, and the battery is fully charged.
 - The transfer case control module ground circuits do not have an open or high resistance.
 - The transfer case control module power circuits do not have an open, short to ground, or high resistance.

Reference Information

Schematic Reference

Transfer Case Control Wiring Schematics

Connector End View Reference

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

Description and Operation

Transfer Case Description and Operation

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.

Circuit/System Verification

1. Ignition OFF for at least 1 minute to allow for the complete shutdown of the K69 transfer case control module. Engine ON.
2. Verify that DTC P062F or DTC P064F is only set as a history DTC.
 - *If any of the DTC's are set as current*
 1. Program the K69 transfer case control module.
 2. Verify none of the DTC's reset.
 - If any of the DTC's reset, replace the K69 transfer case control module.

- Go to next step: If none of the DTC's reset
3. All OK.
- *Go to next step: If any of the DTC's are set as history*

NOTE: After inspection, apply Nyogel lubricant 760G to each connector terminal. Ensure each connector and CPA is correctly seated.

3. Visually inspect each connector terminal of the K69 transfer case control module connector for damage or corrosion. Repair as necessary.
4. Clear DTC P062F, or DTC P064F from history.
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. The DTC should not set.
 - *If any of the DTC's set*

Replace the K69 Transfer Case Control Module and perform the Range Actuator Learn procedure.

- *Go to next step: If none of the DTC's set*

6. All OK.

Repair Instructions

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

- [Control Module References](#) for K69 transfer case control module replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#) for Range Actuator Learn Procedure

DTC P17D4, P185F, OR P279A-P279C (NQ6, NQ7)

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 P17D4

Transfer Case Neutral Range Detected in High or Low Range

DTC P185F

Transfer Case Shift Pending Signal Not Plausible

DTC P279A

Transfer Case High Range Incorrect Ratio

DTC P279B

Transfer Case Low Range Incorrect Ratio

DTC P279C

Transfer Case High or Low Range Detected in Neutral Range

Circuit/System Description

The ECM uses the following two ways to determine if the transfer case is in 4WD Low, 4WD High or Neutral.

1. Compare the transmission output speed sensor (Transmission OSS) to the transfer case output speed sensor (Transfer Case OSS - parameter name inside ECM) (B115 Vehicle Speed Sensor - component code name in Schematics) in order to calculate transfer case range.
2. Use a LAN message sent by the transfer case shift control module to the ECM.

The ECM uses this message to determine motor torque required and transmission shifting.

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

Conditions for Running the DTC

- Engine = Running - For greater than 5 s
- Vehicle Speed = 10 to 200 km/h (6 to 124 MPH)

DTCs run continuously when the above condition is met.

Conditions for Setting the DTC

- If the first way and second way of determining transfer case range do not match while in 4WD Low, 4WD High or Neutral, then the DTC is set.
- The ECM has detected 32 fail counts out of 400 samples.

DTCs run continuously when the above condition is met.

Actions Taken When the DTC Sets

DTCs P17D4, P185F, P279A, P279B, P279C are Type B DTCs.

Conditions for Clearing the DTC

DTCs P17D4, P185F, P279A, P279B, P279C are Type B DTCs.

Diagnostic Aids

- Misalignment, debris, or a poor connection at the transmission output speed sensor or the transfer case vehicle speed sensor can cause this DTC to set.
- Verify that the following scan tool data can be obtained and is functioning properly while operating the vehicle within the Conditions for Running the DTC. Data that is questionable may indicate a concern.
 - Transmission OSS scan tool parameter in the Transmission Control Module scan tool data list
 - Transfer Case OSS scan tool parameter in the Engine Control Module scan tool data list
- Internal transmission mechanical faults may cause this DTCs to set
- The Actions Taken for P279A may set DTC P16F3.
- DTC P279A, P279B, or P279C may set before P0502, P0503, P0721, P0722, P0723, P077C, P077D, P2160, or P2161.
- When attempting to set ECM DTCs, run the engine for at least 1 min, and then shut the engine off for 2 min. Following this procedure will allow for a complete ECM shutdown. Program the ECM with the latest software version and retest the DTC to see if the DTC resets.

Reference Information

Schematic Reference

Transfer Case Control 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 P0502, P0503, P0721, P0722, P0723, P077C, P077D, P2160, or P2161 is not set as current or in history
 - **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**
3. Ignition ON, engine running for greater than 1 min.
4. Ignition OFF for greater than 2 min, key out of the ignition/keyless start transmitter 1 m (3 ft) away from the vehicle, and all vehicle systems OFF.
5. Ignition ON/Vehicle in Service Mode
6. Verify DTC P17D4, P185F, P279A, P279B, P279C is only set as a history DTC.
 - **If any of the DTCs are set as current.**
Refer to Circuit/System Testing
 - **If any of the DTCs are only set as history.**
Refer to Diagnostic Aids
 - **Go to next step: If none of the DTCs are set**
7. Clear All Vehicle DTCs.
8. Drive the vehicle at a speed greater than 10 km/h (6 mph) and verify the following parameters match the actual vehicle speed and each other. Both parameters should show a smooth/steady curve when viewed in graph form:
 - Transmission OSS scan too parameter in the Transmission Control Module scan tool data list
 - Transfer Case OSS scan too parameter in the Engine Control Module scan tool data list
 - **If the above parameters do not match or are not smooth**
A fault exists with the B14S Transmission Output Shaft Speed Sensor or the B115 Vehicle Speed Sensor. Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .
 - **Go to next step: If the above parameters match and are smooth**
9. All OK.

[Circuit/System Testing](#)

1. Ignition ON/Vehicle in Service Mode
2. Clear All Vehicle DTCs.
3. Operate the vehicle within the Conditions for Running the DTC.
4. Verify the DTC does not set.

- **If the DTC sets**

1. Program the ECM.
2. Operate the vehicle within the Conditions for Running the DTC.
3. Verify the DTC does not set.

- **If the DTC sets**

Replace the component: K20 Engine Control Module

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

4. All OK.

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

5. Using the transfer case range selection switch, shift the transfer case between 2HI, 4HI, 4LO, and Neutral, allowing enough time between each selection for the transfer case to complete each shift. During each selection, verify the scan tool Transfer Case Range Selection Switch State parameter and the Transfer Case Commanded Position parameter match and that the appropriate indicator on the transfer case range selection switch illuminates, indicating the transfer case has completed the shift.

- **If the transfer case does not operate as specified**

- Inspect the transfer case assembly for any electrical or mechanical condition that would inhibit shifting.

- **Go to next step: If the transfer case does not operate as specified**

6. Refer to Diagnostic Aids. Drive the vehicle and ensure there is no slippage in the transfer case clutch.

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 P2160 OR P2161 (3-WIRE)

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 P2160

Vehicle Speed Sensor (VSS) 2 Circuit Low Voltage

DTC P2161

Vehicle Speed Sensor (VSS) 2 Circuit Intermittent

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Vehicle Speed Signal Sensor	P2160, P2161	P2160, P2161	P2160, P2161	P2160, P2161
5 Volt Reference	P2160, P2161	P2160, P2161	P2160, P2161	P2160, P2161
Low Reference	-	P2160, P2161	-	-

Circuit/System Description

The B115 vehicle speed sensor is a three wire hall effect sensor. The B115 vehicle speed sensor provides vehicle speed information to the K20 engine control module. The B115 vehicle speed sensor is mounted on the left rear of the transfer case facing the Rear Output Shaft Speed Sensor Reluctor Wheel which is splined to the output shaft. As

the output shaft and rear output shaft speed sensor reluctor wheel rotate, the toothed rotor of the rear output shaft speed sensor reluctor wheel passes through the magnetic field of the B115 vehicle speed sensor and produces an AC voltage. The AC voltage level and the number of pulses increase as the speed of the vehicle increases. The K20 engine control module converts the voltage to vehicle speed. The K20 engine control module uses the output shaft speed signal to determine shift timing, as well as transfer case range. The K20 engine control module supplies a 5 volt reference, a 12 volt signal circuit, and a low reference or ground circuit to the B115 vehicle speed sensor.

Conditions for Running the DTC

P2160

- No input speed sensor (ISS) DTCs P0716 or P0717.
- No output speed sensor (OSS) DTCs P0722 or P0723.
- No vehicle speed sensor (VSS) DTCs P2160 or P2161.
- The throttle position is greater than 8 percent and less than 99 percent.
- The transmission is not in PARK, NEUTRAL or REVERSE.
- The transmission is not performing garage shifting.
- No engine torque, crank sensor, throttle position, or turbine speed DTCs.
- The engine torque is greater than 60 N.m (44 lb ft) and less than 8192 N.m (6042 lb ft).
- The input speed is greater than 1500 RPM and less than 6500 RPM.

P2161

- The transmission is not in PARK, NEUTRAL or REVERSE.
- The transmission is not performing garage shifting.
- The engine speed is 1200 RPM or greater.
- No crank sensor or P2160 DTCs.

Conditions for Setting the DTC

P2160

- Low output speed when vehicle has a large input speed while in Drive range with high torque or no speed signal from the transfer case speed sensor.
- The transfer case output shaft speed is 50 RPM or less for 5 s.

P2161

- Unrealistic change in transfer case output shaft speed or loss of speed signal from the transfer case speed sensor.
- Output speed signal is increasing: current transfer case speed signal - last valid output speed jumps greater than 475 RPM for 4 s.
- Output speed signal is decreasing: current transfer case speed signal - last valid output speed drops less than 255 RPM for 4 s.

Action Taken When the DTC Sets

DTCs P2160 and P2161 are Type B DTCs.

Conditions for Clearing the DTC

DTCs P2160 and P2161 are Type B DTCs.

Diagnostic Aids

- The transfer case drain plug provides a good ground point.
- The **EL-49742** harness provides a good source for 12 V and ground.
- Inspect the rear output shaft speed sensor reluctor wheel teeth for damage.

- Visually inspect the B115 vehicle speed sensor for cracks or damage.
- Ensure the B115 vehicle speed sensor is properly torqued to the transfer case housing.
- This diagnostic relates to the B115 vehicle speed sensor located in the transfer case and not the B14A transmission output shaft speed sensor located within the transmission.
- The Actions Taken for DTC P2160 or P6161 may set DTC P16F3.

Reference Information

Schematic Reference

Transfer Case Control Wiring Schematics

Connector End View Reference

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

Description and Operation

Transfer Case Description and Operation

Electrical Information Reference

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

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

EL-49742 Battery Voltage B+ and Ground Source Harness

Circuit/System Verification

1. Ignition ON.
2. Verify DTC P2160 or DTC P2161 is only set as a history DTC.
 - **If the DTC is set as current**
Refer to Circuit/System Testing.
 - **Go to next step: If the DTC is set as history**

NOTE: After inspection, apply Nyogel lubricant 760G to each connector terminal. Ensure each connector and CPA is correctly seated.

3. Visually inspect each connector terminal of the B115 Vehicle Speed Sensor connector, the K20 Engine Control Module connectors, the S77 Transfer Case Shift Control Switch connector, and the K69 Transfer Case Control Module X1 connector for damage or corrosion. Repair as necessary.
4. Operate the vehicle within the Conditions for Running the DTC. 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**

5. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the B115 Vehicle Speed Sensor.
2. Test for less than 10 Ω between the low reference terminal 3 and ground.

- **If 10 Ω or greater**

1. Ignition OFF, disconnect the appropriate connector listed below:
 - Engine RPO LKH/LWN = K20 Engine Control Module connector X1
 - Engine RPO LFX = K20 Engine Control Module connector X2.
 - Engine RPO LCV = K20 Engine Control Module connector X3.
2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance on the circuit.
 - If less than 2 Ω , replace the K20 Engine Control Module.

- **Go to next step: If less than 10 Ω**

3. Ignition ON.
4. Test for 4.8 - 5.2 V between the 5 V reference circuit terminal 1 and ground.

- **If less than 4.8 V**

1. Ignition OFF, disconnect the appropriate connector listed below:
 - Engine RPO LKH/LWN = K20 Engine Control Module connector X1
 - Engine RPO LFX = K20 Engine Control Module connector X2.
 - Engine RPO LCV = K20 Engine Control Module connector X3.
2. Test for infinite resistance between 5 V reference circuit terminal 1 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
3. Test for less than 2 Ω in the 5 V reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance on the circuit.
 - Go to next step: If less than 2 Ω
4. Test for infinite resistance between the 5 V reference circuit terminal 1 and all other pins of the B115 Vehicle Speed Sensor connector.
 - If less than infinite resistance, repair the shorted together condition between the affected circuits.
 - If infinite resistance, replace the K20 Engine Control Module.

- **If greater than 5.2 V**

1. Ignition OFF, disconnect the appropriate connector listed below:
 - Engine RPO LKH/LWN = K20 Engine Control Module connector X1
 - Engine RPO LFX = K20 Engine Control Module connector X2.
 - Engine RPO LCV = K20 Engine Control Module connector X3.
2. Ignition ON.
3. Test for less than 1 V between the 5 V reference circuit terminal 1 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - Go to next step: If less than 1 V
4. Test for infinite resistance between the 5 V reference circuit terminal 1 and all other pins of the B115 Vehicle Speed Sensor connector.
 - If less than infinite resistance, repair the shorted together condition between the affected circuits.
 - If infinite resistance, replace the K20 Engine Control Module.

- **Go to next step: If between 4.8-5.2 V**

5. Test for 10.5 V or greater between the vehicle speed signal sensor circuit terminal 2 and ground.

- **If less than 10.5 V**

1. Ignition OFF, disconnect the appropriate connector listed below:
 - Engine RPO LKH/LWN = K20 Engine Control Module connector X1
 - Engine RPO LFX = K20 Engine Control Module connector X2.
 - Engine RPO LCV = K20 Engine Control Module connector X3.
2. Test for infinite resistance between vehicle speed signal sensor circuit terminal 2 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
3. Test for less than 2 Ω in the vehicle speed signal sensor circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance on the circuit.
 - Go to next step: If less than 2 Ω
4. Test for infinite resistance between the vehicle speed signal sensor circuit terminal 2 and all other pins of the B115 Vehicle Speed Sensor connector.
 - If less than infinite resistance, repair the shorted together condition between the affected circuits.
 - If infinite resistance, replace the K20 Engine Control Module.
- **Go to next step: If 10.5 V or greater**
6. Replace the B115 Vehicle Speed Sensor.

Repair Instructions

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

- [Vehicle Speed Sensor Replacement](#)
- [Control Module References](#) for ECM replacement, programming and setup

SYMPTOMS - TRANSFER CASE

Procedure

1. Perform the [Diagnostic System Check - Vehicle](#) before using the symptom tables, in order to verify the following conditions are true:
 - There are no diagnostic trouble codes (DTCs) set.
 - The control modules can communicate via the serial data link.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to: [Transfer Case Description and Operation](#).

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the automatic transfer case system. Refer to [CHECKING AFTERMARKET ACCESSORIES](#) .
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Inspect the automatic transfer case for the proper fluid level.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to: [Testing for Intermittent Conditions and Poor Connections](#)

Symptom List

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

- [Transfer Case Popping Noise](#)
- [Transfer Case Whine or Rumble Noise](#)
- [Transfer Case Growl or Grinding Noise](#)

- [Transfer Case Grating Noise](#)
- [Transfer Case Clunk in 2HI Only](#)
- [Transfer Case Clunk in 4HI](#)
- [Transfer Case Clunk in 4LO](#)
- [Transfer Case Clunk During Acceleration and Deceleration](#)
- [Transfer Case Shudder or Binding](#)
- [Transfer Case Will Not Shift](#)
- [Transfer Case Jumps Out of Gear](#)
- [Transfer Case Leak Diagnosis](#)

FRONT AXLE WILL NOT ENGAGE

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.

Circuit/System Description

The front axle control circuit consists of an electric motor actuator which engages and disengages the front axle. The front axle actuator motor consists of a permanent magnetic motor, a worm gear controlled plunger, a front axle switch and an electronic control circuit within the actuator assembly.

The front axle actuator consists of the following circuits:

- The front axle control circuit, which is also connected to the transfer case shift control module
- The front axle switch circuit, which is also connected to the transfer case shift control module
- An ignition 3 voltage circuit
- A ground circuit

When a shift to AUTO 4WD, 4HI, or 4LO is requested, the transfer case shift control module engages the front axle by grounding the front axle control circuit through a current limiting driver.

Reference Information

Schematic Reference

[Transfer Case Control 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.

Circuit/System Testing

1. If this is occurring without DTC C0379 setting it is likely related to a mechanical issue. Refer to [Four-Wheel Drive Does Not Engage](#) .
2. If no mechanical issue is found replace the front axle actuator.

Repair Instructions

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

- [Control Module References](#) for TCSCM replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#)
- [Four-Wheel Drive Does Not Engage](#)
- [Four-Wheel Drive Does Not Disengage](#)
- [Front Drive Axle Actuator Replacement](#)

FRONT AXLE WILL NOT DISENGAGE

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.

Circuit/System Description

The front axle control circuit consists of an electric motor actuator which engages and disengages the front axle. The front axle actuator motor consists of a permanent magnetic motor, a worm gear controlled plunger, a front axle switch and an electronic control circuit within the actuator assembly.

The front axle actuator consists of the following circuits:

- The front axle control circuit, which is also connected to the transfer case shift control module
- The front axle switch circuit, which is also connected to the transfer case shift control module
- An ignition 3 voltage circuit
- A ground circuit

When a shift to AUTO 4WD, 4HI, or 4LO is requested, the transfer case shift control module engages the front axle by grounding the front axle control circuit through a current limiting driver.

Reference Information

Schematic Reference

[Transfer Case Control 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.

Circuit/System Testing

1. If this is occurring without DTC C0379 setting it is likely related to a mechanical issue. Refer to [Four-Wheel Drive Does Not Disengage](#).
2. If no mechanical issue is found replace the front axle actuator.

Repair Instructions

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

- [Control Module References](#) for TCSCM replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#)
- [Four-Wheel Drive Does Not Engage](#)
- [Four-Wheel Drive Does Not Disengage](#)
- [Front Drive Axle Actuator Replacement](#)

TRANSFER CASE SHIFT CONTROL SWITCH INOPERATIVE

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.

Circuit/System Description

The active transfer case mode switch circuit consists of 5 modes. The transfer case shift control module supplies 5 volts to the switch through the 5-volt reference circuit. The current travel through the resistor of the currently active mode. The current is then returned to the transfer case shift control module through the switch signal circuit.

The transfer case shift control module constantly monitors this signal voltage to determine the condition of the mode switch circuit.

When each of the modes are selected they complete a circuit through their own specific resistor. The transfer case shift control module continuously monitors the switch input to determine whether the Neutral, AWD, 2HI, 4HI, or 4LO mode was selected by the driver.

Reference Information

Schematic Reference

[Transfer Case Control 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.

Diagnostic Aids

If the 5-volt reference or the switch signal wire are shorted to ground the scan tool can show up to 7.5 volts.

Circuit/System Testing

1. Review the scan tool data list mode switch selected and select difference mode with the transfer case shift control switch. Does the mode switch selected parameter on the scan tool change as you change modes on the switch?
2. If the modes change according to the scan tool replace the transfer case control module, reprogram, complete the motor learn procedure. If the modes on the scan tool not change replace the switch.

Repair Instructions

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

- [Transfer Case Selector Switch Replacement](#)
- [Control Module References](#) for TCSCM replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#)

NO CORRECTION FOR SLIP IN ALL-WHEEL DRIVE MODE

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.

Circuit/System Description

When transfer case is in auto 4WD mode the transfer case control module monitors the front wheel speeds and the rear wheel speeds. When a noticeable difference between the front and rear is seen the transfer case control module sends a PWM voltage to the motor so it can apply the clutch in order to correct a slip condition. The slip conditions is the difference in speed between the front and rear axles. The module has a thermal model based system so when the slip correction can not be made when a large percentage PWM signal has been sent, it will disable the system to prevent damage to the clutches.

Reference Information

Schematic Reference

[Transfer Case Control 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.

Diagnostic Aids

Erratic wheel speed sensors can cause this condition to occur. Monitor the wheel speeds using the EBCM scan tool data list.

Circuit/System Testing

1. Monitor the wheel speed sensors using the EMCM scan tool data list. If the wheel speeds are erratic or there is a large difference between front and rear then diagnose and repair as necessary. Check for EBCM DTCs as they have likely set for wheel speed performance.
2. If nothing is found with wheel speed performance then the clutches may be excessively worn. Refer to [Transfer Case Disassembled View](#).

Repair Instructions

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

[Transfer Case Disassembled View](#)

TRANSFER CASE SHIFT CONTROL SWITCH INDICATOR ALWAYS ON - TWO OR MORE

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.

Circuit/System Description

The indicator circuits consists of an interior lights dimming circuit and an indicator control circuit. When a mode has been selected, current is supplied to the indicator by the interior lights dimming circuit, traveling through the indicator LED, at which time the transfer case shift control module supplies the ground through the indicator lamp control circuit.

Reference Information

Schematic Reference

[Transfer Case Control 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.

Diagnostic Aids

A short to ground on the indicator control circuit will cause the indicator to remain on at all times.

Circuit/System Testing

1. With in ignition off disconnect connector X1 at the transfer case control module and turn the ignition on. If the affected indicator goes out replace the transfer case control module, program, and perform the motor learn procedure.
2. If the affected indicator did not go out check for a short to ground on the affected indicator control circuit. If this checks as good then replace the transfer case shift control switch.

Repair Instructions

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

- [Transfer Case Selector Switch Replacement](#)
- [Control Module References](#) for TCSCM replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#)

TRANSFER CASE SHIFT CONTROL SWITCH INDICATOR INOPERATIVE - ONE OR MORE

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.

Circuit/System Description

The indicator circuits consists of an interior lights dimming circuit and an indicator control circuit. When a mode has been selected, current is supplied to the indicator by the interior lights dimming circuit, traveling through the indicator LED, at which time the transfer case shift control module supplies the ground through the indicator lamp control circuit.

Reference Information

Schematic Reference

[Transfer Case Control 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.

Diagnostic Aids

A short to ground on the indicator control circuit will cause the indicator to remain on at all times.

Circuit/System Testing

1. With in ignition off disconnect connector X1 at the transfer case control module and turn the ignition on. With a jumper wire probe the indicator control circuit of the affected indicator and take the other end of the jumper to ground. If the indicator comes on then replace the transfer case control module, program, and perform the motor learn procedure
2. If the affected indicator did not come on then check the indicator control circuit for an open or high resistance. If the circuit checks good then replace the transfer case shift control switch.

Repair Instructions

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

- [Transfer Case Selector Switch Replacement](#)
- [Control Module References](#) for TCSCM replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#)

SERVICE INDICATOR ALWAYS ON

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.

Circuit/System Description

If the service indicator needs to be turned on the transfer case shift control module sends a signal via LAN to the instrument panel asking the I/P to command the Service 4WD indicator.

Reference Information

Schematic Reference

Transfer Case Control 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.

Circuit/System Testing

1. If the Service 4WD indicator is on and there are no DTCs check the fuse for the transfer case as this would cause the transfer case control module to drop off the LAN causing a service indicator.
2. If the fuse is good check the module power and grounds for proper connections as this could cause the same thing as a blown fuse.
3. If this checks OK then check all other U codes that may be set against the transfer case shift control module such as I/P, BCM, PCM, and follow the proper U code diagnostic.

Repair Instructions

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

- [Control Module References](#) for TCSCM replacement, setup, and programming
- [Transfer Case High/Low Clutch Reset \(NQ6\)](#)

TRANSFER CASE HIGH/LOW CLUTCH RESET (NQ6)

Using a Scan Tool

1. Ignition ON, engine OFF.

2. Select the Module Setup heading on the scan tool, under transfer case control module.
3. Select the Range Actuator Learn procedure.
4. When the Range Actuator Learn procedure is initiated an audible noise from the A16 Transfer Case Motor should occur, indicating a successful learn procedure.

Using The Transfer Case Shift Control Switch

NOTE: The Range Actuator Learn procedure is performed with the ignition in the **ACCESSORY** position. The shift to transfer case **NEUTRAL** procedure uses this same procedure, but with the key in the **RUN** position.

1. Ignition OFF for at least 30 s.
2. Engage parking brake.
3. Place transmission in Neutral.
4. Turn the S77 Transfer Case Shift Control Switch to the 2WD High position for at least 5 s. The 2WD High indicator may not illuminate.
5. Turn the S77 Transfer Case Shift Control Switch clockwise past the 4WD Low position to the neutral request position and hold for at least 30 s.
6. An audible noise from the A16 Transfer Case Motor should occur, indicating a successful learn procedure.

TRANSFER CASE POPPING NOISE

Cause	Correction
Definition: A faulty internal transfer case component that causes a light popping noise in the transfer case. A light popping type noise that occurs when shifting, and quits after the shift is completed would be considered normal. When shifting out of 4 HI in a mode shift, there may be a delay and a popping may be heard when the High/Low clutch disengages. 1. Compare the noise to a similar vehicle to see if a normal condition. 2. Identify the source of the noise using chassis ears and refer to the appropriate service information section. 3. Note specifics such as when the noise is present (2HI, 4HI, OR 4LO). 4. Note if the noise relative to vehicle speed, is noisy on turns, or other specifics. 5. If the source of the noise is the transfer case, inspect for the correct fluid level. Review the Symptoms - Transfer Case and perform the necessary inspections.	
Transmission or transfer case mounts loose or damaged	Repair or replace the mounts as required
Propeller shaft universal joints worn	Replace the universal joints as required. Refer to Symptoms - Propeller Shaft .
Suspension components worn	Replace the suspension components as required. Refer to Noise Diagnosis - Front Suspension , or Noise Diagnosis - Rear Suspension .
Front axle actuator shift noise	NOTE: When shifting from 2WD-to-4WD or 4WD-to-2WD, the front axle actuator may be heard engaging or disengaging and the axle internal

Cause	Correction
	components shifting. This is to be considered a normal condition. Shift from 2WD-to-4WD and from 4WD-to-2WD to determine if the noise source is the front axle to determine if this is a normal condition.
Transfer case drive and driven sprockets worn or a stretched chain causing a chain jump condition	NOTE: • A chain jump condition may cause a banging noise and can only occur with the vehicle in 4WD. • A chain jump condition may be caused by water intrusion into the transfer case and deterioration of the transfer case fluid. Water intrusion conditions may occur in extreme off road conditions or in situations where under-vehicle power washing occurs. 1. Inspect the oil for water intrusion and/or fluid discoloration and contamination. 2. Inspect the vent hose for proper routing and connection to the transfer case. 3. Inspect for damaged internal components. Refer to Drive Chain, Drive Sprocket, and Driven Sprocket Cleaning and Inspection.

Cause	Correction
	4. Replace the chain and sprockets as required. Refer to Transfer Case Disassemble , or Transfer Case Assemble .

TRANSFER CASE WHINE OR RUMBLE NOISE

Cause	Correction
DEFINITION: A faulty internal transfer case component that causes a high pitch whine or low pitch rumbling noise in the transfer case. A high pitch whine or rumble noise with the vehicle in 4LO is to be considered normal. NQ6 transfer case applications are noisier by design in 4WD mode than they are in 2WD mode. Compare the noise to a similar vehicle to see if a normal condition. 1. Identify the source of the noise using chassis ears and refer to the appropriate service information section. 2. Note specifics such as when the noise is present (2HI, 4HI, OR 4LO). 3. Note if the noise relative to vehicle speed, is noisy on turns, or other specifics. 4. If the source of the noise is the transfer case, inspect for the correct fluid level. Review the Symptoms - Transfer Case and perform the necessary inspections.	
Tire Noise	NOTE: A high pitch whine or low pitch rumble noise that increases as vehicle speed increases may be caused by tires that are, unevenly inflated, unevenly worn or have an aggressive tread pattern. Rotate or substitute tires and retest. Refer to Tire and Wheel Inspection .
Propeller shaft universal joints worn	Replace the universal joints as required. Refer to Symptoms - Propeller Shaft .
Front or rear axle bearings worn	NOTE: • A high pitch whine or low pitch rumble noise that increases as vehicle speed increase

Cause	Correction
	may be caused by worn axle bearings. • To determine if the noise is front axle related, remove the front propeller shaft and retest. Repair or replace the axle as required. Refer to Symptoms - Front Drive Axle , or Symptoms - Rear Drive Axle .
Transmission rear output shaft bearing worn	NOTE: A high pitch whine or low pitch rumble noise that increases as transmission output shaft speed increases may be caused by a worn transmission output shaft bearing. Repair or replace the transmission as required. Refer to Symptoms - Automatic Transmission .
Transfer case fluid level low	NOTE: A high pitch whine or low pitch rumble noise that increases as transmission output shaft speed increases may be caused by a low transfer case fluid level. Fill the transfer case to the correct fluid level and retest.

Cause	Correction
Transfer case input shaft bearing worn	NOTE: A high pitch whine or low pitch rumble noise that increases as transmission output shaft speed increases may be caused by a worn transfer case input shaft bearing. Replace the bearing as required. Refer to Transfer Case Disassemble, or Transfer Case Assemble.
Transfer case rear output shaft bushing worn	NOTE: • An excessively worn bushing may be indicated by a leaking rear output shaft seal. • A high pitch whine or low pitch rumble noise that increases as vehicle speed increases may be caused by a worn transfer case rear output shaft bushing. Replace the rear output shaft bushing and propeller shaft slip yoke as required. Refer to Transfer Case Disassemble, or Transfer Case Assemble.
Transfer case front or rear output shaft bearings worn	NOTE: A high pitch whine or low pitch rumble

Cause	Correction
	noise that increases with road speed may be caused by the front or rear output shaft bearing. Replace the bearings as required. To Transfer Case Disassemble, or Transfer Case Assemble.
Transfer case planetary carrier gears worn	NOTE: • A high pitch whine or low pitch rumble noise that increases in 2HI only may be caused by worn or damaged planetary gears and High/Low internal gear damage. • A whine noise that occurs in either 2HI or 4HI may be caused by worn planetary gear needle bearings or shafts. • A high pitch whine that occurs in 4LO may be caused by worn

Cause	Correction
	planetary gears or High/Low internal gear. Repair as required - Inspect for the following: - Chipped, bent, or deformed teeth - Planetary gear needle bearings worn - Planetary gear thrust washers cracked or missing - Seized or binding planetary gears - Replace the planetary components as required.

TRANSFER CASE GROWL OR GRINDING NOISE

Cause	Correction
DEFINITION: A faulty internal transfer case component that causes a low pitch growl or grinding noise in the transfer case while the vehicle is turning left or right or in a four wheel drive mode. A low pitch growl noise with the vehicle in 4LO or 4HI is to be considered normal. NQ6 transfer case applications are noisier by design in 4WD mode than they are in 2WD mode. - Compare the noise to a similar vehicle to see if a normal condition. - Identify the source of the noise using chassis ears and refer to the appropriate service information section. - Note specifics such as when the noise is present (2HI, 4HI, OR 4LO). - Note if the noise relative to vehicle speed, is noisy on turns, or other specifics. - If the source of the noise is the transfer case, inspect for the correct fluid level. Review the Symptoms - Transfer Case and perform the necessary inspections.	
Tire wear	NOTE: A growl noise that increases as vehicle speed increases may be caused by tires that are unevenly worn, unevenly inflated, or have an aggressive tread pattern. Rotate or substitute tires and retest. Refer to: Tire and Wheel Inspection.
Propeller shaft universal joints worn	Replace the universal joints as required. Refer to: Symptoms - Propeller Shaft.

Cause	Correction
Front or rear axle bearings worn	NOTE: • A growl or grinding noise that increases as vehicle speed increases may be caused by worn axle bearings. • To determine if the noise is front axle related, remove the front propeller shaft and retest. Repair or replace the axle as required. Refer to: Symptoms - Front Drive Axle , or Symptoms - Rear Drive Axle .
Transmission rear output shaft bearing worn	NOTE: A growl or grinding noise that increases as transmission output shaft speed increases may be caused by a worn transmission output shaft bearing. Replace transmission components as required. Refer to: Symptoms - Automatic Transmission .
Transfer case fluid level low	NOTE: A growl or grinding noise that increases as transmission output shaft speed increases

Cause	Correction
	may be caused by a low transfer case fluid level. Fill the transfer case to the correct fluid level and retest.
Transfer case input shaft bearing worn	NOTE: A high pitch whine or low pitch rumble noise that increases as transmission output shaft speed increases may be caused by a worn transfer case input shaft bearing. Replace the bearing as required. Refer to: Transfer Case Disassemble, or Transfer Case Assemble.
Transfer case rear output shaft bushing worn	NOTE: • An excessively worn bushing may be indicated by a leaking rear output shaft seal. • A growl or grinding noise that increases as vehicle speed increases may be caused by a worn transfer case rear output shaft bushing. Replace the rear output shaft bushing and propeller shaft slip yoke as required. Refer to Transfer Case Disassemble, or Transfer Case Assemble.

Cause	Correction
Transfer case front or rear output shaft bearings worn	NOTE: A high pitch whine or low pitch rumble noise that increases with road speed may be caused by the front or rear output shaft bearing. Replace the bearings as required. Refer to: Transfer Case Disassemble, or Transfer Case Assemble.
Transfer case shift fork inserts broken or missing	A growl, rattle, or grinding noise that occurs when a shift is commanded may be caused by broken or missing shift fork inserts which may lead to incomplete engagement of the synchronizer teeth. Refer to High/Low Shift Components Cleaning and Inspection. Replace the shift forks and inserts as required. Refer to: Transfer Case Disassemble, or Transfer Case Assemble.
Transfer case range sleeve or input shaft gears worn	A growl or grinding noise that occurs when a shift is commanded may be caused by worn High/Low clutch gears and incomplete engagement. Repair or replace as required.
Transfer case planetary carrier gears worn	NOTE: • A high pitch whine or low pitch rumble noise that increases in 2HI only may be caused by worn or damaged planetary gears and ring gear damage. • A whine noise that occurs in either 2HI or 4HI may be caused by worn planetary gear

Cause	Correction
	needle bearings or shafts. - A high pitch whine that occurs in 4LO may be caused by worn planetary gears or High/Low internal gear. Repair as required - Inspect for the following: - Chipped, bent, or deformed teeth - Planetary gear needle bearings worn - Planetary gear thrust washers cracked or missing - Seized or binding planetary gears - Replace the planetary components as required.

TRANSFER CASE GRATING NOISE

Cause	Correction
DEFINITION: A faulty internal transfer case component that causes a grating noise in the transfer case while in the AWD, 4HI, or 4LO mode. Review the Symptoms - Transfer Case and perform the necessary inspections.	
Broken clutch apply plate	- Inspect for a broken clutch apply plate. Refer to Transfer Case Disassemble, or Transfer Case Assemble. - Replace the apply plate and the transfer case components that are damaged. Refer to Transfer Case Disassemble, or Transfer Case Assemble.
Faulty scissor mechanism lever thrust bearings	- Inspect for faulty scissor mechanism lever thrust bearings. Refer to Two/Four Wheel Drive Shift Components Cleaning and Inspection. - Recondition the transfer case components that are damaged from debris. Refer to Transfer Case Disassemble, or Transfer Case Assemble.

TRANSFER CASE CLUNK IN 2HI ONLY

Cause	Correction
DEFINITION: A faulty internal transfer case component that causes a clunk that is heard or felt during acceleration or deceleration with the transfer case in 2HI mode only.	
	Compare the noise to a similar vehicle to see if a normal condition.

Cause	Correction
- Identify the source of the noise using chassis ears and refer to the appropriate service information section. - Note specifics such as when the noise is present (2HI, 4HI, OR 4LO). - Note if the noise relative to vehicle speed, is noisy on turns, or other specifics. - If the source of the noise is the transfer case, inspect for the correct fluid level.	Review the Symptoms - Transfer Case and perform the necessary inspections.
Transmission or transfer case mounts loose or damaged	Repair or replace the mounts as required.
Rear propeller shaft universal joints worn	Replace the universal joints as required. Refer to Symptoms - Propeller Shaft .
Transfer case rear output shaft bushing worn	NOTE: An excessively worn bushing may be indicated by a leaking rear output shaft seal. Replace the rear output shaft bushing and propeller shaft slip yoke as required.
Suspension components worn	Replace the suspension components as required. Refer to Noise Diagnosis - Front Suspension , or Noise Diagnosis - Rear Suspension .
Front axle actuator shift noise	NOTE: When shifting from 2WD-to-4WD or 4WD-to-2WD, the front axle actuator may be heard engaging or disengaging and the axle internal components shifting. This is to be considered a normal condition. Shift from 2WD-to-4WD and from 4WD-to-2WD to determine if the noise source is the front axle to determine if this is a normal condition.
Rear output shaft spline-to-propeller shaft slip yoke spline-excessive clearance	NOTE: A clunk condition in 2WD heard when the vehicle comes to a stop or from

Cause	Correction
	a stop-to-acceleration situation may be caused by excessive clearance between of the splines of the rear output shaft and propeller shaft slip yoke. Replace the following components: • Rear output shaft. Refer to Transfer Case Disassemble, or Transfer Case Assemble. • Propeller shaft slip yoke. Refer to Propeller Shaft Slip Yoke Replacement.
Transfer Case Rear Output Shaft Rear Bearing Retaining Ring Incorrectly Installed	1. Inspect for the following: • Improperly installed rear output shaft rear bearing retaining ring. The snap ring is to be installed completely into the OD groove of the bearing. • Excessive wear or damaged retaining ring groove in the rear case half. 2. Repair or replace the following components as required: • Properly install a new rear output shaft rear bearing outer retaining ring. • Replace the rear case half if the retaining ring groove is excessively worn. Refer to Transfer Case Disassemble, or Transfer Case Assemble.

TRANSFER CASE CLUNK IN 4HI

Cause	Action
DEFINITION: During acceleration or deceleration, a clunk is heard or felt in the transfer case while in the 4HI range only. 1. Compare the noise to a similar vehicle and see if a normal condition. 2. Identify the source of the noise using chassis ears and refer to the appropriate service information section. 3. Note specifics such as when the noise is present (2HI, 4HI, OR 4LO). 4. Note if the noise relative to vehicle speed, is noisy on turns, during acceleration, stops, or other specifics. 5. If the source of the noise is the transfer case, inspect for the correct fluid level. Review the Symptoms - Transfer Case and perform the necessary inspections.	
Tire pressure uneven	NOTE:

Cause	Action
	A clunk condition that occurs when performing slow speed turns in 4WD may be caused by low or uneven tire pressure. 1. Set the tires to the recommended vehicle tire pressure for evaluation to see if the noise goes away. 2. Upon completion of the test, reset the tire pressure to the correct pressure as recommended on the tire.
Transmission or transfer case mounts loose or damaged	Repair or replace the mounts as required
Propeller shaft universal joints worn	Replace the universal joints as required. Refer to Symptoms - Propeller Shaft
Front axle actuator shift noise	NOTE: When shifting from 2WD-to-4WD or 4WD-to-2WD, the front axle actuator may be heard engaging or disengaging and the axle internal components shifting. This is to be considered a normal condition. Shift from 2WD-to-4WD and from 4WD-to-2WD to determine if the noise source is the front axle to determine if this is a normal condition.
Suspension components worn	Replace the suspension components as required. Refer to Noise Diagnosis - Front Suspension , or Noise Diagnosis - Rear Suspension .
4wd gear noise	NOTE: A growl or clunk that occurs with vehicle in 4WD at low speed in a tight turning radius situation may be caused by

Cause	Action
	the gears and chain and is to be considered a normal condition and an operating characteristic of a 4WD system. Operated the vehicle in 4WD performing low speed left or right turns to confirm a transfer case gear noise.
Transfer case planetary carrier gears worn	NOTE: • A clunk in 4HI noise that increases in 2HI only may be caused by worn or damaged planetary gears and High/Low internal gear damage. • A clunk in noise that occurs in either 2HI or 4HI may be caused by worn planetary gear needle bearings or shafts. • A clunk that occurs in 4LO may be caused by worn planetary gears or High/Low

Cause	Action
	internal gear. Repair as required. - Inspect the following: - Chipped, bent, or deformed teeth - Planetary gear needle bearings worn - Planetary gear thrust washers cracked or missing - Seized or binding planetary gears - Replace the planetary components as required.
Transfer case rear output shaft rear bearing retaining ring-incorrectly installed	- Inspect for the following: - Improperly installed rear output shaft rear bearing outer retaining ring. The snap ring is to be installed completely into the OD groove of the bearing. - Excessive wear or damaged retaining ring groove in the rear case half - Repair or replace the following components as required: - Properly install a new rear output shaft rear bearing outer retaining ring. - Replace the rear case half if the retaining ring groove is excessively worn. Refer to Transfer Case Disassemble, or Transfer Case Assemble.

TRANSFER CASE CLUNK IN 4LO

Cause	Correction
DEFINITION: During acceleration or deceleration, a clunk is heard or felt in the transfer case while in the 4LO range only. It is typical for the vehicle to exhibit significant engagement noise and bump when shifting between Four-Wheel Drive Low and Four-Wheel Drive High ranges or from transfer case N (Neutral) with the engine running. - Review the correct owner's manual shifting procedures with the customer. - Compare the noise to a similar vehicle and see if a normal condition. - Identify the source of the noise using chassis ears and refer to the appropriate service information section. - Note specifics such as when the noise is present (2HI, 4HI, OR 4LO). - Note if the noise relative to vehicle speed, is noisy on turns, during acceleration, stops, or other specifics. - If the source of the noise is the transfer case, inspect for the correct fluid level. Review the Symptoms - Transfer Case and perform the necessary inspections.	
Tire pressure uneven	NOTE: A clunk condition that occurs when performing slow speed turns in 4WD

Cause	Correction
	may be caused by low or uneven tire pressure. 1. Check the tire pressure and adjust as required to the value recommended by the label on the vehicle. 2. Road test the vehicle
Transmission or transfer case mounts loose or damaged	Repair or replace the mounts as required
Propeller shaft universal joints worn	Replace the universal joints as required. Refer to Symptoms - Propeller Shaft .
Front axle actuator shift noise	NOTE: When shifting from 2WD-to-4WD or 4WD-to-2WD, the front axle actuator may be heard engaging or disengaging and the axle internal components shifting. This is to be considered a normal condition. Shift from 2WD-to-4WD and from 4WD-to-2WD to determine if the noise source is the front axle to determine if this is a normal condition.
Suspension components worn	Replace the suspension components as required. Refer to Noise Diagnosis - Front Suspension , or Noise Diagnosis - Rear Suspension .
Tire scuffing noise	NOTE: A growl or clunk that occurs with vehicle in 4WD at low speed in a tight turning radius situation may be caused by a tire scuffing type noise and is to be considered a normal condition and

Cause	Correction
	operating characteristic of a part-time 4WD system. Operated the vehicle in 4WD performing low speed left and right turns to confirm a tire scuffing type noise.
Transfer case planetary carrier gears worn	NOTE: • A clunk in 4HI noise that increases in 2HI only may be caused by inspect for worn or damaged planetary gears and ring gear damage. • A clunk in noise that occurs in either 2HI or 4HI may be caused by worn planetary gear needle bearings or shafts. • A clunk that occurs in 4LO may be caused by worn planetary gears or High/Low internal gear. Repair as required 1. Inspect for the following:

Cause	Correction
	- Chipped, bent, or deformed teeth - Planetary gear needle bearings worn - Planetary gear thrust washers cracked or missing - Seized or binding planetary gears 2. Replace the planetary components as required.

TRANSFER CASE CLUNK DURING ACCELERATION AND DECELERATION

Cause	Correction
DEFINITION: During acceleration or deceleration, a clunk is heard or felt in the transfer case when it is in AWD mode. Review the Symptoms - Transfer Case and perform the necessary inspections.	
Incorrect fluid level or incorrect fluid	- Inspect the transfer case for the correct fluid level. - Inspect the transfer case for the correct type of fluid. Refer to Approximate Fluid Capacities. - Flush the transfer case and fill with the correct fluid, if required. Refer to Transfer Case Fluid Replacement.
Excessive clearance between the slip yoke and the rear output shaft	- Inspect for the following conditions: - Worn slip yoke splines - Worn rear output shaft splines - Repair or replace the following components if faulty: - Replace the slip yoke, if required. Refer to Propeller Shaft Slip Yoke Replacement. - Replace the rear output shaft, if required. Refer to Transfer Case Disassemble, or Transfer Case Assemble.
Excessive clearance between the slip yoke and the rear bushing	- Inspect for the following conditions: - Worn rear bushing - Worn slip yoke bushing journal - Repair or replace the following components if faulty: - Replace the slip yoke, if required. Refer to Propeller Shaft Slip Yoke Replacement. - Replace the rear bushing if worn. Refer to Transfer Case Disassemble, or Transfer Case Assemble.

TRANSFER CASE SHUDDER OR BINDING

Cause	Correction
DEFINITION: When in the AWD mode, a shudder is felt during acceleration or a crow-hop or binding while turning, which may cause tire scuffing. Review the Symptoms - Transfer Case and perform the necessary inspections.	
Oil breakdown or contamination	Flush the transfer case and fill with the correct fluid. Refer to Transfer Case Fluid Replacement .
Incorrect transfer case fluid	Flush the transfer case and fill with the correct fluid. Refer to Transfer Case Fluid Replacement .
Burrs on the clutch hub slots	Inspect the clutch disc tab slots in the clutch hub for burrs or notches. Refer to Two/Four Wheel Drive Shift Components Cleaning and Inspection.

Cause	Correction
	2. De-burr the hub slots. If the hub slots are excessively notched, replace the clutch hub. Refer to Transfer Case Disassemble , or Transfer Case Assemble .

TRANSFER CASE WILL NOT SHIFT

Cause	Correction
DEFINITION: The transfer case will not shift from 2 wheel drive to 4 wheel drive or there is a gear clashing when shifting from hi to lo modes. When shifting from 2HI or 4HI to 4LO, the transmission must be in neutral and the vehicle speed below 3 mph. 1. Review the correct owner's manual shifting procedures with the customer. 2. Inspect for the correct fluid level. Review the Symptoms - Transfer Case and perform the necessary inspections.	
Front axle actuator	NOTE: • A transfer case that will not shift into 4WD may be caused by the front axle actuator. • If the symptoms occur during cold temperatures, flush and fill the front axle with synthetic fluid. Refer to: Front Axle Lubricant Level Inspection 1. Perform the Diagnostic System Check - Vehicle before using the symptom tables, in order to verify the following conditions are true: • There are no diagnostic trouble codes (DTCs) present. • The control modules can communicate via the serial data link. 2. Inspect for an intermittent. Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to: Testing for Intermittent Conditions and Poor Connections , Some symptoms may be caused by loose wiring. Test the system after moving or connecting harnesses, but before replacing parts. Refer to: Four-Wheel Drive Does Not Engage
Electrical system	1. Perform the Diagnostic System Check - Vehicle before using the symptom tables, in order to verify the following conditions are true: • There are no diagnostic trouble codes (DTCs) present. • The control modules can communicate via the serial data link. 2. Inspect for an intermittent. Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to: Testing for

Cause	Correction
	<u>Intermittent Conditions and Poor Connections</u> , Some symptoms may be caused by loose wiring. Test the system after moving or connecting harnesses, but before replacing parts. Refer to: <u>Four-Wheel Drive Does Not Engage</u>
Transfer case shift fork inserts broken or missing	A growl, rattle, or grinding noise that occurs when a shift is commanded may be caused by broken or missing shift fork inserts which may lead to incomplete engagement of the high/low clutch teeth. Refer to: <u>High/Low Shift Components Cleaning and Inspection</u>. Replace the shift forks and inserts as required. Refer to: <u>Transfer Case Disassemble</u>, or <u>Transfer Case Assemble</u>
Transfer case high/low clutch gear tooth damage	NOTE: Excessive gear tooth damage may cause a will not shift or gear clash when shifting condition. 1. Inspect the gear teeth for excessive damage. Refer to: <u>Transfer Case Fluid Replacement</u> 2. Inspect the splines of the high/low clutch and rear output shaft to ensure the clutch moves freely on the shaft. 3. Replace components as required.
Clutch pack	A worn clutch pack may set a DTC and disable shifting. Refer to: <u>Diagnostic System Check - Vehicle</u>
Rear output shaft snap ring broken or out of position	NOTE: A broken or mis-positioned rear output shaft snap ring may lead to a will not shift condition. Inspect for a broken or mis-positioned rear output shaft snap ring.
Transfer case high/low planetary carrier assembly	NOTE: In situations where there is excessive input shaft gear teeth wear, it may not be possible to engage 4LO. 1. Inspect the planetary gears and high/low internal gear for wear or damage. 2. Inspect the input shaft gear teeth for wear or damage

Cause	Correction
	3. Replace components as required.

TRANSFER CASE JUMPS OUT OF GEAR

Cause	Correction
DEFINITION: Loss of the transfer case drive torque during deceleration, acceleration or under load or the transfer case jumps out of gear and into a neutral position. Inspect for the correct fluid level. Review the Symptoms - Transfer Case and perform the necessary inspections.	
Transfer case scissor mechanism lever bearing	Inspect for a worn or damaged scissor mechanism lever and/or bearing Replace components as required.
Transfer case Actuator motor brake	NOTE: - The actuator motor brake may lead to a will not shift or jumps out of gear condition - If the condition is caused by a brake electrical condition, a DTC will be set. - If the condition is caused by a brake electrical condition, a DTC will be set. Inspect the electrical system for a properly operating actuator motor.
Rear output shaft snap ring broken or out of position	NOTE: A broken or out-of-positioned rear output shaft snap ring may lead to a will-not-shift or jumps-out-of-gear condition.

Cause	Correction
	Inspect for a broken or out-of-position rear output shaft snap ring.
Transfer case shift fork broken or fork inserts broken or missing	NOTE: A growl, rattle, or grinding noise that occurs when a shift is commanded may be caused by broken or missing shift fork inserts which may lead to incomplete engagement of the high/low clutch teeth. Refer to: High/Low Shift Components Cleaning and Inspection Replace the shift forks and inserts as required. Refer to: Transfer Case Disassemble, or Transfer Case Assemble

TRANSFER CASE LEAK DIAGNOSIS

Cause	Correction
DEFINITION: A visible indication of an external fluid leak from the transfer case. Review the Symptoms - Transfer Case and perform the necessary inspections. See below for suggested diagnostic method(s). Special Tools • GE-28431-6 Fluorescent Oil Dye • GE-28428-E High Intensity Black Light Kit Refer to: Special Tools. Fluorescent Dye Method 1. Add GE-28431-6 Fluorescent dye to the transmission or transfer case to determine the source of the leak. 2. Operate the vehicle. 3. Inspect for the presence of dye within the oil leak using the GE-28428-E High Intensity Black Light Kit. A presence or non-presence of dye within the oil leak will indicate which component is the source of the leak. Powder Method CAUTION: Do not clean using brake cleaner or other	

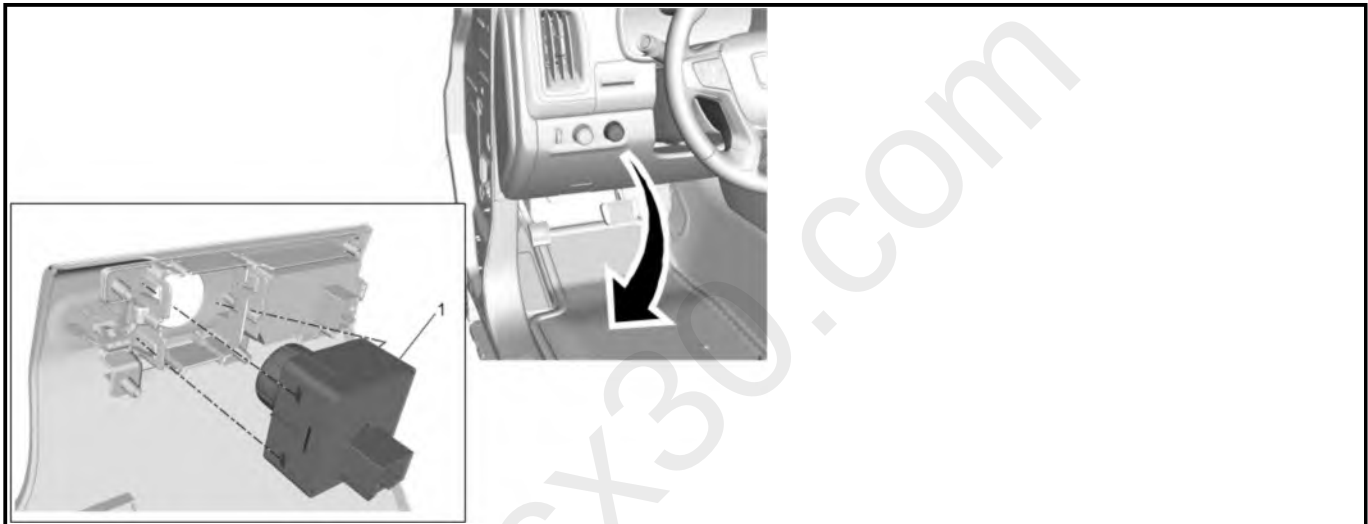
Cause	Correction
reactive solvents as these solvents can damage rubber gaskets, seals and bushings. 1. Thoroughly clean the suspected leak area using a rag. 2. Apply an aerosol type leak tracing powder to the suspected leak area. NOTE: Do not drive the vehicle on the freeway as this will splatter oil 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.	
Transfer case adapter leak	NOTE: A leak at the transmission-to-transfer case adapter weep hole location may be caused by either a leaking transmission rear output shaft oil seal or a leaking transfer case input shaft oil seal. Neither the adapter nor the gasket is the source of the leak. 1. Inspect for a restricted vent hose assembly. Repair as required. 2. Add GE-28431-6 Fluorescent Oil Dye to the transmission to determine the source of the leak.

Cause	Correction
	3. Operate the vehicle 4. Inspect the adapter weep hole for a fluid leak and for traces of dye within the oil using the GE-28428-E High Intensity Black Light Kit. 5. If fluorescent dye is present within the fluid leak, replace the transmission rear output shaft seal. 6. If fluorescent dye is not present within the fluid leak, replace the transfer case input shaft oil seal. Refer to: Transfer Case Fluid Replacement
Vent hose leak	1. Inspect the transfer case for an overfill condition. Refer to: Transfer Case Fluid Replacement 2. Inspect for a loose, disconnected, restricted, or damaged vent hose assembly. 3. Replace components as required.
Drain plug or fill plug leak	1. Inspect for the correct amount and type of sealer on the plugs. Refer to: Adhesives, Fluids, Lubricants, and Sealers 2. Install the correct sealer onto the threads of the plugs and tighten to the correct torque value. Refer to: Transfer Case Fluid Replacement
Rear output shaft bearing snap ring access hole plugs leak	Replace the access hole plugs to lower case front.
Vehicle speed sensor (VSS) leak	1. Remove the VSS. Refer to: Vehicle Speed Sensor Replacement 2. Inspect the VSS for a cut or damaged VSS O-ring seal. 3. Replace the VSS O-ring seal or sensor as required.
Propeller shaft slip yoke cup plug leak	1. Inspect for a leaking cup plug in the rear of the propeller shaft slip yoke 2. Replace the yoke assembly as required.
Rear output shaft oil seal leak	1. Inspect for a restricted vent hose assembly. Repair as required. 2. Inspect for a transfer case for an overfill condition. 3. Inspect for a leaking rear output shaft oil seal. Refer to: Rear Output Shaft Seal Replacement 4. Inspect the propeller shaft slip yoke sealing surface for excessive wear, rust, or other damage. Minor abrasions may be repaired using very fine emery cloth sandpaper. Refer to: Symptoms - Propeller Shaft 5. Inspect the rear output shaft bushing for excessive wear. Refer to: Transfer Case Disassemble, or Transfer Case Assemble 6. Replace components as required.
Front output shaft oil seal leak	1. Inspect for a restricted vent hose assembly. Repair as required. 2. Inspect for a transfer case for an overfill condition. 3. Inspect for a leaking front output shaft oil seal. Refer to: Front Output Shaft Seal Replacement 4. Replace components as required.
Actuator shaft position sensor or O-ring seal leak	1. Inspect the sensor for porosity or a cut or damaged O-ring seal. 2. Replace components as required.

Cause	Correction
Two/four wheel drive actuator seal leak	1. Inspect for a leaking two/four wheel drive actuator motor seal leak. 2. Replace the motor and seal assembly as required.
Front case half-to-rear case half seam leak	Disassemble the transfer case and reseat the case halves. Refer to: Transfer Case Disassemble , or Transfer Case Assemble
Case leak	1. Inspect for a cracked case half or case porosity. 2. Add GE-28431-6 Fluorescent Oil Dye to the transfer case. 3. Operate the vehicle 4. Inspect the transfer case fluid leak for presence of dye within the oil using the GE-28428-E High Intensity Black Light Kit. Refer to: Transfer Case Disassemble, or Transfer Case Assemble

REPAIR INSTRUCTIONS - ON VEHICLE

TRANSFER CASE SELECTOR SWITCH REPLACEMENT



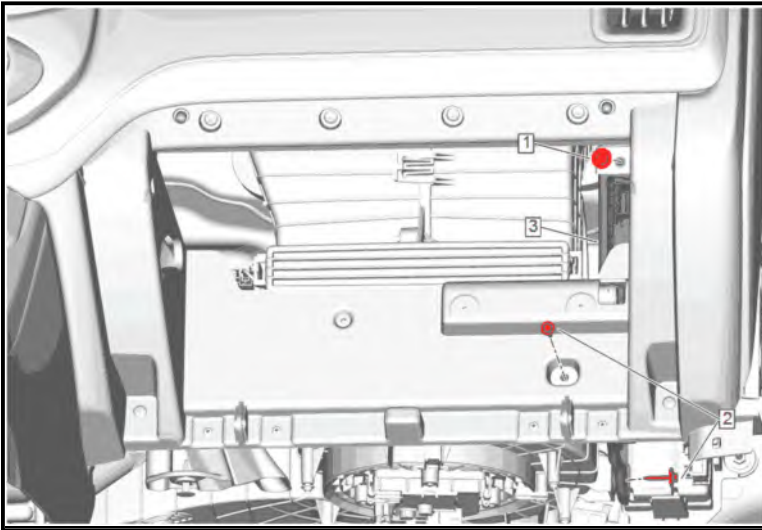
NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure	
Remove instrument panel knee bolster. Refer to Instrument Panel Knee Bolster Replacement .	
1	Transfer Case Selector Switch
Procedure	
Using the appropriate tool gently depress tabs to remove the switch assembly from the bezel.	

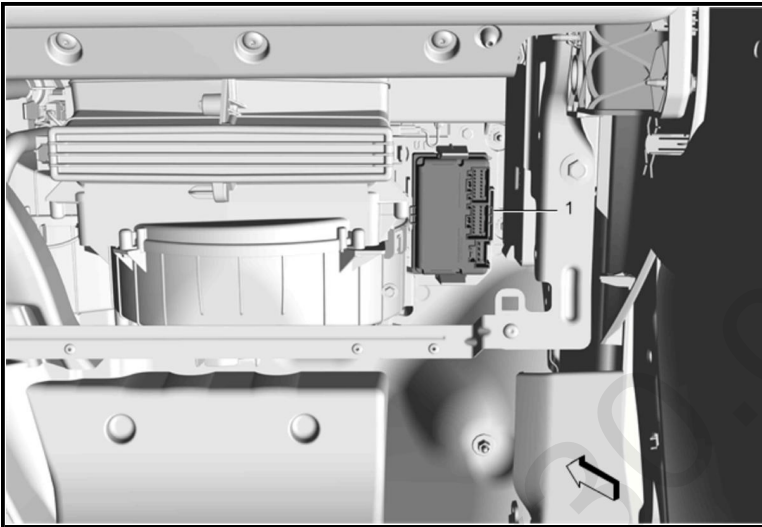
TRANSFER CASE CONTROL MODULE REPLACEMENT

Removal Procedure

1. Remove the radio speaker amplifier. Refer to [Radio Speaker Amplifier Replacement](#) .



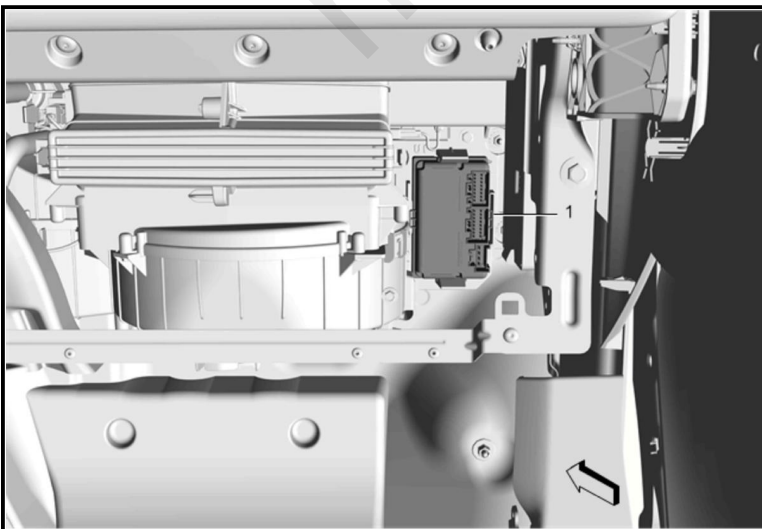
2. Disconnect the (3) electrical connectors from the transfer case control module (1).



3. Remove the module from the module bracket by releasing the retaining tabs.

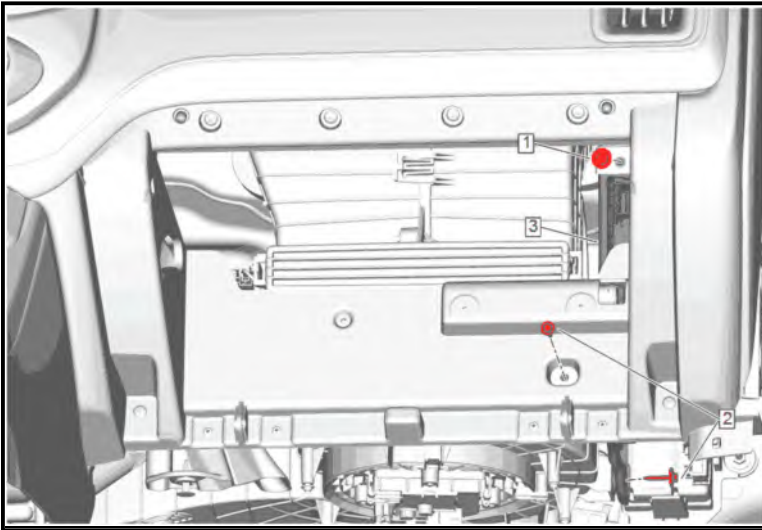
Installation Procedure

1. Install the module to the module bracket.



2. Connect the (3) electrical connectors to the transfer case control module (1).

3. Install the radio speaker amplifier. Refer to [Radio Speaker Amplifier Replacement](#) .



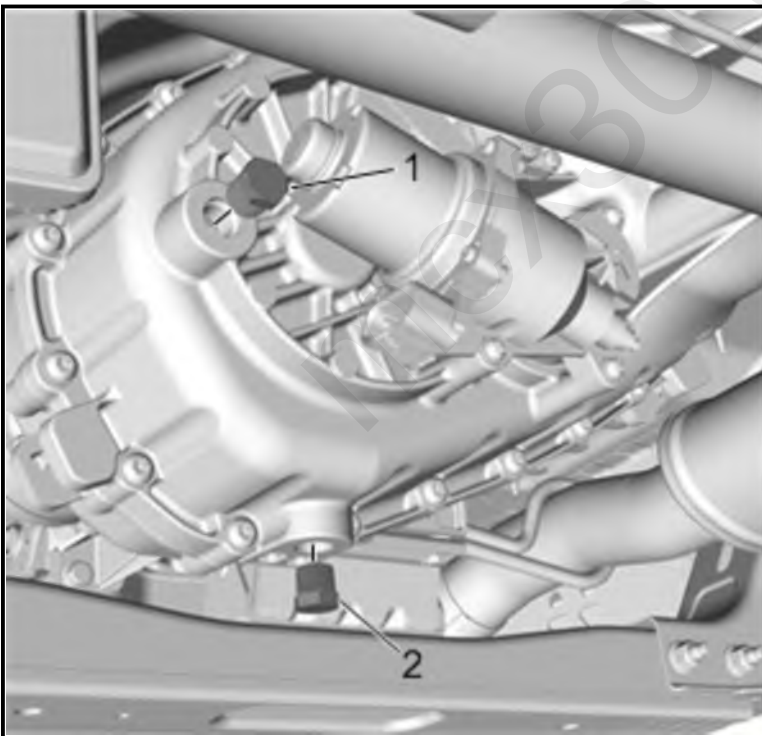
4. If installing a new module, perform the transfer case shift control module programming and setup. Refer to [Control Module References](#) .

TRANSFER CASE FLUID REPLACEMENT

Removal Procedure

NOTE: When performing the following service procedures, use only hand tools to remove and install the fill or drain plugs.

1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the fill plug (1) from the transfer case.

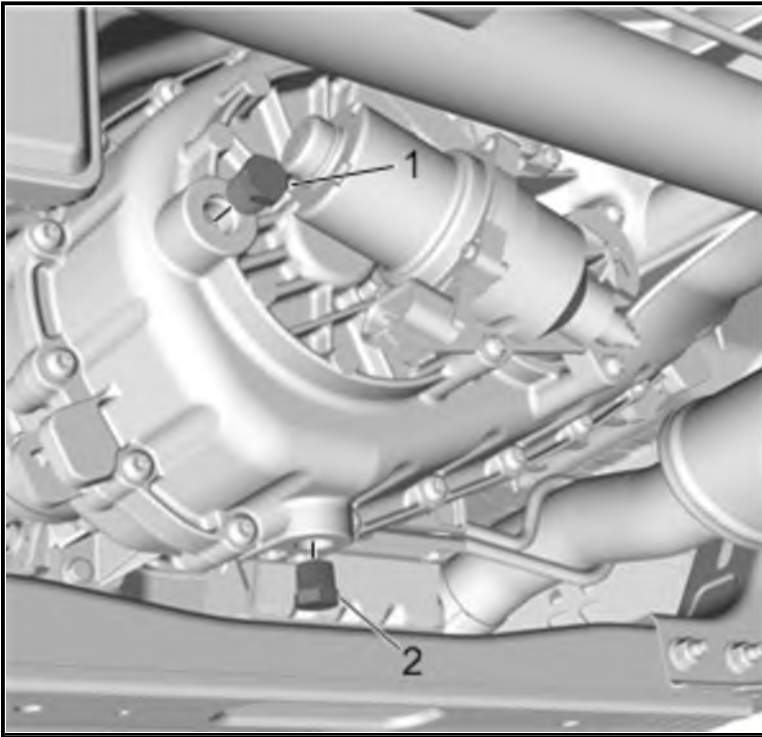


NOTE: When draining the transfer case, make sure that an approved drain pan is used.

3. Remove the drain plug (2) from the transfer case.

Installation Procedure

1. Apply sealant to the threads on the drain plug (2). Refer to [Adhesives, Fluids, Lubricants, and Sealers](#) .



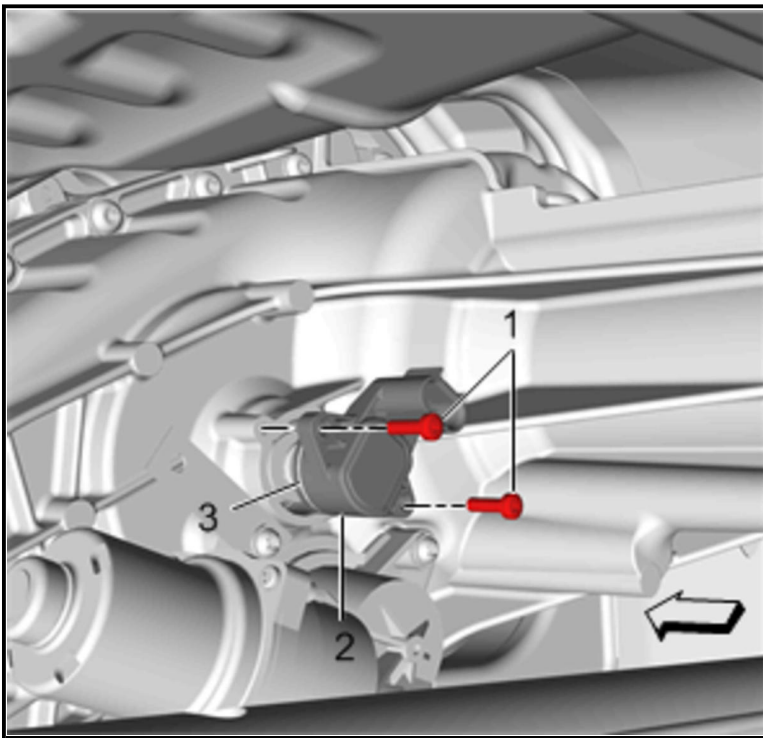
CAUTION: Refer to [Component Fastener Tightening Caution](#) .

2. Install the drain plug in the transfer case and tighten the drain plug to 25 N.m (18 lb ft).
3. Fill the transfer case to the bottom of the fill hole with the proper fluid. Refer to [Adhesives, Fluids, Lubricants, and Sealers](#) .
4. Apply sealant to the threads on the fill plug (1). Refer to [Adhesives, Fluids, Lubricants, and Sealers](#) .
5. Install the fill plug and tighten to 25 N.m (18 lb ft).
6. Lower the vehicle.

TRANSFER CASE TWO/FOUR WHEEL DRIVE ACTUATOR POSITION SENSOR REPLACEMENT

Removal Procedure

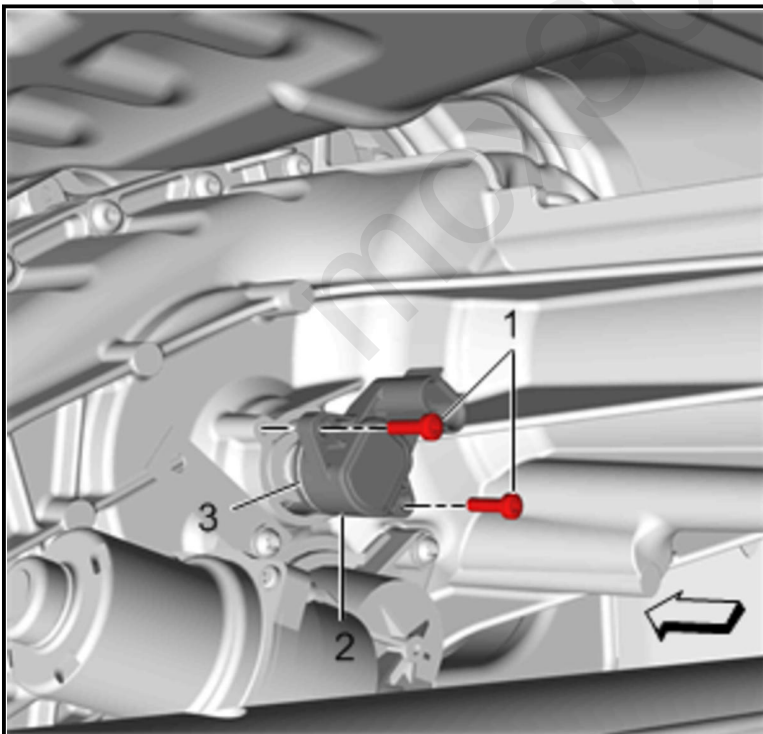
1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Disconnect the electrical connector from the transfer case two/four wheel drive actuator position sensor.
3. Remove the transfer case two/four wheel drive actuator position sensor fasteners (1) from the transfer case.



4. Remove the transfer case two/four wheel drive actuator position sensor (2) from the transfer case.
5. If necessary, remove and Discard the transfer case two/four wheel drive actuator position sensor O-ring from the sensor (3).

Installation Procedure

1. If necessary, install a New transfer case two/four wheel drive actuator position sensor O-ring (3) on the sensor (2).



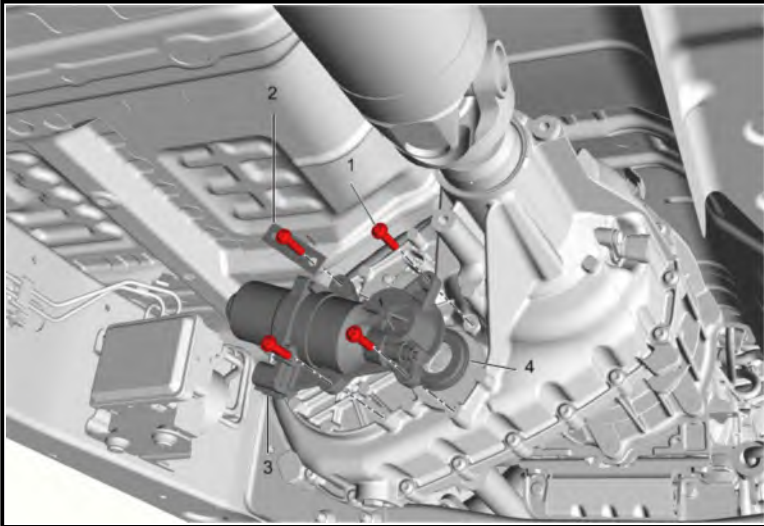
2. Install the transfer case two/four wheel drive actuator position sensor (2) into the transfer case.

CAUTION: Refer to [Fastener Caution](#) .

3. Install the transfer case two/four wheel drive actuator position sensor fasteners (1) and tighten to 8 N.m (71 lb in).
4. Connect the electrical connector to the transfer case two/four wheel drive actuator position sensor.

5. Lower the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .

TRANSFER CASE FOUR WHEEL DRIVE ACTUATOR REPLACEMENT



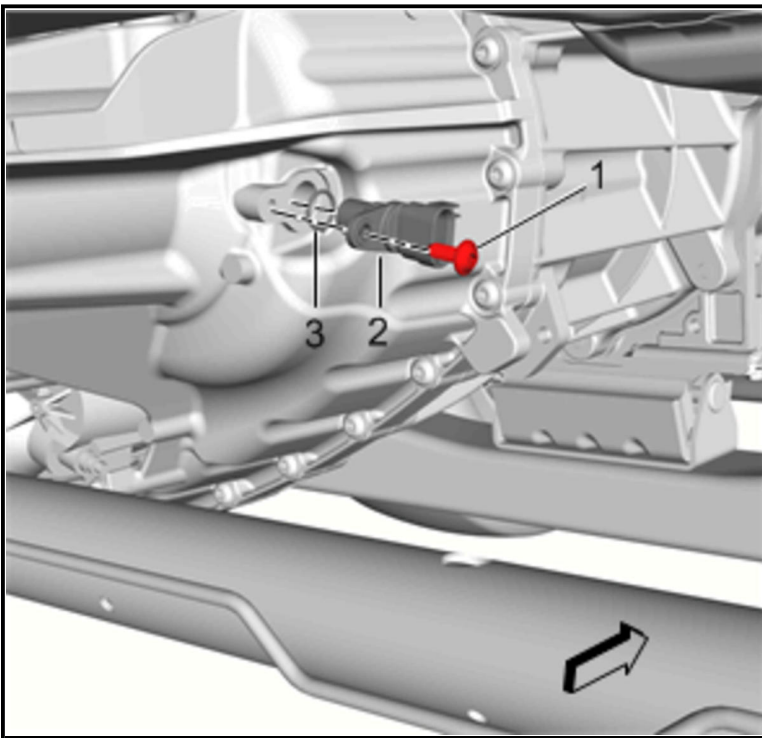
NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. Disconnect the electrical connector. 3. Place a drain pan beneath the area of the actuator. 4. Fill the transfer case as required after replacing the actuator. Refer to Transfer Case Fluid Replacement .	
1	Two/Four Wheel Drive Actuator Bolt (Qty: 4) CAUTION: Refer to Fastener Caution . Tighten 19 N.m (14 lb ft)
2	Wire Harness Retainer Bracket
3	Two/Four Wheel Drive Actuator
4	Two/Four Wheel Drive Actuator Seal

VEHICLE SPEED SENSOR REPLACEMENT

Removal Procedure

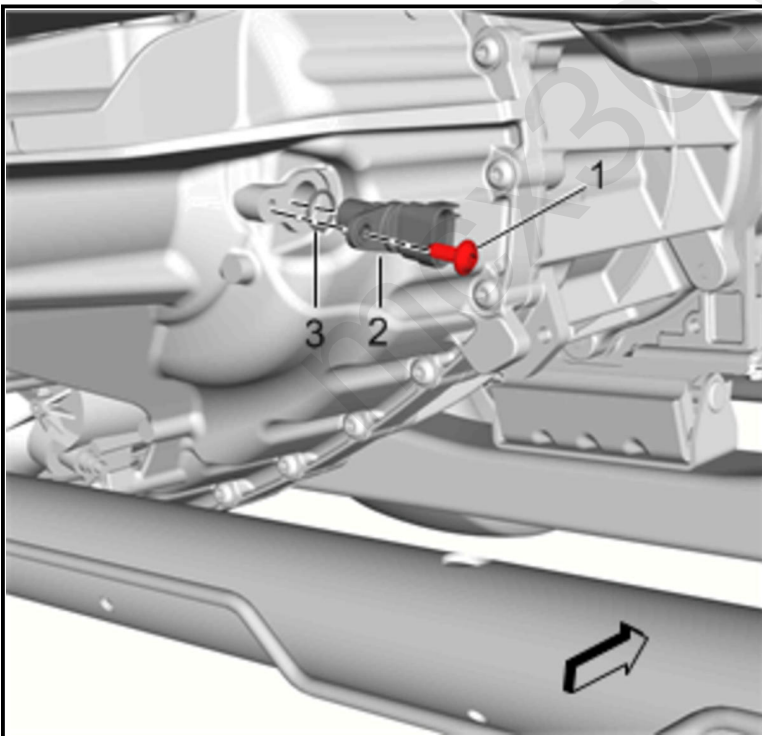
1. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Disconnect the electrical connector from the transfer case vehicle speed sensor.
3. Remove the transfer case vehicle speed sensor fastener (1) from the transfer case.



4. Remove the transfer case vehicle speed sensor (2) from the transfer case.
5. If necessary, remove and Discard the transfer case vehicle speed sensor O-ring (3).

Installation Procedure

1. If necessary, install a New transfer case vehicle speed sensor O-ring (3).



2. Install the transfer case vehicle speed sensor (2) into the transfer case.

CAUTION: Refer to [Fastener Caution](#) .

3. Install the transfer case vehicle speed sensor fastener (1) and tighten to 8 N.m (71 lb in).
4. Connect the electrical connector to the transfer case vehicle speed sensor.
5. Lower the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .

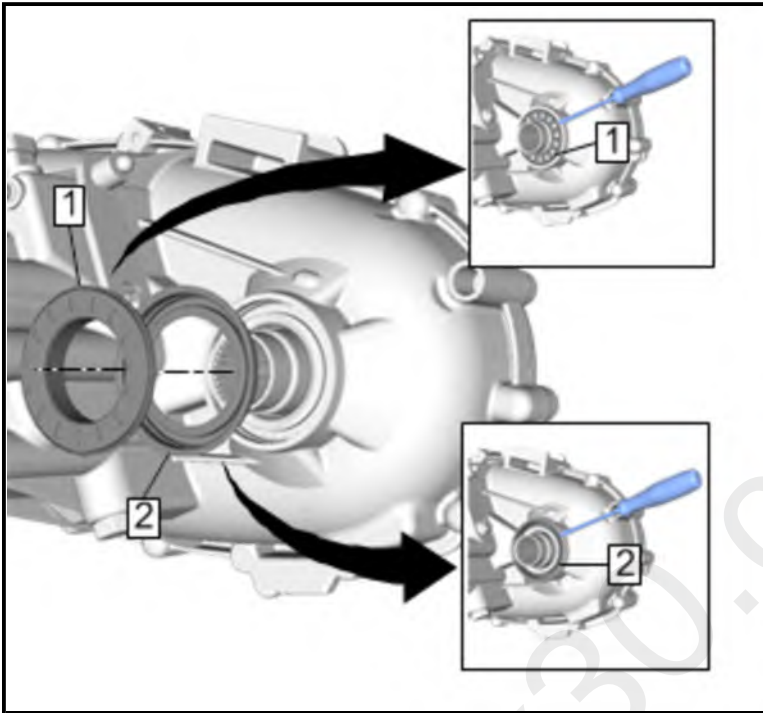
FRONT OUTPUT SHAFT SEAL REPLACEMENT

Removal Procedure

1. Remove the front propeller shaft. Refer to [Front Axle Propeller Shaft Replacement \(Without Bison\)](#) , or [Front Axle Propeller Shaft Replacement \(With Bison\)](#) .
2. Remove the front output shaft flange seal. Refer to transfer case front output shaft flange, front output shaft seal and front output shaft removal in [Transfer Case Disassemble](#) .

NOTE: Remove the front output shaft seal in two pieces using the following procedure.

3. Insert a screwdriver between the metal inner and metal outer portions of the seal.



4. Pry upward in multiple locations working the metal inner portion of the seal off the shaft until removed.
5. Once the inner metal portion is removed, insert a screwdriver between the outer diameter metal flange of the seal and the housing.
6. Drive the screwdriver inward in multiple locations, the outer portion of the seal will be distorted and can easily be removed from the housing.

Installation Procedure

1. Install the front output shaft flange seal. Refer to transfer case front output shaft flange, front output shaft seal and front output shaft installation in [Transfer Case Assemble](#) .
2. Install the front propeller shaft. Refer to [Front Axle Propeller Shaft Replacement \(Without Bison\)](#) , or [Front Axle Propeller Shaft Replacement \(With Bison\)](#) .

TRANSFER CASE FRONT OUTPUT SHAFT OIL SLINGER REPLACEMENT

Removal Procedure

1. Remove the front propeller shaft. Refer to [Front Axle Propeller Shaft Replacement \(Without Bison\)](#) , or [Front Axle Propeller Shaft Replacement \(With Bison\)](#) .
2. Remove the transfer case front output shaft oil slinger. Refer to transfer case front output shaft flange, front output shaft seal and front output shaft removal in [Transfer Case Disassemble](#) .

Installation Procedure

1. Install the transfer case front output shaft oil slinger. Refer to transfer case front output shaft flange, front output shaft seal and front output shaft installation in [Transfer Case Assemble](#) .

2. Install the front propeller shaft. Refer to [Front Axle Propeller Shaft Replacement \(Without Bison\)](#) , or [Front Axle Propeller Shaft Replacement \(With Bison\)](#) .

TRANSFER CASE FRONT OUTPUT SHAFT FLANGE REPLACEMENT

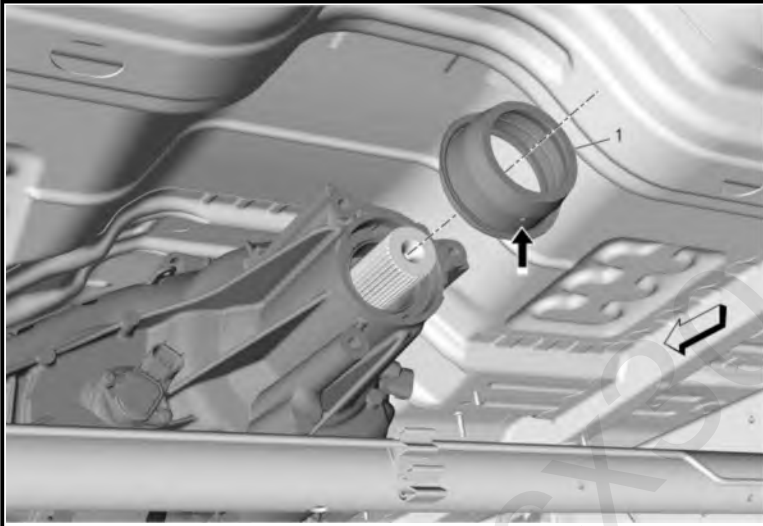
Removal Procedure

1. Remove the front propeller shaft. Refer to [Front Axle Propeller Shaft Replacement \(Without Bison\)](#) , or [Front Axle Propeller Shaft Replacement \(With Bison\)](#) .
2. Remove the transfer case front output shaft flange. Refer to transfer case front output shaft flange, front output shaft seal and front output shaft removal in [Transfer Case Disassemble](#).

Installation Procedure

1. Install the transfer case front output shaft flange. Refer to transfer case front output shaft flange, front output shaft seal and front output shaft installation in [Transfer Case Assemble](#).
2. Install the front propeller shaft. Refer to [Front Axle Propeller Shaft Replacement \(Without Bison\)](#) , or [Front Axle Propeller Shaft Replacement \(With Bison\)](#) .

REAR OUTPUT SHAFT SEAL REPLACEMENT



NOTE: Callouts in the following chart represent components shown in graphic above.

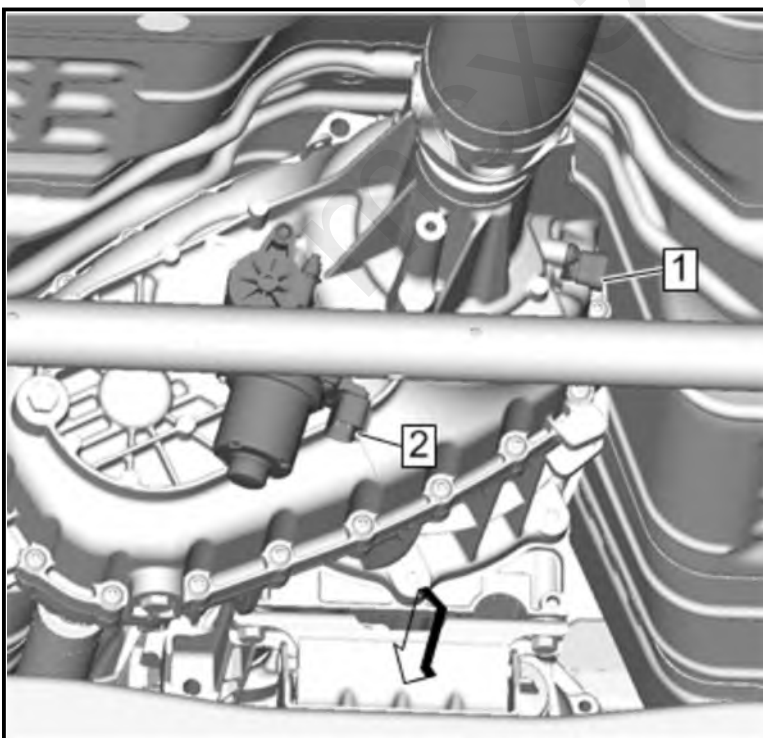
Callout	Component Name
CAUTION: Do not damage the sealing surfaces of the transfer cases or the shafts when prying the seals for removal. Damaging the sealing surface may cause leakage or require replacement of the	

Callout	Component Name
damaged component.	
Preliminary Procedure Remove the rear propeller shaft. Refer to Propeller Shaft Replacement (With MYB) , or Propeller Shaft Replacement (M5T with 2WD) , or Propeller Shaft Replacement (M5T with 4WD) , or Propeller Shaft Replacement (With Bison) .	
1	Transfer Case Output Shaft Seal Procedure 1. Remove the seal using an appropriate tool. 2. Install the seal with the notch at the top and the weep hole at the bottom. Special Tools • DT-48210 Seal Installer • J-8092 Drive Handle For equivalent regional tools, refer to Special Tools .

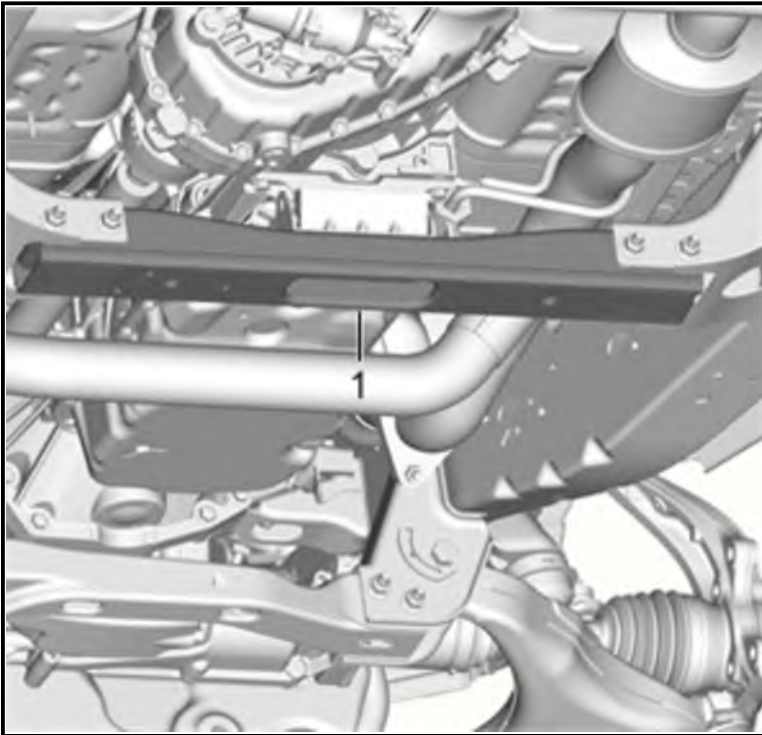
TRANSFER CASE ASSEMBLY REPLACEMENT (NQ6)

Removal Procedure

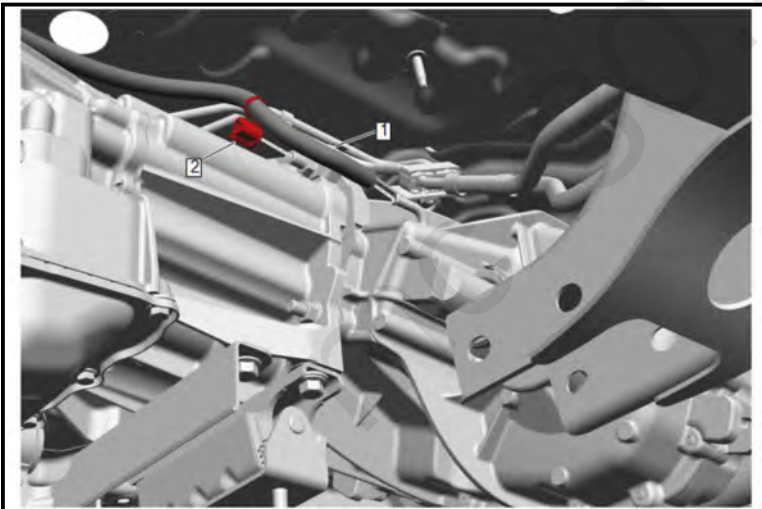
1. Remove the propeller shaft. [Propeller Shaft Replacement \(With MYB\)](#) , or [Propeller Shaft Replacement \(With Bison\)](#).
2. Remove the front propeller shaft. [Front Axle Propeller Shaft Replacement \(Without Bison\)](#) , or [Front Axle Propeller Shaft Replacement \(With Bison\)](#).
3. Disconnect the wiring harness electrical connectors from the following:



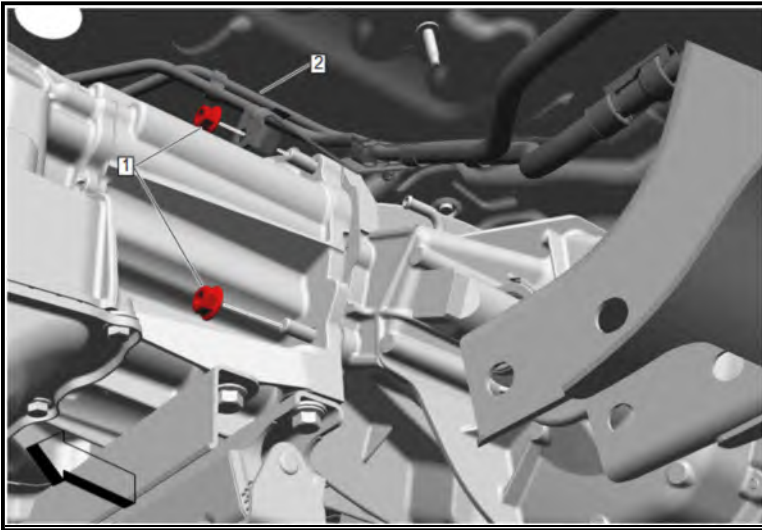
- Vehicle speed sensor (1)
 - Four wheel drive actuator (2)
4. Position the Transmission wiring harness aside.
 5. Remove the transmission support crossmember (1). [Transmission Support Crossmember Replacement \(4 Wheel Drive\)](#).



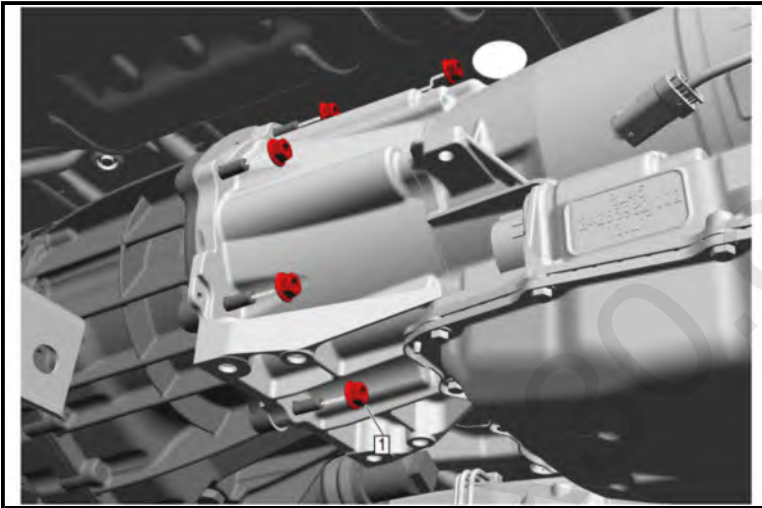
6. Remove the transmission mount. [Transmission Mount Replacement \(4WD\)](#)
7. Using a suitable transmission jack, support the transfer case.
8. Remove the four wheel drive actuator from the transfer case. [Transfer Case Four Wheel Drive Actuator Replacement](#)
9. Disconnect the vent hose (1) and the vent hose retainer (2) from the transfer case.



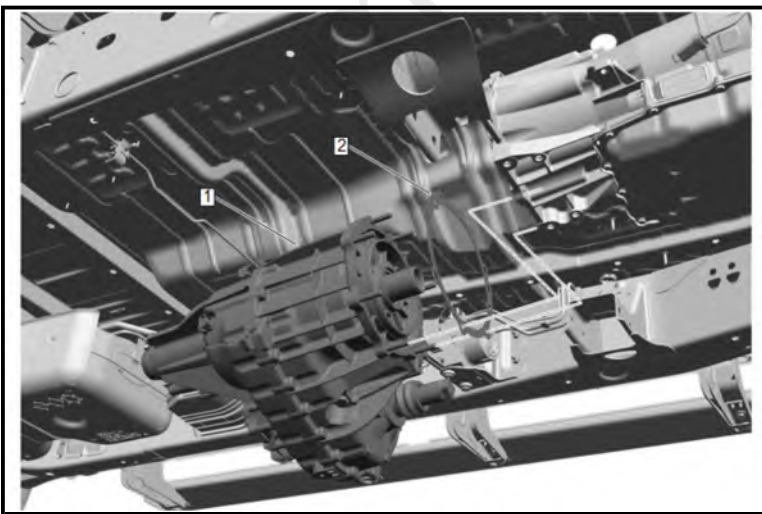
10. Transfer Case Nut (1) - Remove [2x]



11. Remove and reposition the fuel feed pipe (2).
12. Lower the transfer case to gain access to the top fasteners.
13. Transfer Case Nut (1) - Remove [5x]



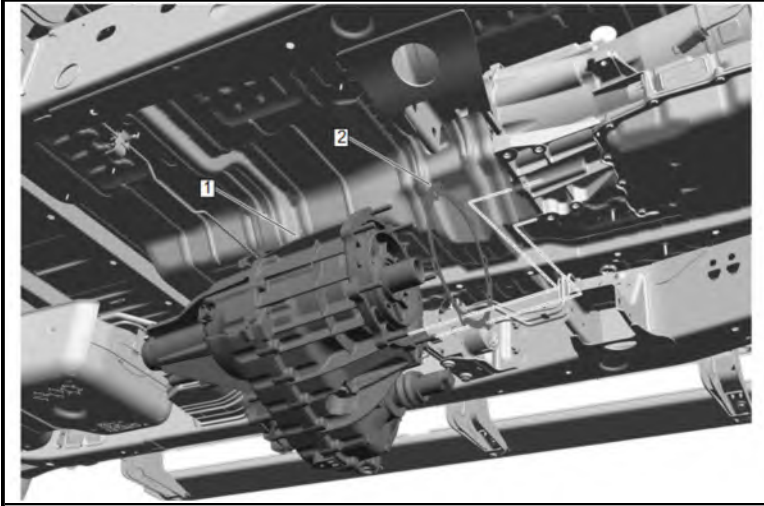
14. Remove the transfer case (1) and extension housing gasket (2).



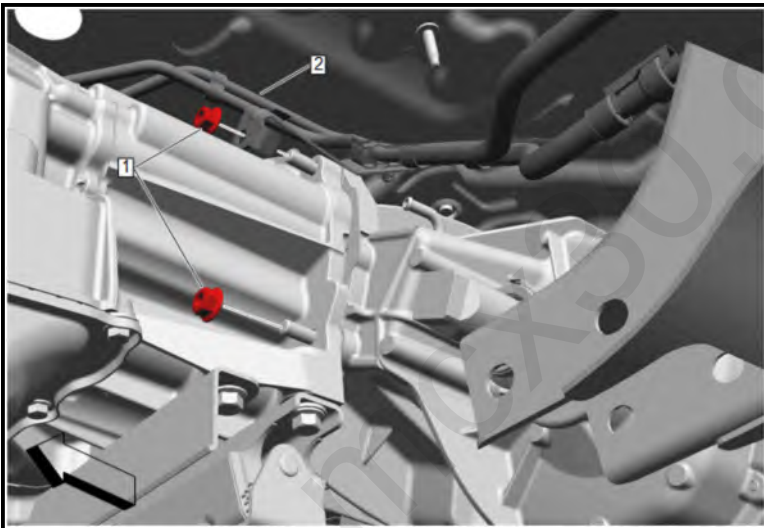
15. DISCARD the extension housing gasket (2).
16. With the aid of an assistant, carefully lower the transfer case from the vehicle.
17. Install the transmission mount. [Transmission Mount Replacement \(4WD\)](#)
18. To support the transmission assembly, install the transmission support crossmember. [Transmission Support Crossmember Replacement \(4 Wheel Drive\)](#)

Installation Procedure

1. Install a NEW extension housing gasket (2) onto the transfer case.

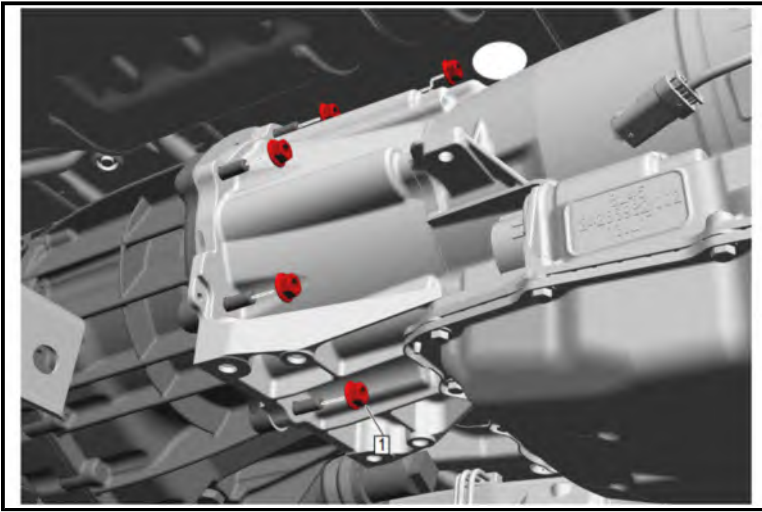


2. With the aid of an assistant, carefully raise the transfer case to the transfer case extension housing, aligning the splines.
3. Install the extension housing gasket (2) and the transfer case (1).
4. Reposition and install the fuel feed pipe (2).

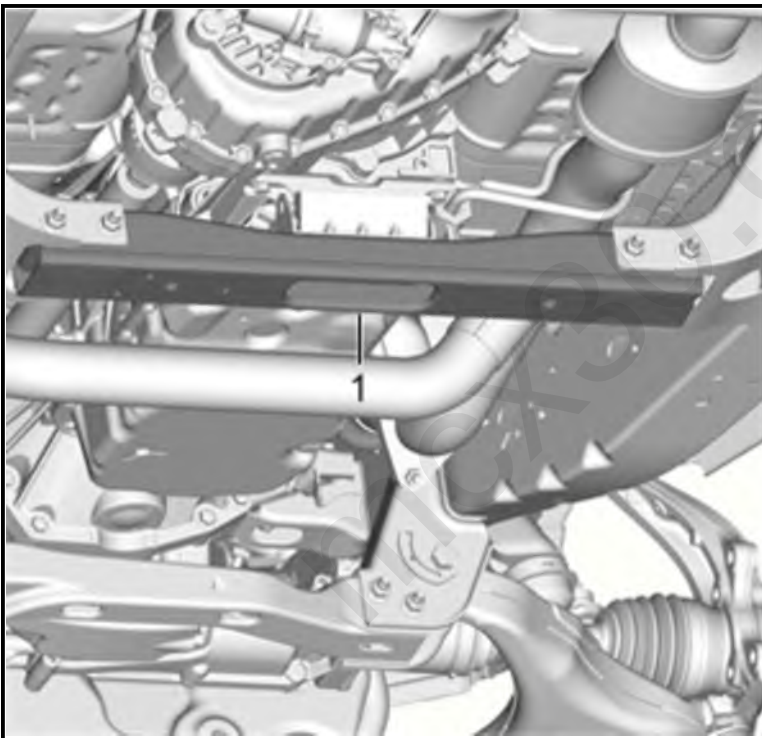


CAUTION: Refer to [Fastener Caution](#) .

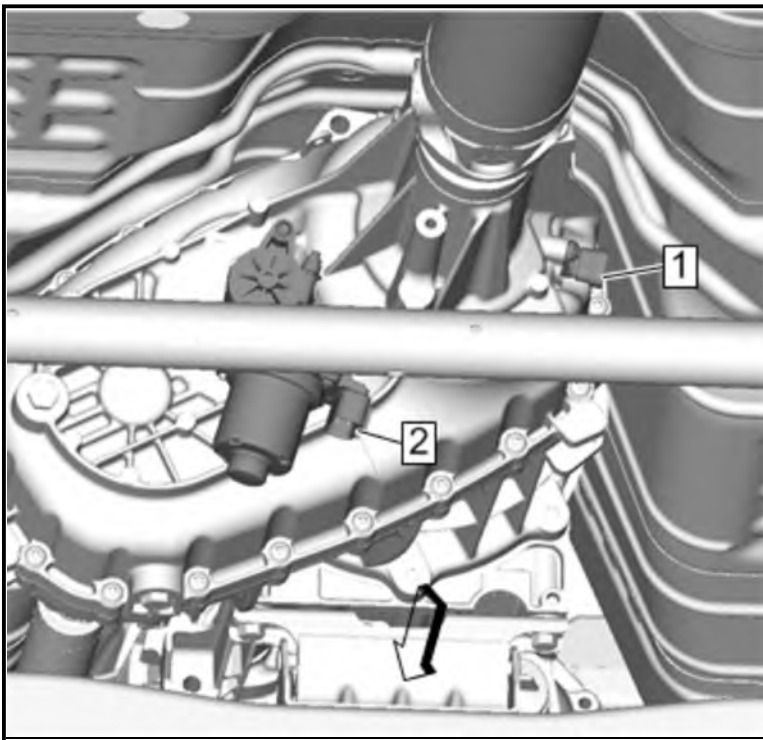
5. Transfer Case Nut (1) - Install and tighten [2x] 50 N.m (37 lb ft)
6. To gain access to the lower fastener, remove the transmission mount. [Transmission Mount Replacement \(4WD\)](#)
7. Transfer Case Nut (1) - Install and tighten [5x] 50 N.m (37 lb ft)



8. Using a suitable jack, raise the transfer case with extension housing.
9. Remove the transmission support crossmember. [Transmission Support Crossmember Replacement \(4 Wheel Drive\)](#)
10. Install the transmission mount. [Transmission Mount Replacement \(4WD\)](#)
11. Install the transmission support crossmember (1). [Transmission Support Crossmember Replacement \(4 Wheel Drive\)](#)



12. Install the four wheel drive actuator to the transfer case. [Transfer Case Four Wheel Drive Actuator Replacement](#)
13. Position the transmission wiring harness to the transfer case assembly.
14. Connect the engine wiring harness electrical connectors to the following:



- Vehicle speed sensor (1)
- Four wheel drive actuator (2)

15. Install the propeller shaft. [Propeller Shaft Replacement \(With MYB\)](#) , or [Propeller Shaft Replacement \(With Bison\)](#)
16. Install the front propeller shaft. [Front Axle Propeller Shaft Replacement \(Without Bison\)](#) , or [Front Axle Propeller Shaft Replacement \(With Bison\)](#)
17. Fill the transfer case with fluid, if previously drained or lost from component replacement. [Adhesives, Fluids, Lubricants, and Sealers](#)

TRANSFER CASE ADAPTER REPLACEMENT (EQUIPPED WITH LWN ENGINE)

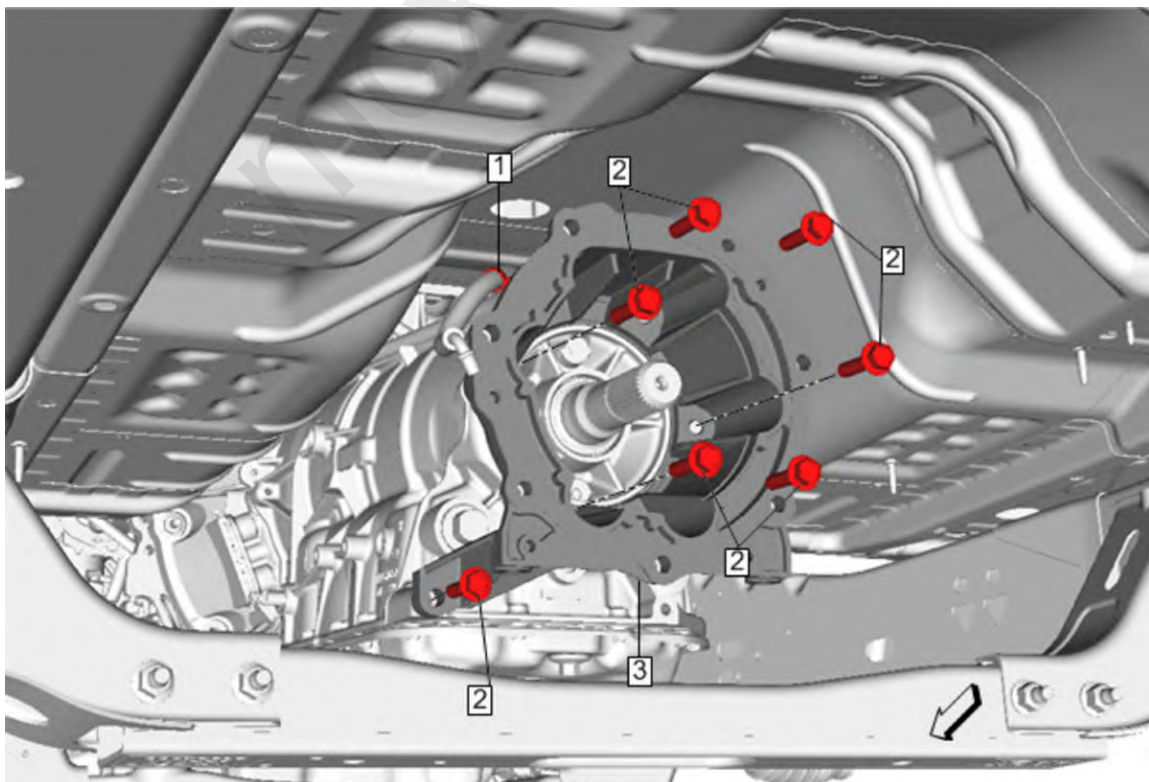


Fig. 4: Transfer Case Adapter Components Location (Equipped With LWN Engine)

Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure Remove the transfer case. Refer to Transfer Case Adapter Replacement (Equipped with LWN Engine) .	
1	Transfer Case Vent Tube Retainer
2	Transfer Case Adapter Bolt (Qty: 7) CAUTION: Refer to Fastener Caution . Tighten 58 N.m (43 lb ft)
3	Transfer Case Adapter NOTE: Replace the transfer case adapter gasket.

TRANSFER CASE ADAPTER REPLACEMENT (EQUIPPED WITH LCV ENGINE)

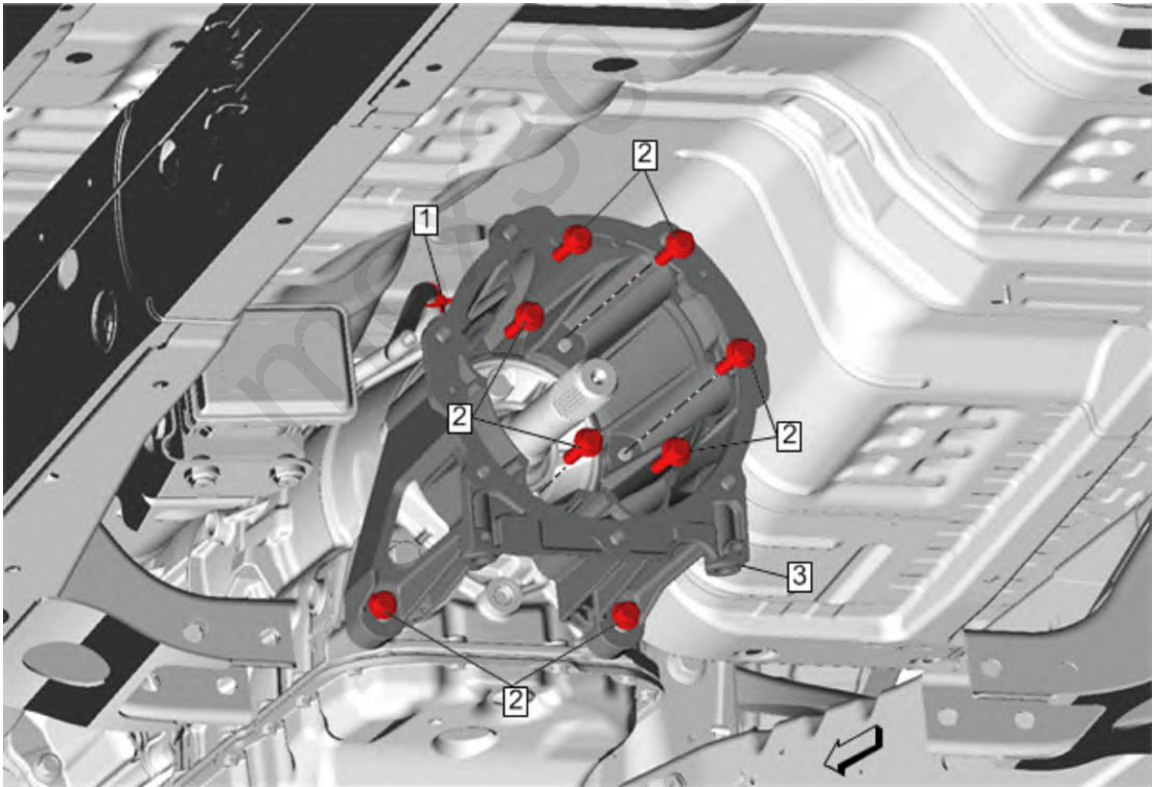


Fig. 5: Transfer Case Adapter Components Location (Equipped With LCV Engine)
Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure Remove the transfer case. Refer to Transfer Case Assembly Replacement (NQ7) .	

Callout	Component Name
1	Transfer Case Vent Tube Retainer
2	Transfer Case Adapter Bolt (Qty: 8) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 58 N.m (43 lb ft)
3	Transfer Case Adapter NOTE: Replace the transfer case adapter gasket.

INPUT SHAFT SEAL REPLACEMENT

Removal Procedure

1. Remove the transfer case. Refer to Transfer Case Assembly Replacement (NQ7) .
2. Remove the input shaft seal from the transfer case. Refer to input shaft seal removal in Transfer Case Disassemble .

Installation Procedure

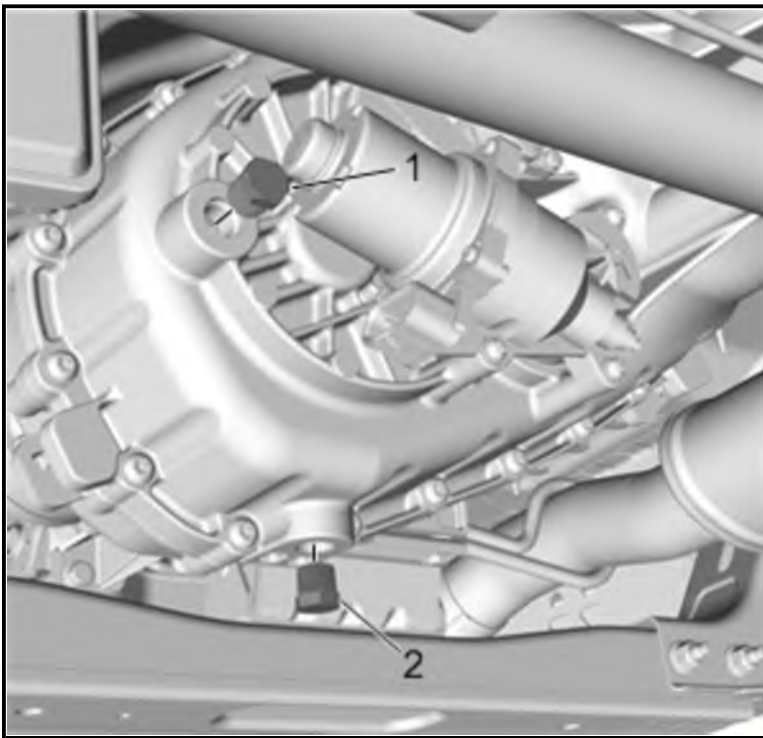
1. Install the input shaft seal. Refer to input shaft seal installation in Transfer Case Assemble .
2. Install the transfer case. Refer to Transfer Case Assembly Replacement (NQ7) .

TRANSFER CASE OIL FILL PLUG REPLACEMENT

Removal Procedure

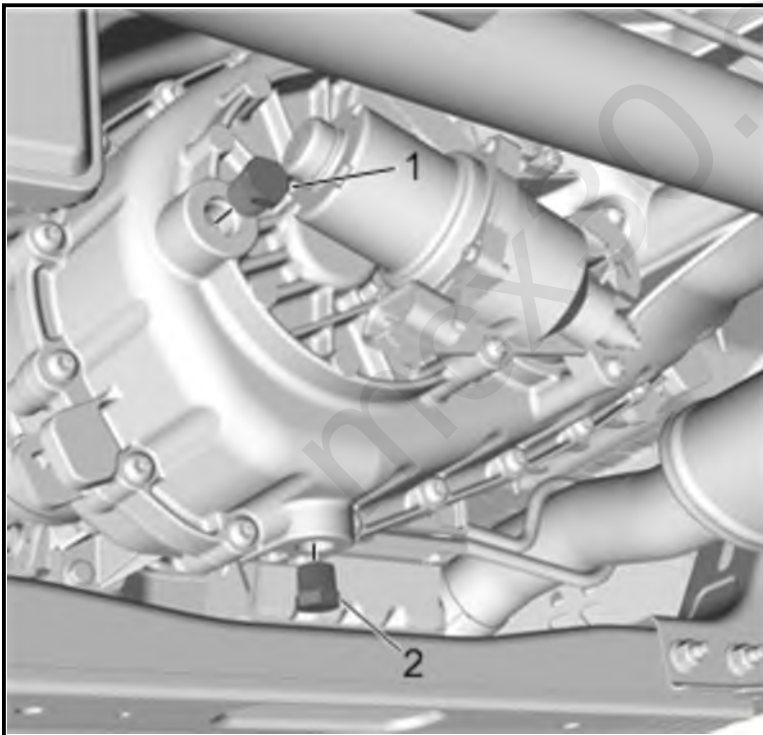
NOTE: When performing the following service procedures, use only hand tools to remove and install the fill or drain plugs.

1. Raise the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Remove the fill plug (1) from the transfer case.



Installation Procedure

1. Apply sealant to the threads on the fill plug (1). Refer to [Adhesives, Fluids, Lubricants, and Sealers](#) .



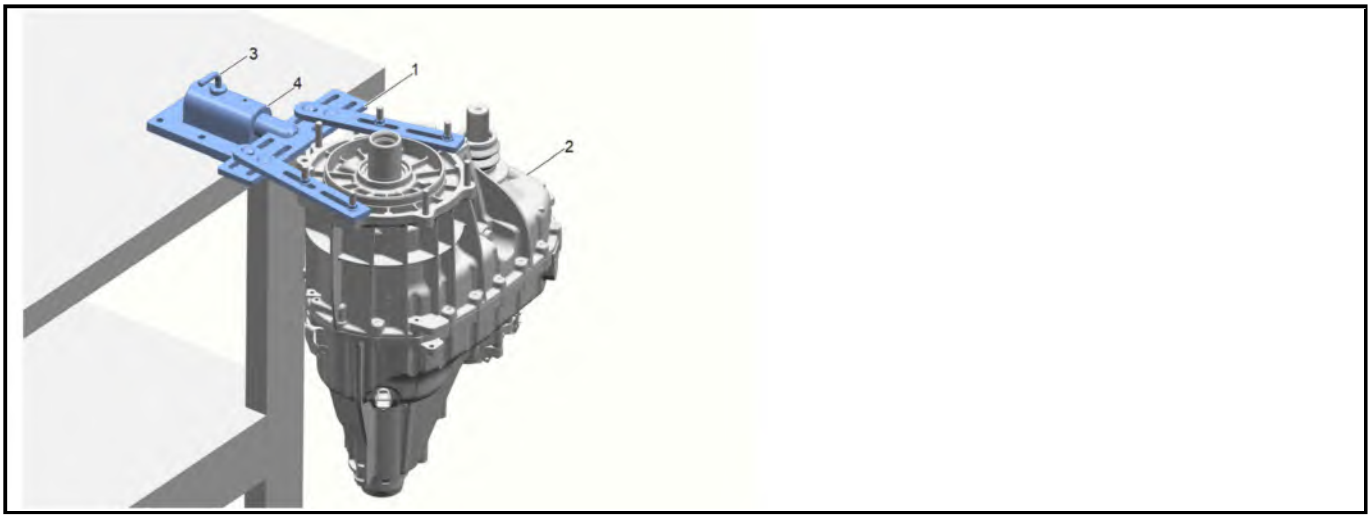
CAUTION: Refer to [Component Fastener Tightening Caution](#) .

2. Install the fill plug (1) in the transfer case and tighten to 25 N.m (18 lb ft).
3. Lower the vehicle.

REPAIR INSTRUCTIONS - OFF VEHICLE

TRANSFER CASE DISASSEMBLE

Transfer Case Holding Fixture Installation



NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Holding Fixture Installation

Callout	Component Name
1	Transfer Case Nut Procedure Use nuts with M10 x 1.5 mm threads. Special Tools DT-36842 Transaxle Holding Fixture (1) Equivalent regional tools: Special Tools
2	Transfer Case Special Tools DT - 3289-20 Holding Fixture (4)
3	Pivot Pin (3) Procedure 1. Always secure with the pivot pin after rotating. 2. The transfer case can be rotated 360 degrees to facilitate repair.

Transfer Case Access Hole Plugs, Fill and Drain Plug, Vent, 4 Wheel Drive Actuator, 2/4 Wheel Drive Actuator Position Sensor, Shift Detent Plunger Plug, and Vehicle Speed Sensor Removal

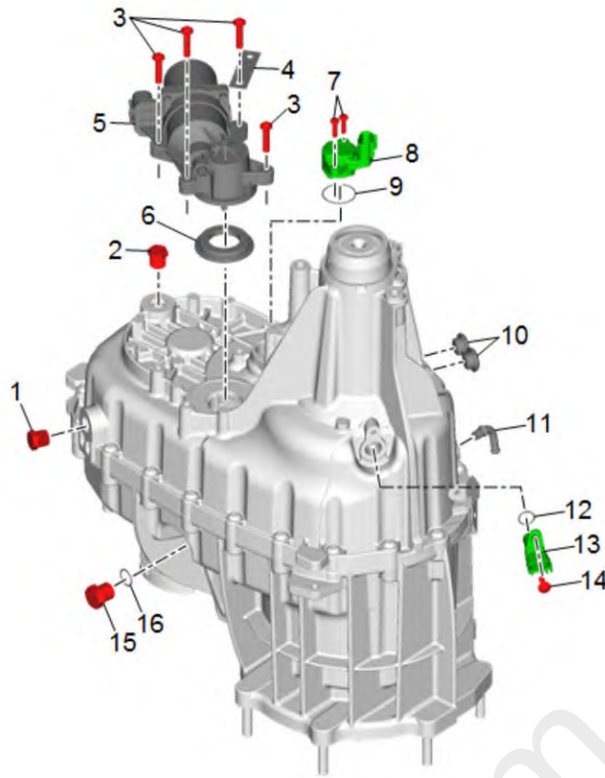


Fig. 6: Transfer Case Components Location

Courtesy of GENERAL MOTORS COMPANY

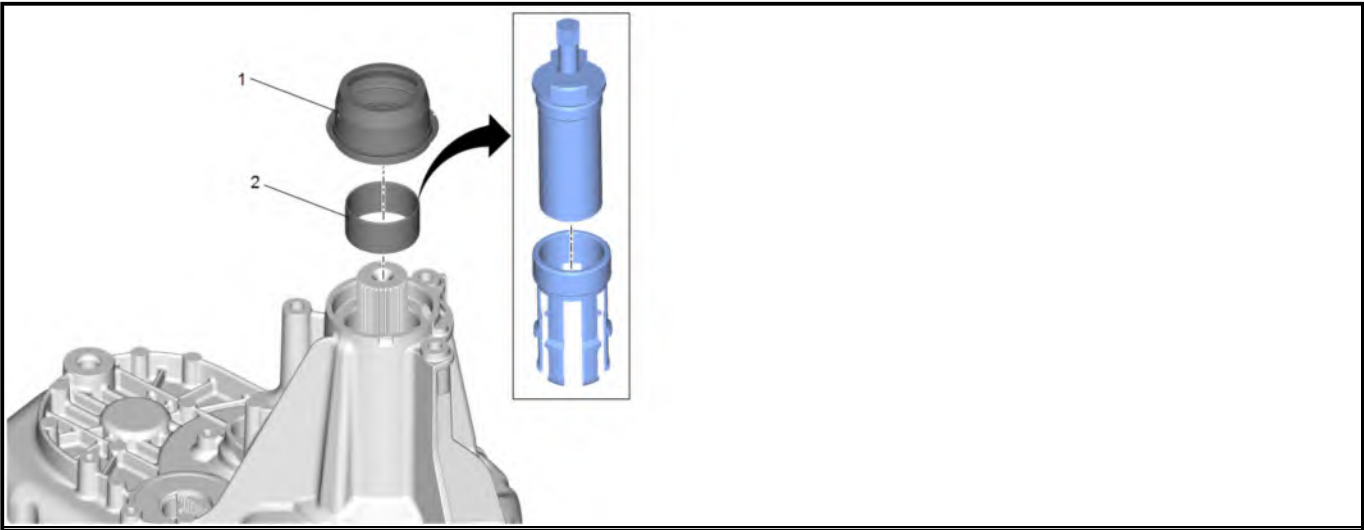
NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Access Hole Plugs, Fill and Drain Plug, Vent, 4 Wheel Drive Actuator, 2/4 Wheel Drive Actuator Position Sensor, Shift Detent Plunger Plug, and Vehicle Speed Sensor Removal

Callout	Component Name
1	Transfer Case Drain Plug Procedure Remove and DISCARD
2	Transfer Case Fill Plug Procedure Remove and DISCARD
3	Transfer Case Two/Four Wheel Drive Actuator Bolt/Screw [3x]
4	Transfer Case Actuator Harness Bracket
5	Transfer Case Four Wheel Drive Actuator
6	Transfer Case Two/Four Wheel Drive Actuator Seal
7	Transfer Case Two/Four Wheel Drive Actuator Position Sensor Bolt [2x]
8	Transfer Case Two/Four Wheel Drive Actuator Position Sensor
9	Transfer Case Two/Four Wheel Drive Actuator Position Sensor Seal
10	Transfer Case Access Hole Plug [2x]
11	Transfer Case Vent Procedure Remove ONLY if the vent pipe is damaged.
12	Vehicle Speed Sensor Bolt
13	Vehicle Speed Sensor
14	Vehicle Speed Sensor O-Ring Procedure Remove and replace only if damaged.
15	Transfer Case Shift Detent Plunger Plug
16	Transfer Case Shift Detent Plunger Plug Seal Procedure

Callout	Component Name
	Remove and replace only if damaged.

Transfer Case Rear Output Shaft Seal and Bushing Removal

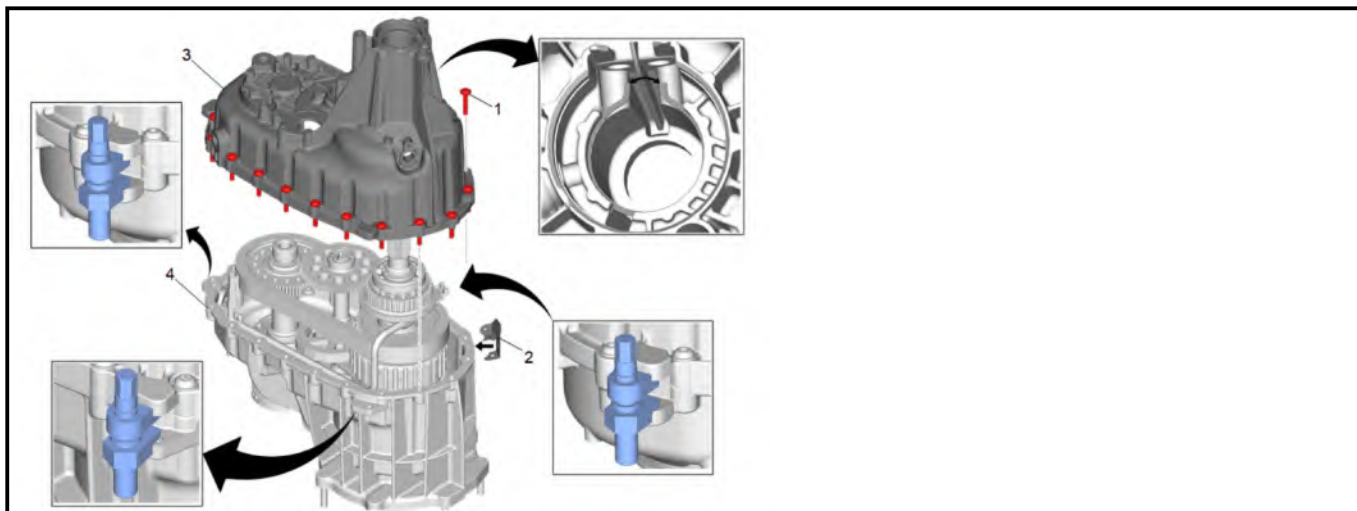


NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Rear Output Shaft Seal and Bushing Removal

Callout	Component Name
1	Transfer Case Rear Output Shaft Seal CAUTION: Refer to Transfer Case Seal Removal Caution .
2	Transfer Case Rear Output Shaft Bushing Procedure 1. Install the finger section of the DT-45380 Transfer Case Rear Bushing Remover and Installer into bushing. 2. Install the tube and forcing screw assembly into the finger section. Ensure the forcing screw is backed out. 3. Using a wrench on the forcing screw, remove the bushing. NOTE: Only remove the bushing if faulty. Transfer Case Rear Half Cleaning and Inspection Special Tools DT-45380 Transfer Case Rear Bushing Remover and Installer Equivalent regional tools: Special Tools

Transfer Case Rear Extension Removal



NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Rear Extension Removal

Callout	Component Name
1	Transfer Case Half Bolt [20x]
2	Transfer Case Bracket
3	Transfer Case Rear Case Half CAUTION: Refer to Machined Surface Damage Caution . Procedure 1. Use DT-50228 Case Splitter to spread the case halves. 2. Use snap ring pliers to release the transfer case rear output shaft outer retaining ring from the transfer case rear output shaft rear bearing assembly. Special Tools DT-50228 Case Splitter Equivalent regional tools: Special Tools
4	Transfer Case Front Case Half

Transfer Case Oil Pump Suction Pipe and Actuator Shaft Gear Removal

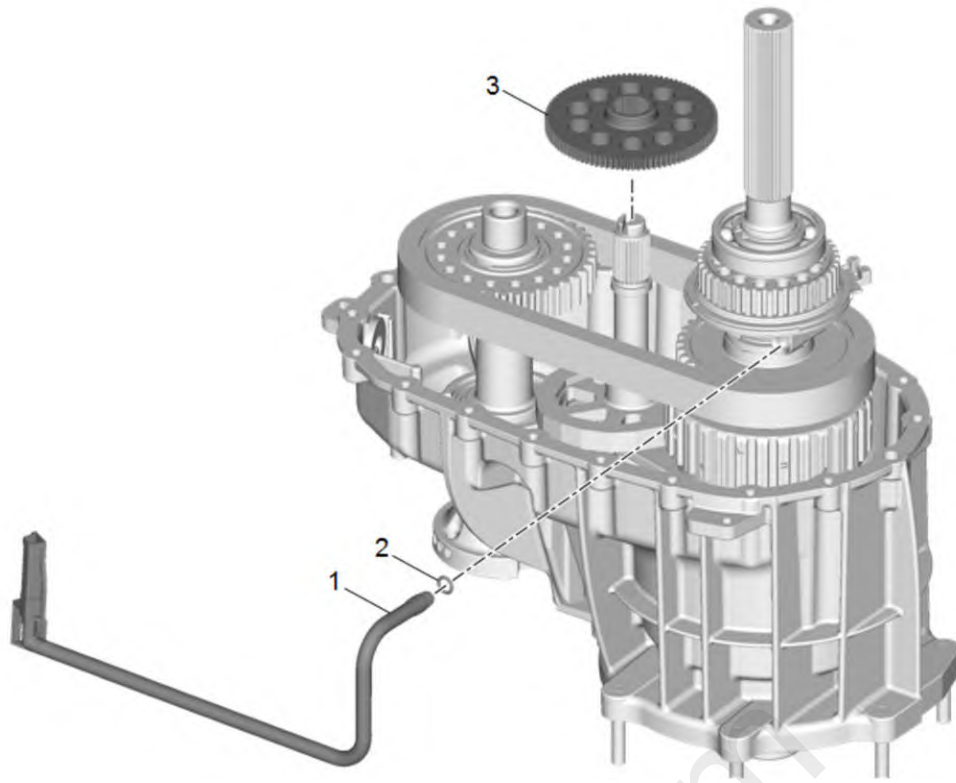


Fig. 7: Transfer Case Oil Pump Suction Pipe And Actuator Shaft Gear Components Location
 Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Oil Pump Suction Pipe and Actuator Shaft Gear Removal

Callout	Component Name
1	Transfer Case Oil Pump Suction Pipe
2	Transfer Case Oil Pump Suction Pipe Seal
3	Transfer Case Two/Four Wheel Drive Actuator Shaft Gear

Transfer Case Front Output Shaft Driven Sprocket, Clutch Assembly, Drive Chain, High/Low Shift Fork Assembly, High/Low Clutch and Chip Collector Magnet Removal

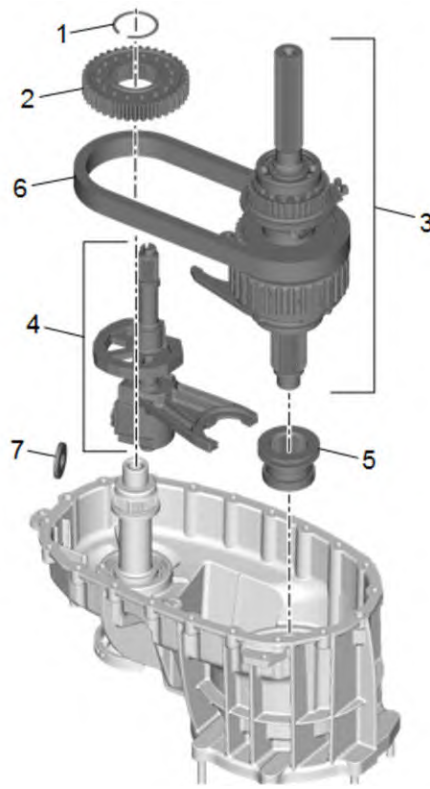


Fig. 8: Transfer Case Components Location
 Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Front Output Shaft Driven Sprocket, Clutch Assembly, Drive Chain, High/Low Shift Fork Assembly, High/Low Clutch and Chip Collector Magnet Removal

Callout	Component Name
1	Transfer Case Front Output Shaft Drive Sprocket Retaining Ring
2	Transfer Case Front Output Shaft Driven Sprocket Procedure Lift upward on the output shaft assembly (3) in order to separate the chain (6) from the driven gear (2).
3	Transfer Case Clutch Pack Assembly Procedure 1. The shift fork assembly (4) and rear output shaft assembly can be removed at the same time. 2. Mount the rear output shaft assembly into a soft-jaw vice or holding fixture for disassembly.
4	Transfer Case High/Low Shift Fork Assembly
5	Transfer Case High/Low Clutch
6	Transfer Case Front Output Shaft Drive Chain Assembly
7	Transfer Case Chip Collector Magnet

Transfer Case Clutch Assembly Disassemble

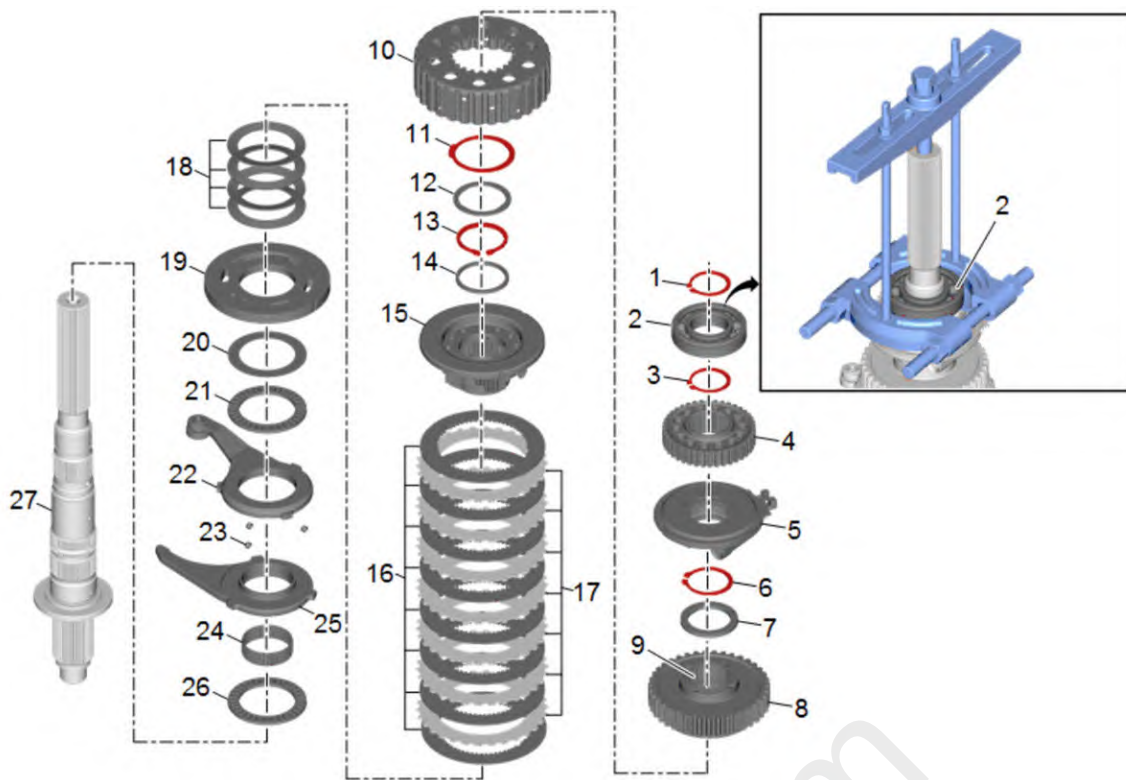


Fig. 9: Exploded View Of Transfer Case Clutch Assembly Components

Courtesy of GENERAL MOTORS COMPANY

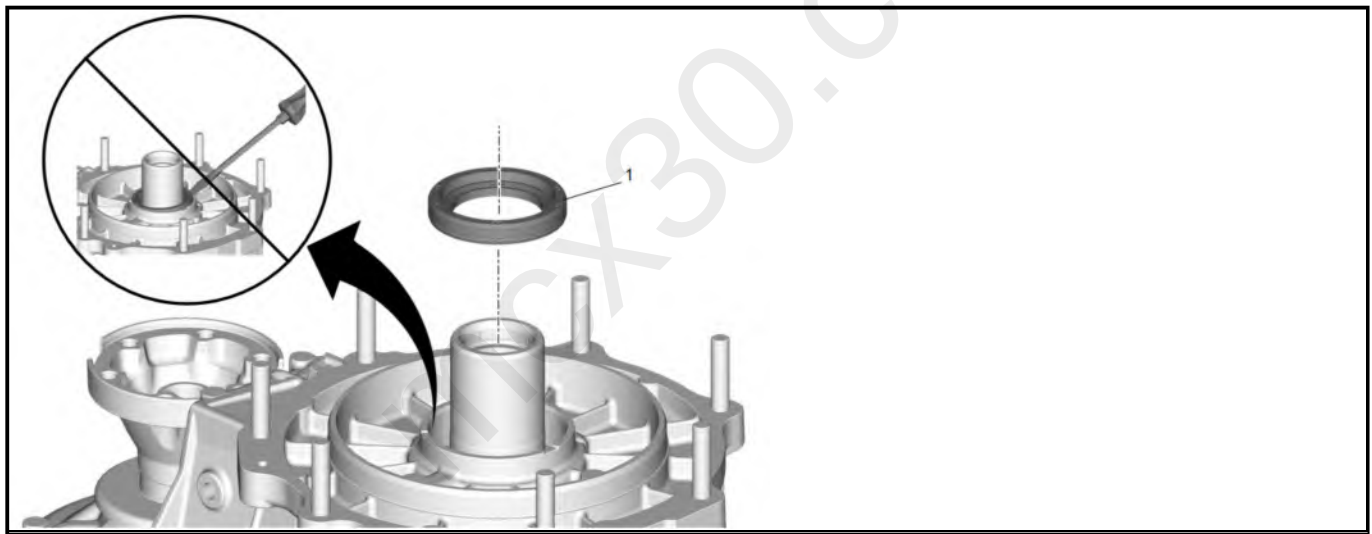
NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Clutch Assembly Disassemble

Callout	Component Name
1	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
2	Transfer Case Rear Output Shaft Rear Bearing Procedure Use an arbor press or suitable puller to remove the bearing from the rear output shaft. Special Tools • GE-8433 Two Jaw Puller • DT-22912 Split Plate Bearing Puller • DT-50315 Puller Hardware Kit Equivalent regional tools: Special Tools
3	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
4	Transfer Case Rear Output Shaft Speed Reluctor Wheel
5	Transfer Case Oil Pump
6	Transfer Case Front Output Shaft Drive Sprocket Retaining Ring
7	Transfer Case Front Output Shaft Drive Sprocket Spacer - Rear
8	Transfer Case Front Output Shaft Drive Sprocket
9	Transfer Case Front Output Shaft Drive Sprocket Bearing [2x] NOTE: Only remove the bearings if faulty.

Callout	Component Name
	<u>Drive Chain, Drive Sprocket, and Driven Sprocket Cleaning and Inspection</u>
10	Transfer Case Four Wheel Drive Clutch Housing
11	Transfer Case Four Wheel Drive Clutch Housing Retaining Ring
12	Transfer Case Front Output Shaft Driven Sprocket Spacer- Front
13	Transfer Case Two/Four Wheel Drive Clutch Retaining Ring
14	Transfer Case Four Wheel Drive Clutch Shim
15	Transfer Case Four Wheel Drive Clutch Hub
16	Transfer Case Four Wheel Drive Clutch Friction Plate [8x]
17	Transfer Case Four Wheel Drive Clutch Pressure Plate [7x]
18	Transfer Case Four Wheel Drive Clutch Pressure Plate Spring [4x]
19	Transfer Case Four Wheel Drive Clutch Pressure Plate - Apply
20	Transfer Case Control Actuator Lever Washer
21	Transfer Case Control Actuator Thrust Bearing
22	Transfer Case Scissor Mechanism Lever
23	Transfer Case Scissor Lever Ball [3x]
24	Transfer Case Control Actuator Lever Bearing
25	Transfer Case Scissor Mechanism Lever
26	Transfer Case Control Actuator Thrust Bearing
27	Transfer Case Rear Output Shaft

Transfer Case Input Shaft Oil Seal Removal



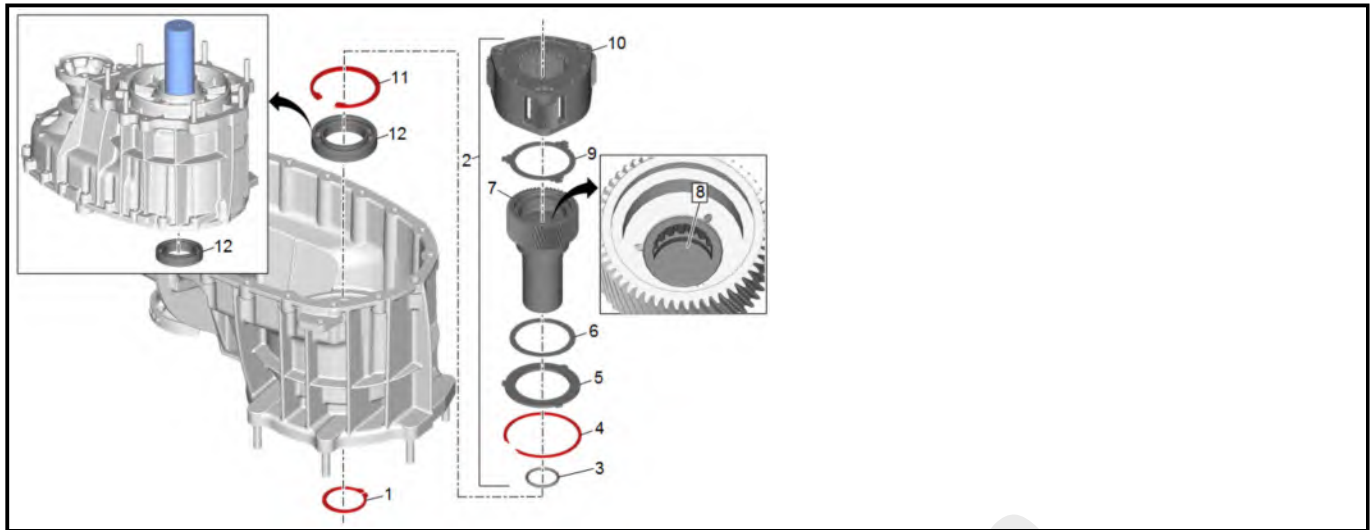
NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Input Shaft Oil Seal Removal

Callout	Component Name
1	Transfer Case Input Shaft Seal
	CAUTION: Refer to Machined Surface Damage Caution . Procedure 1. Drill a pilot hole, as required, and insert a self-tapping screw into the body of the seal.

Callout	Component Name
	2. Use a plier or slide hammer type tool to remove the seal from the bore.

Transfer Case Input Shaft and High/Low Planetary Assembly Removal



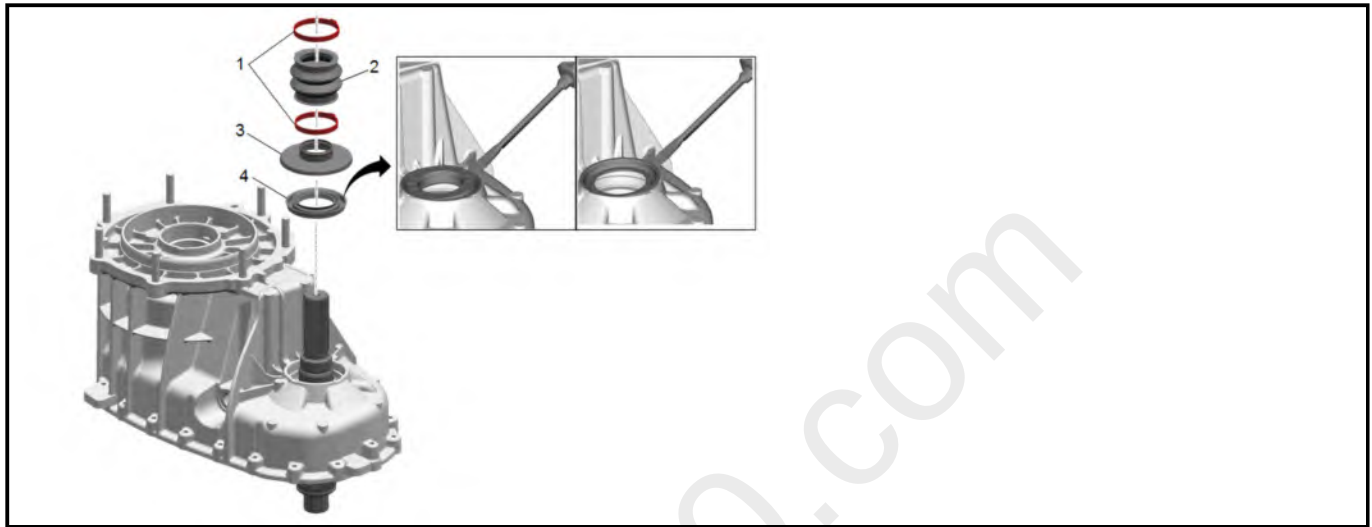
NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Input Shaft and High/Low Planetary Assembly Removal

Callout	Component Name
1	Transfer Case Input Shaft Inner Retaining Ring WARNING: Do not rotate the transfer case and holding fixture with the retaining ring removed. Rotating may cause the input shaft/planetary assembly to fall from the transfer case, resulting in personal injury.
2	Transfer Case High/Low Planetary Carrier
3	Transfer Case Input Shaft Inner Retaining Ring
4	Transfer Case High/Low Locking Plate
5	Transfer Case Input Shaft Washer
6	Transfer Case Input Shaft Seal
7	Transfer Case Input Shaft
8	Transfer Case Input Shaft Pilot Bearing NOTE: Only remove the bearing if faulty.

Callout	Component Name
	Front Output Shaft and Input Shaft Cleaning and Inspection
9	Transfer Case High/Low Planetary Carrier Pinion Gear Thrust Washer
10	Transfer Case High/Low Planetary Carrier
11	Transfer Case Input Shaft Bearing Outer Retaining Ring
12	Transfer Case Input Shaft Bearing Special Tools J-41736 Press Tube Equivalent regional tools: Special Tools

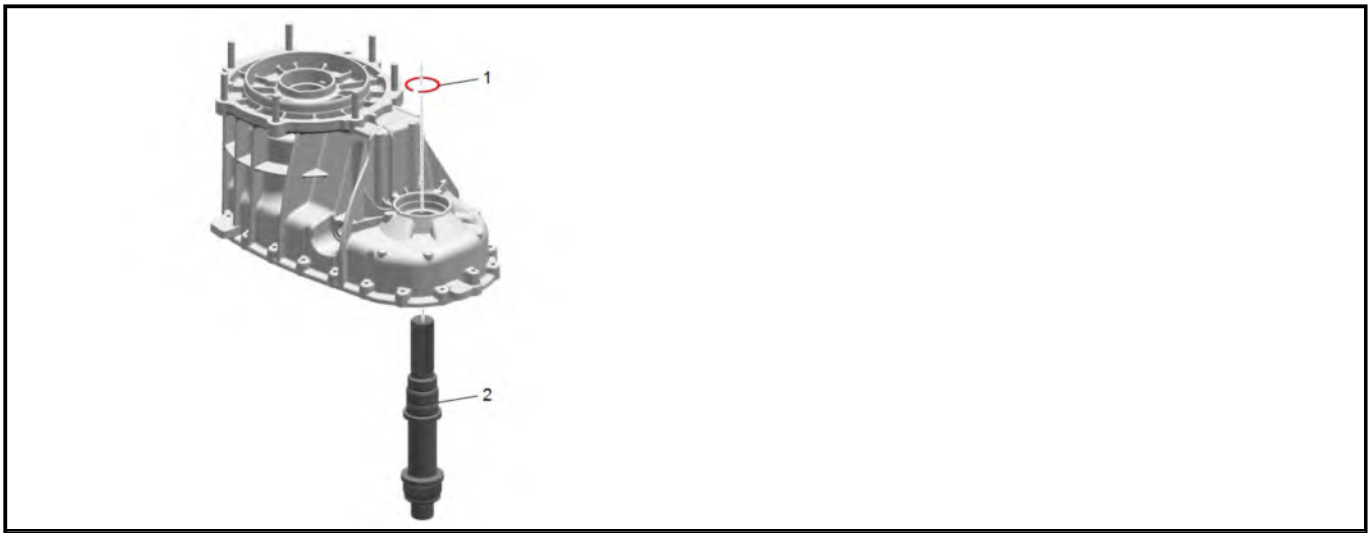
Transfer Case Front Output Shaft Seal, Oil Slinger and Boot Removal



NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Front Output Shaft Seal, Oil Slinger and Boot Removal

Callout	Component Name
1	Transfer Case Front Output Shaft Boot Clamp [2x]
2	Transfer Case Front Output Shaft Boot
3	Transfer Case Front Output Flange Oil Slinger
4	Transfer Case Front Output Shaft Seal Procedure 1. Insert a screwdriver between the metal inner and metal outer portions of the seal. 2. Pry upward in multiple locations working the metal inner portion of the seal off the shaft until removed. 3. Once the inner metal portion is removed, insert a screwdriver between the outer diameter metal flange of the seal and the housing. 4. Drive the screwdriver inward in multiple locations, the outer portion of the seal will be distorted and can easily be removed from the housing. NOTE: Removing the front output shaft seal in two pieces.

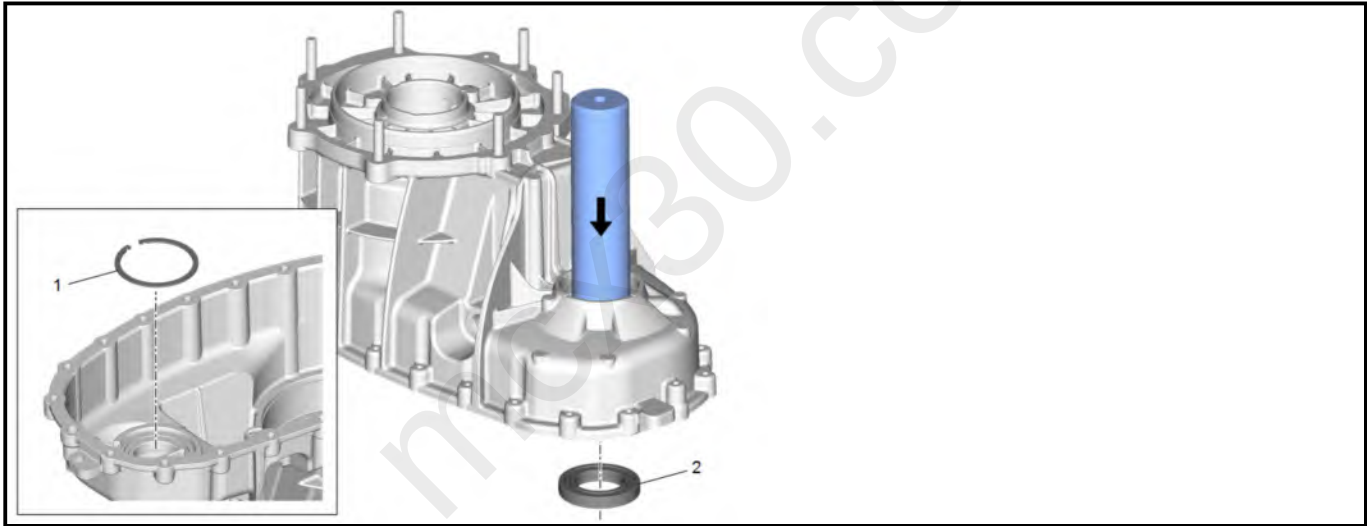


NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Front Output Shaft Front Bearing Removal

Callout	Component Name
1	Transfer Case Front Output Shaft Retaining Ring
2	Transfer Case Front Output Shaft

Transfer Case Front Output Shaft Front Bearing Removal

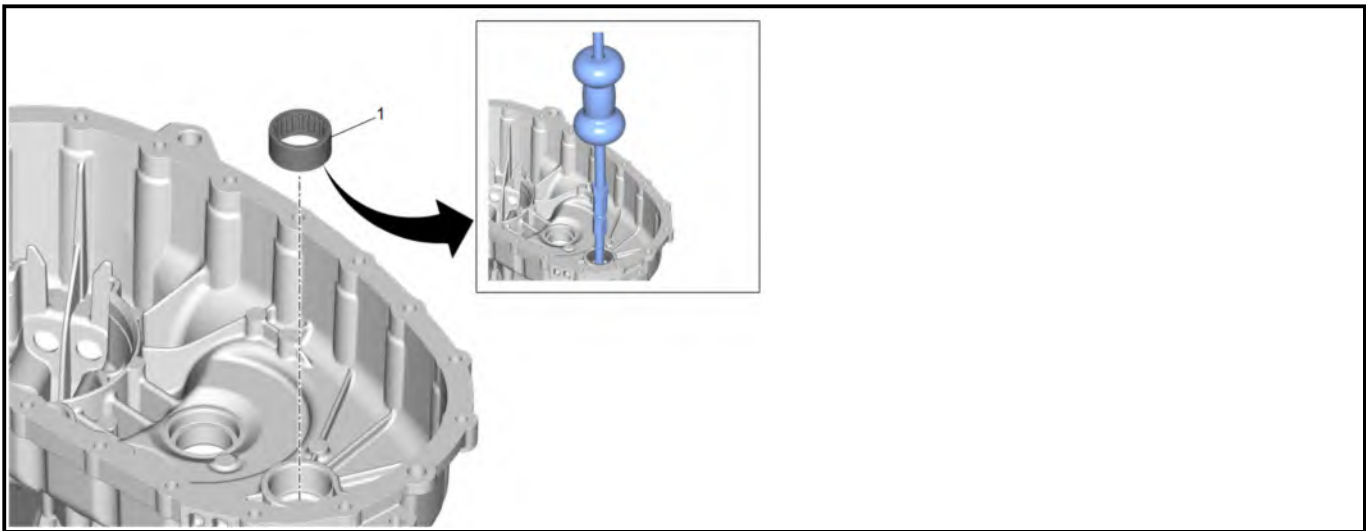


NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Front Output Shaft Front Bearing Removal

Callout	Component Name
1	Transfer Case Front Output Shaft Front Bearing Retaining Ring
2	Transfer Case Front Output Shaft Front Bearing Special Tools J-24433 Pinion Cone and Side Bearing Installer Equivalent regional tools: Special Tools

Transfer Case Front Output Shaft Rear Bearing Removal

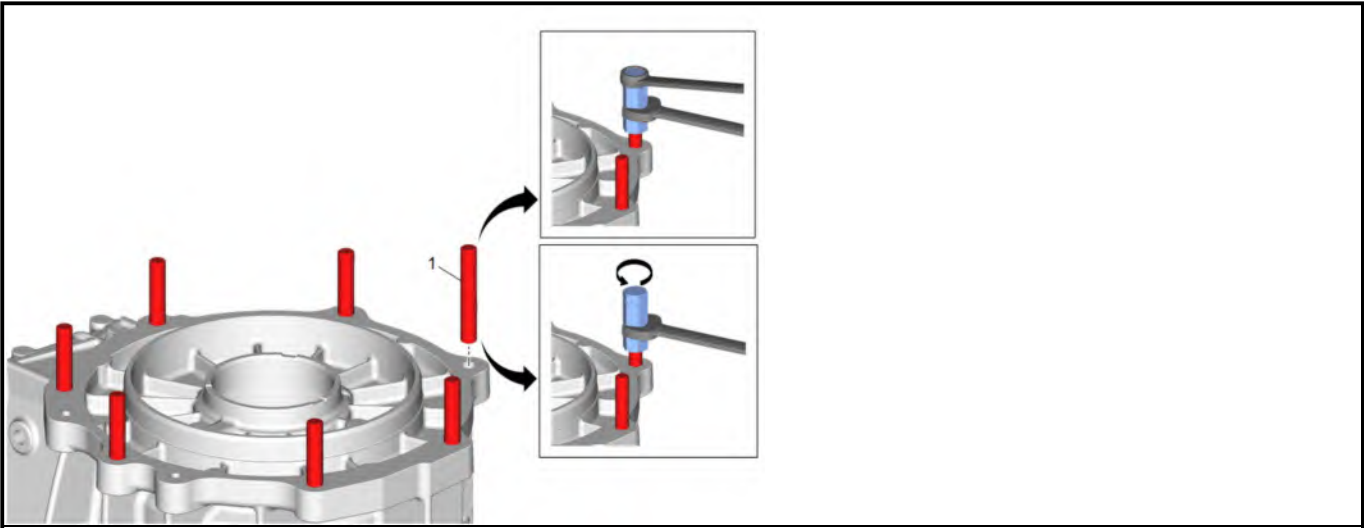


NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Front Output Shaft Rear Bearing Removal

Callout	Component Name
1	Transfer Case Front Output Shaft Rear Bearing Procedure 1. Install the DT-44737 Bearing Remover into the bearing. 2. Install the GE-2619 - 01 Slide Hammer to the DT-44737 Bearing Remover. 3. Remove and discard the bearing. NOTE: Remove the bearing only if replacement is required. Special Tools • DT-44737 Bearing Remover • GE-2619 - 01 Slide Hammer Equivalent regional tools: Special Tools

Transfer Case Stud Removal

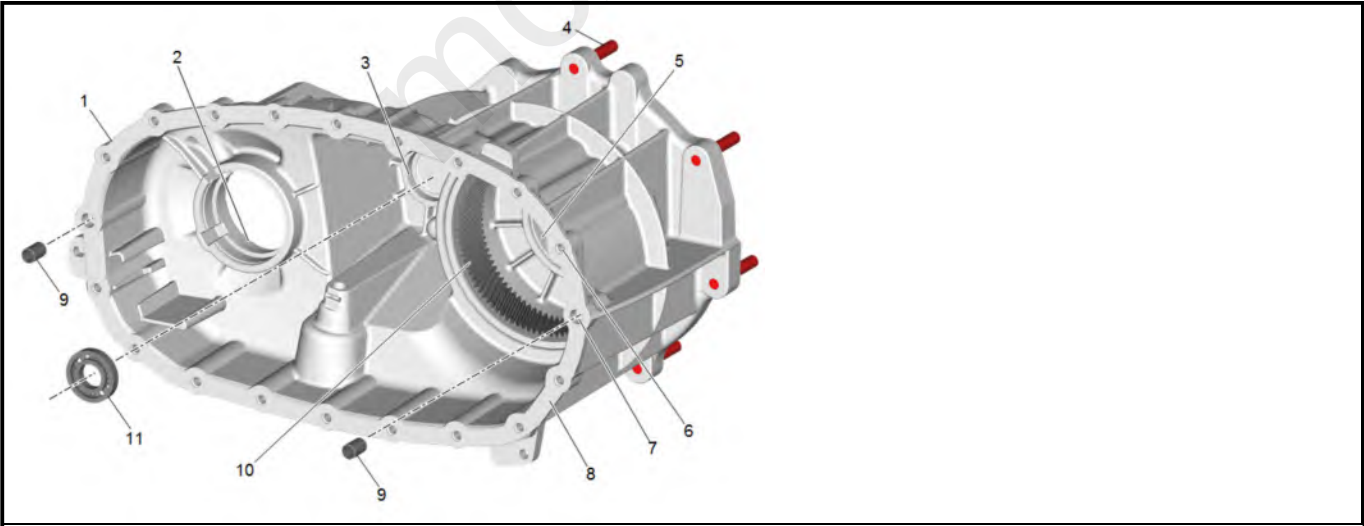


NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Stud Removal

Callout	Component Name
1	Transfer Case Stud - Transmission Interface NOTE: Remove the studs only if replacement is required. Special Tools DT-49308 Stud Remover and Installer Equivalent regional tools: Special Tools

TRANSFER CASE FRONT HALF CLEANING AND INSPECTION

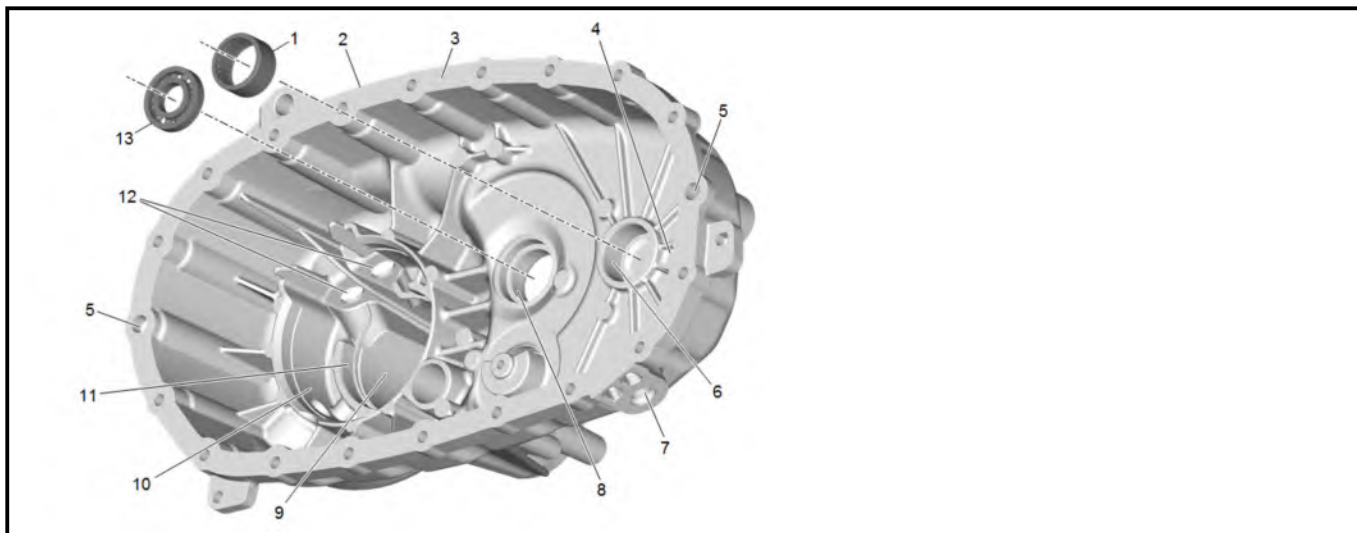


NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
CAUTION: Refer to: Machined Surface	

Callout	Component Name
<u>Damage Caution .</u> Preliminary Procedure 1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated. 2. Clean the front case half in cleaning solvent and air dry. 3. Remove any sealant from the sealing surface.	
1	Transfer Case Front Case Half Procedure Inspect for cracks, broken areas, or other damage. The component must be replaced if damage is found.
2	Transfer Case Front Output Shaft Seal Bore Procedure Replace the front case half assembly if the seal bore has excessive damage.
3	Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Bore Procedure Replace the front case half assembly if a bearing has spun or if cracks are detected.
4	Transfer Case Stud [7x] Procedure Replace any damaged studs
5	Transfer Case Input Shaft Seal Bore Procedure Replace the front case half assembly if the seal bore has excessive damage.
6	Transfer Case Threaded Bolt Holes Procedure Repair any damaged threads.
7	Transfer Case Locating Pin Holes Procedure Replace the front case half assembly if the locating pin holes are out of round or damaged.
8	Transfer Case Sealing Surface Procedure Repair small scratches or nicks with a soft stone.
9	Transfer Case Half Locating Pin [2x] Procedure Repair or replace loose, missing, or damaged locating pins.
10	Transfer Case High/Low Internal Gear Procedure Replace the front case half assembly if the gear is loose in the case, or if the gear teeth are chipped or embedded with debris.
11	Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Procedure Replace the bearing if roughness, brinelling, or pitting is detected. <u>Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Replacement - Front</u>

TRANSFER CASE REAR HALF CLEANING AND INSPECTION



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
CAUTION: Refer to Machined Surface Damage Caution .	
Preliminary Procedure 1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated. 2. Clean the rear case half in cleaning solvent and air dry. 3. Remove any sealant from the sealing surface.	
1	Transfer Case Front Output Shaft Rear Bearing Procedure Replace the bearing if damage to the needle rollers or bearing case is detected.
2	Transfer Case Rear Case Half Procedure Inspect for cracks, broken areas, or other damage. The component must be replaced if damage is found.
3	Case Sealing Surface Procedure Repair small scratches or nicks with a soft stone.
4	Transfer Case Fill Hole
5	Transfer Case Locating Pin Holes Procedure Replace the rear case half assembly if the locating pin holes are out of round or damaged.
6	Transfer Case Front Output Shaft Rear Bearing Bore Procedure Replace the rear case half assembly if a bearing has spun or if cracks are detected.
7	Transfer Case Drain Hole
8	Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Bore
9	Transfer Case Rear Output Shaft Bushing Procedure • Replace the bushing if it is damaged or worn.

Callout	Component Name
	If the bushing is removed, inspect the bushing bore for signs of spinning. Replace the rear case half assembly if the bushing has spun. Refer to: Transfer Case Disassemble, or Transfer Case Assemble
10	Transfer Case Rear Output Shaft Bearing Bore Procedure Replace the rear case half assembly if a bearing has spun or if cracks are detected.
11	Transfer Case Rear Output Shaft Rear Bearing Outer Retaining Ring Groove Procedure Replace the rear case half assembly if the groove is worn.
12	Transfer Case Access Holes
13	Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing- Rear Procedure Replace the bearing if roughness, brinelling, or pitting is detected. Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing Replacement - Rear

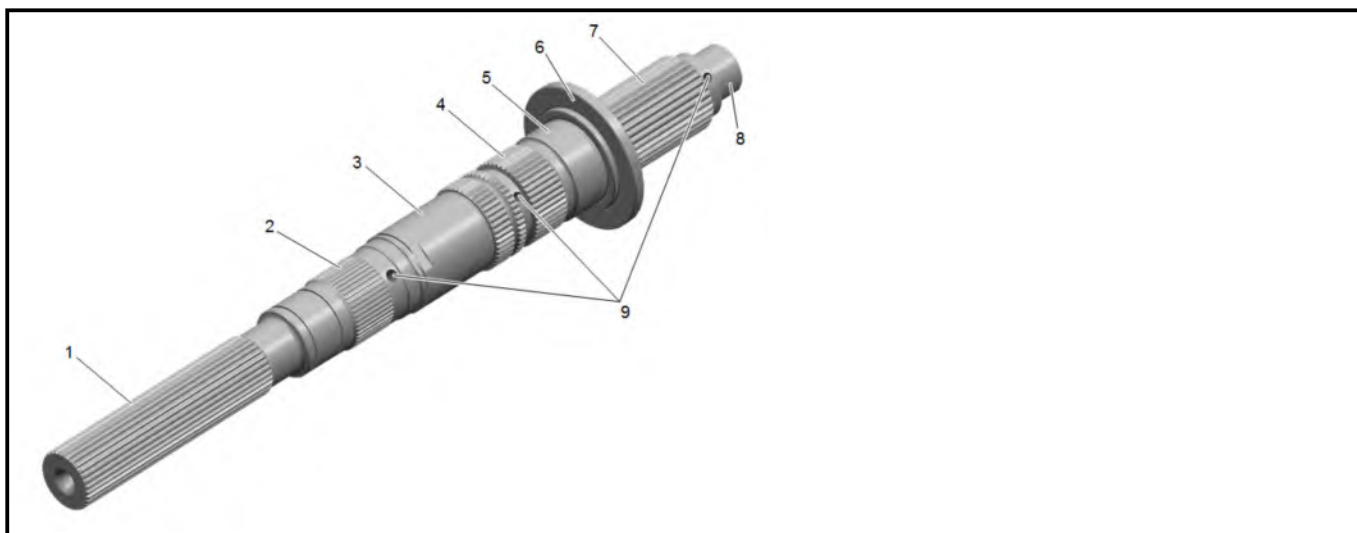
TRANSFER CASE OIL PUMP CLEANING AND INSPECTION



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure - Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated. - Clean all components in cleaning solvent and air dry.	
1	Transfer Case Oil Pump Procedure Replace the oil pump assembly if end play is evident or if there is any sign of binding. End play can be measured by inserting a feeler gauge between the outer rotor and housing. If the end play is greater than 0.1 mm (0.004 in), replace the oil pump assembly. Do not disassemble the oil pump. The oil pump is serviced as an assembly.
2	Transfer Case Oil Pump Suction Pipe Procedure Replace the oil pump suction pipe if the screen is embedded with debris.

REAR OUTPUT SHAFT CLEANING AND INSPECTION



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure 1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated. 2. Clean all components in cleaning solvent and air dry.	
1	Transfer Case Rear Output Shaft Splines Procedure Witness marks at the location of the yoke are normal.
2	Transfer Case Oil Pump and Rear Output Shaft Speed Reluctor Wheel Engagement Splines Procedure Witness marks at the location of the components are normal.
3	Transfer Case Front Output Shaft Drive Sprocket Bearing Surface Procedure Inspect for scoring, brinelling, pitting, or excessive wear.
4	Transfer Case Two/Four Wheel Drive Clutch Hub Engagement Splines Procedure Witness marks at the location of the hub is normal.
5	Transfer Case Control Actuator Lever Bearing Surface Procedure Inspect for scoring, brinelling, pitting, or excessive wear.
6	Transfer Case Control Actuator Lever Thrust Bearing Surface Procedure Inspect for scoring, brinelling, pitting, or excessive wear.
7	Transfer Case High/Low Clutch Engagement Splines Procedure Witness marks at the location of the high/low clutch is normal.
8	Transfer Case Input Shaft Pilot Bearing Surface Procedure Inspect for scoring, brinelling, pitting, or excessive wear.
9	Oil Galleries Procedure Compressed air may be necessary to clean the oil galleries.

FRONT OUTPUT SHAFT AND INPUT SHAFT CLEANING AND INSPECTION

Transfer Case Input Shaft Cleaning and Inspection

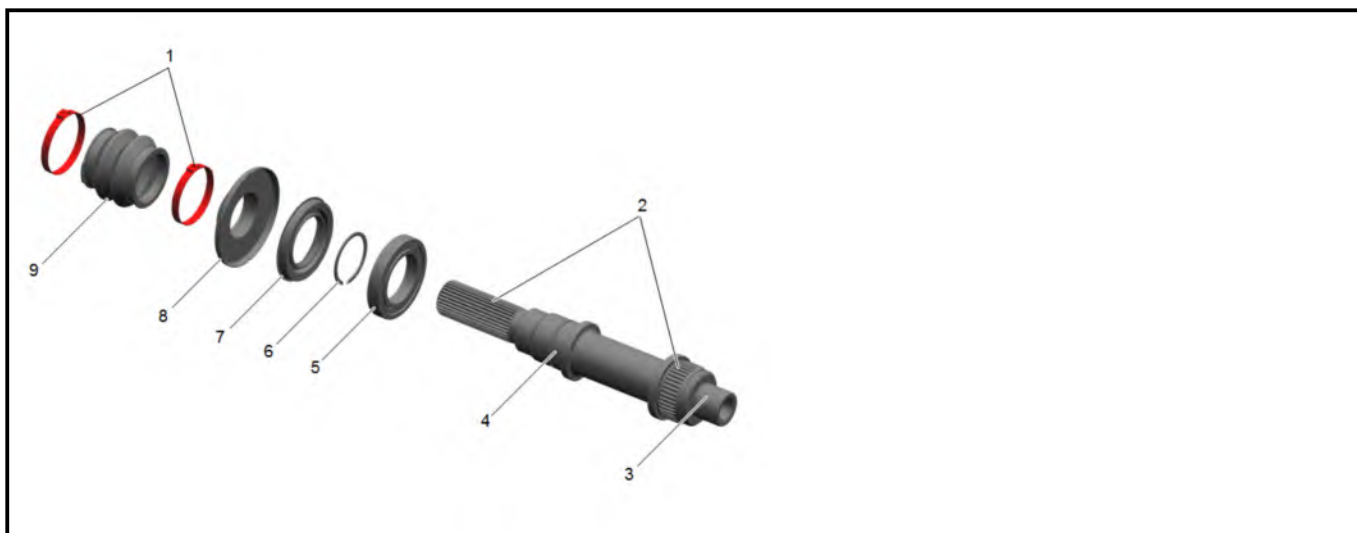


NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Input Shaft Cleaning and Inspection

Callout	Component Name
Preliminary Procedure 1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated. 2. Clean all components in cleaning solvent and air dry.	
1	Transfer Case Input Shaft Seal Surface Procedure Inspect for pitting, excessive wear, or damage.
2	Transfer Case Input Shaft Bearing Surface Procedure Inspect for excessive wear, damage, or if the bearing has spun on the shaft.
3	Transfer Case Input Shaft Planetary Teeth Procedure Inspect for broken, damaged, or debris embedded in the root of the teeth.
4	Transfer Case Input Shaft Pilot Bearing Surface Procedure If the bearing is removed, inspect for excessive wear, damage, or if the bearing has spun in the bore.
5	Transfer Case High/Low Clutch Engagement Teeth Procedure Inspect the engagement teeth for chips or excessive wear.
6	Transfer Case Input Shaft Pilot Bearing Assembly Procedure Replace the bearing if roughness, brinelling, or pitting is detected. Input Shaft Pilot Bearing Replacement
7	Transfer Case Front Output Splines Procedure Witness marks at the location of the sprocket are normal.

Transfer Case Output Shaft Cleaning and Inspection

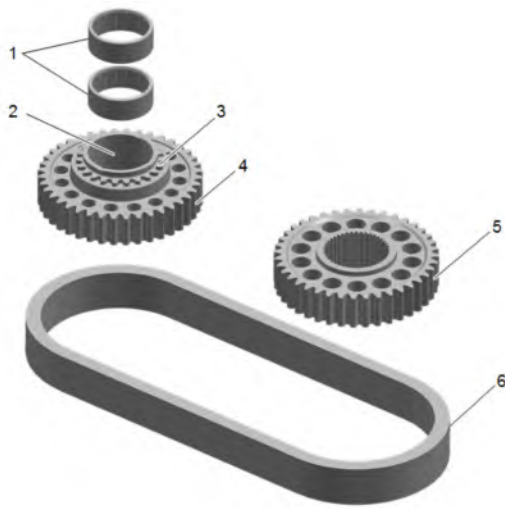


NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Output Shaft Cleaning and Inspection

Callout	Component Name
Preliminary Procedure 1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated. 2. Clean all components in cleaning solvent and air dry.	
1	Transfer Case Front Output Shaft Boot Clamp [2x] Procedure Inspect for damage, replace as required.
2	Transfer Case Front Output Splines Procedure Witness marks at the location of the sprocket are normal.
3	Transfer Case Front Output Shaft Rear Bearing Surface Procedure If the bearing is removed, inspect for excessive wear, damage, or if the bearing has spun on the shaft.
4	Transfer Case Front Output Shaft Front Bearing Surface Procedure Inspect for excessive wear or damage to the bearing surface.
5	Transfer Case Front Output Shaft Front Bearing Procedure Replace the bearing if roughness, brinelling, or pitting is detected. Front Output Shaft Drive Sprocket Bearing Replacement
6	Transfer Case Front Output Shaft Front Bearing Retaining Ring
7	Transfer Case Front Output Shaft Seal Procedure Inspect for pitting, excessive wear, or damage.
8	Transfer Case Front Output Flange Oil Slinger Procedure The slinger is press fit to the flange and should not be removed unless replacement is required.
9	Transfer Case Front Output Shaft Boot Procedure Inspect for damage, replace as required.

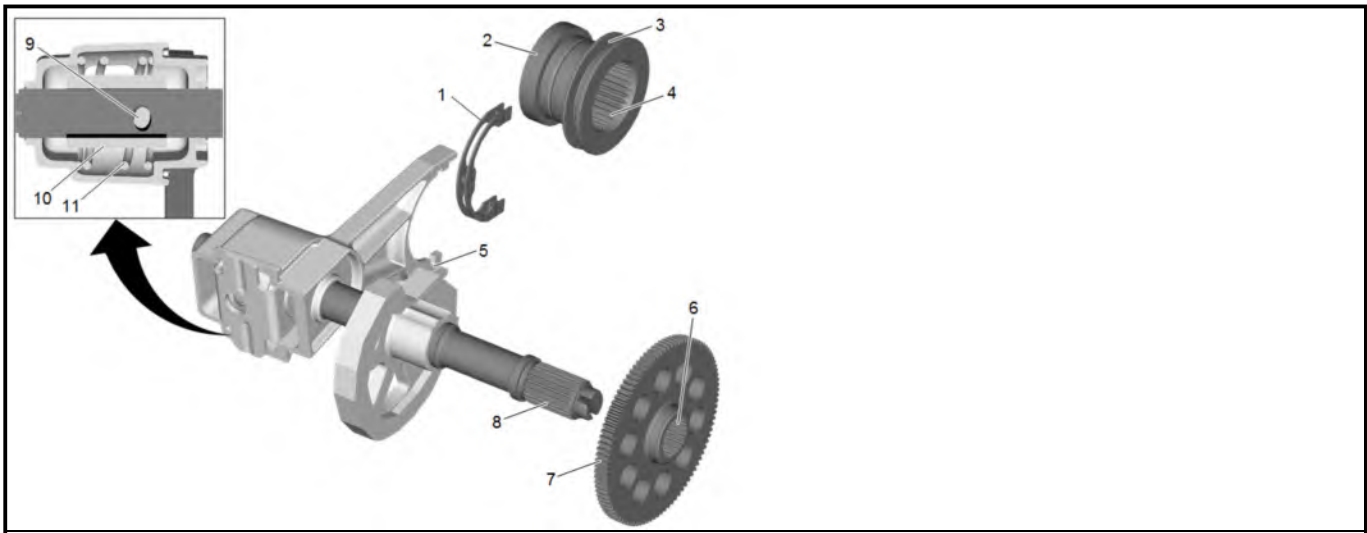
DRIVE CHAIN, DRIVE SPROCKET, AND DRIVEN SPROCKET CLEANING AND INSPECTION



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure 1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated. 2. Replace any components if damage is found in this procedure. The sprockets must be replaced as a pair. 3. Clean all components in cleaning solvent and air dry.	
1	Transfer Case Front Output Shaft Drive Sprocket Bearings Procedure Replace the bearings if roughness, brinelling, or pitting is detected. Front Output Shaft Drive Sprocket Bearing Replacement
2	Transfer Case Front Output Shaft Drive Sprocket Bearing Bore Procedure If the bearing is removed, inspect for excessive wear, damage, or if the bearing has spun in the bore.
3	Transfer Case Four Wheel Drive Clutch Housing Engagement Teeth Procedure Inspect the engagement teeth for chips or excessive wear.
4	Transfer Case Front Output Shaft Drive Sprocket Procedure - Inspect for chipped teeth, excessively worn gear surfaces, and debris embedded in the root of the teeth. - Witness marks at the location of the chain is normal.
5	Transfer Case Front Output Shaft Driven Sprocket Procedure - Inspect for chipped teeth, excessively worn gear surfaces, and debris embedded in the root of the teeth. - Witness marks at the location of the chain is normal.
6	Transfer Case Front Output Shaft Drive Chain Assembly Procedure Inspect for loose link pins, binding or stiff links, debris embedded in the links, or worn teeth surfaces.

HIGH/LOW SHIFT COMPONENTS CLEANING AND INSPECTION

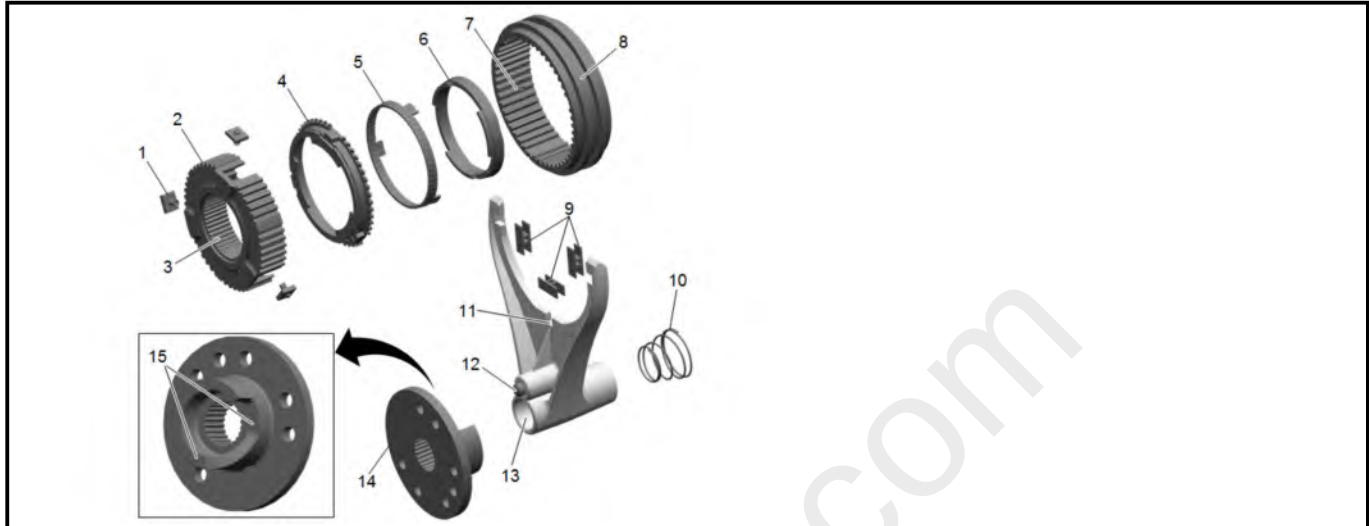


NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure	
1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated.	
2. Clean all components in cleaning solvent and air dry.	
1	Transfer Case High/Low Shift Fork Insert [2x] Procedure Inspect the inserts for wear.
2	Transfer Case High/Low Clutch Teeth Procedure Inspect the engagement teeth for chips or excessive wear.
3	Transfer Case High/Low Shift Fork Collar Procedure Inspect the shift fork collar for wear.
4	Transfer Case High/Low Clutch Inner Splines Procedure Inspect the inner splines for excessive looseness on the rear output shaft.
5	Transfer Case High/Low Shift Fork Procedure Inspect for cracks, broken areas, or other damage. The component must be replaced if damage is found. High/Low Shift Fork Replacement
6	Transfer Case Actuator Shaft Gear Splines Procedure Witness marks at the location of the splines is normal.
7	Transfer Case Actuator Shaft Gear Teeth Procedure Inspect for chipped teeth, excessively worn gear surfaces, and debris embedded in the root of the teeth.
8	Transfer Case Control Actuator Shaft Procedure Inspect the shaft splines for excessive wear. The component must be replaced if damage is found. High/Low Shift Fork Replacement
9	Transfer Case High/Low Shift Fork Pin Procedure Inspect the pin for wear. The component must be replaced if damage is found. High/Low Shift Fork Replacement

Callout	Component Name
10	Transfer Case High/Low Shift Fork Spring Procedure Inspect the cam lobes for wear or roughness. The component must be replaced if damage is found. High/Low Shift Fork Replacement
11	Transfer Case High/Low Shift Fork Spring Procedure Inspect the spring for breakage. The component must be replaced if damage if found. High/Low Shift Fork Replacement .

TWO/FOUR WHEEL DRIVE SHIFT COMPONENTS CLEANING AND INSPECTION

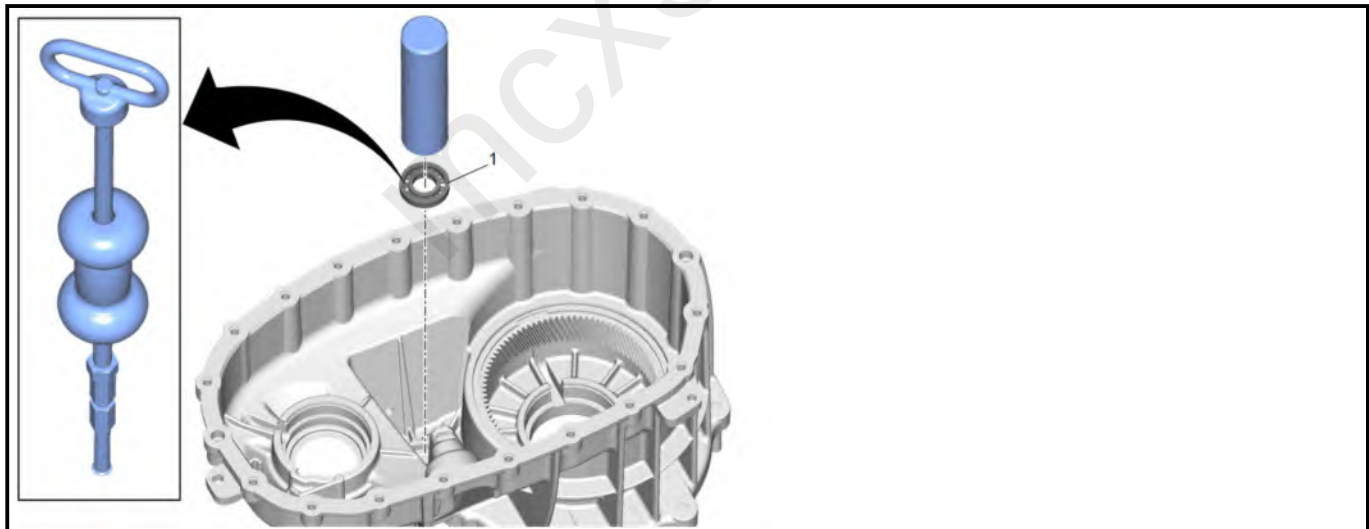


NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure 1. Inspect all components or sub-components and perform any repair procedure necessary to fix the damage. If the damage cannot be repaired, replace the component or sub-component as indicated. 2. Clean all components in cleaning solvent and air dry, except the clutch plates.	
1	Transfer Case Two/Four Wheel Drive Synchronizer Insert [3x] Procedure Inspect the inserts for wear.
2	Transfer Case Two/Four Wheel Drive Synchronizer Hub Engagement Teeth Procedure Inspect the engagement teeth for wear.
3	Transfer Case Two/Four Wheel Drive Synchronizer Hub Splines Procedure Inspect the splines for loose fit on the rear output shaft.
4	Transfer Case Two/Four Wheel Drive Synchronizer Assembly Procedure Inspect the synchronizer for wear or chipped teeth.
5	Transfer Case Two/Four Wheel Drive Synchronizer Blocking Ring - Outer Procedure Inspect the synchronizer ring for wear, damage, or missing material.
6	Transfer Case Two/Four Wheel Drive Synchronizer Blocking Ring - Inner Procedure Inspect the synchronizer ring for wear or roughness.
7	Transfer Case Two/Four Wheel Drive Synchronizer Hub Engagement Teeth Procedure Inspect the engagement teeth for wear.

Callout	Component Name
8	Transfer Case Two/Four Wheel Drive Synchronizer Sleeve Collar Procedure Inspect the collar for wear.
9	Transfer Case Two/Four Wheel Drive Synchronizer Insert [3x] Procedure Inspect the inserts for wear.
10	Transfer Case Shift Fork Spring Procedure Inspect the spring for breakage.
11	Transfer Case Two/Four Wheel Drive Shift Fork Assembly Procedure Inspect for cracks, broken areas, or other damage. The component must be replaced if damage is found.
12	Transfer Case Two/Four Wheel Drive Shift Fork Pin Procedure Replace the shift fork if the pin is worn.
13	Transfer Case Two/Four Wheel Drive Shift Fork Bore Procedure Replace the shift fork if the bore is worn.
14	Transfer Case Shift Detent Plunger Cam Lobes Procedure Inspect the cam lobes for wear or roughness. The component must be replaced if damage is found. High/Low Shift Fork Replacement
15	Transfer Case Two/Four Wheel Drive Mode Cam Lobe Procedure Inspect the cam lobes for wear or roughness. The component must be replaced if damage is found. High/Low Shift Fork Replacement

TRANSFER CASE FOUR WHEEL DRIVE ACTUATOR LEVER SHAFT BEARING REPLACEMENT - FRONT

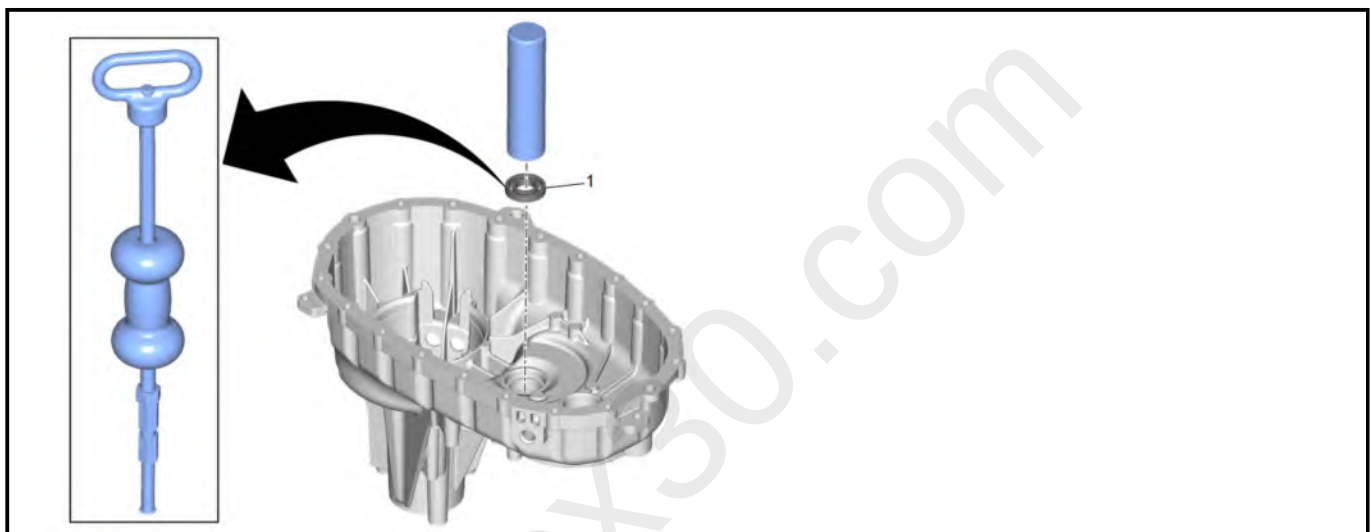


NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure Ensure the bearing is installed squarely into the bearing bore.	
1	Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing- Front Removal Procedure Remove the bearing using the GE-2619-01 Slide Hammer and DT-44737 Shift Rail Bearing Remover.

Callout	Component Name
	Installation Procedure 1. Install the bearing until it bottoms in the rear case half bore with DT-46496 Bearing Installer. 2. Ensure the bearing is installed squarely into the bearing bore. Special Tools • GE-2619-01 Slide Hammer • DT-44737 Shift Rail Bearing Remover • DT-46496 Bearing Installer Equivalent regional tools:Special Tools

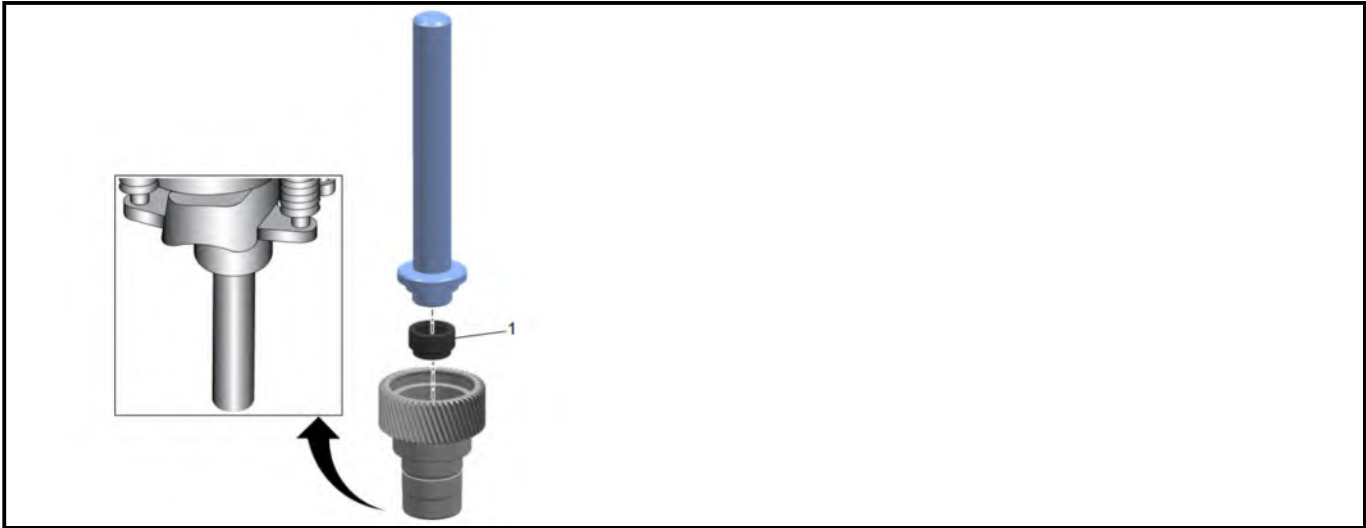
TRANSFER CASE FOUR WHEEL DRIVE ACTUATOR LEVER SHAFT BEARING REPLACEMENT - REAR



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Transfer Case Four Wheel Drive Actuator Lever Shaft Bearing- Rear Removal Procedure Remove the bearing using the GE-2619-01 Slide Hammer and DT-44737 Shift Rail Bearing Remover. Installation Procedure 1. Install the bearing until it bottoms in the rear case half bore with DT-46496 Bearing Installer. 2. Ensure the bearing is installed squarely into the bearing bore. Special Tools • GE-2619-01 Slide Hammer • DT-44737 Shift Rail Bearing Remover • DT-46496 Bearing Installer Equivalent regional tools:Special Tools

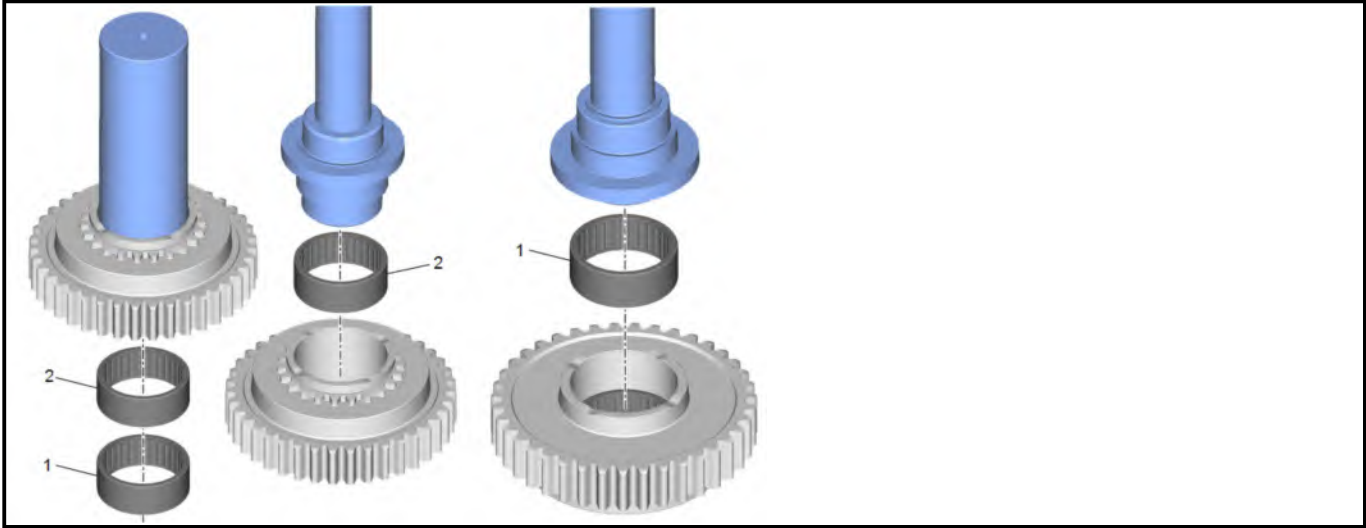
INPUT SHAFT PILOT BEARING REPLACEMENT



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure	
Ensure the bearing is installed squarely into the input shaft bore.	
1	Transfer Case Input Shaft Pilot Bearing
	Procedure
	1. Using a suitable adapter and an arbor press, remove the input shaft pilot bearing by going through the front of the input gear. 2. Install the bearing using the small side of the DT-48212 Input Shaft Pilot Bearing Installer. 3. Press the bearing until the tool bottoms on the input shaft.
	Special Tools • DT-48212 Input Shaft Pilot Bearing Installer • J-8092 Universal Driver
Equivalent regional tools: Special Tools	

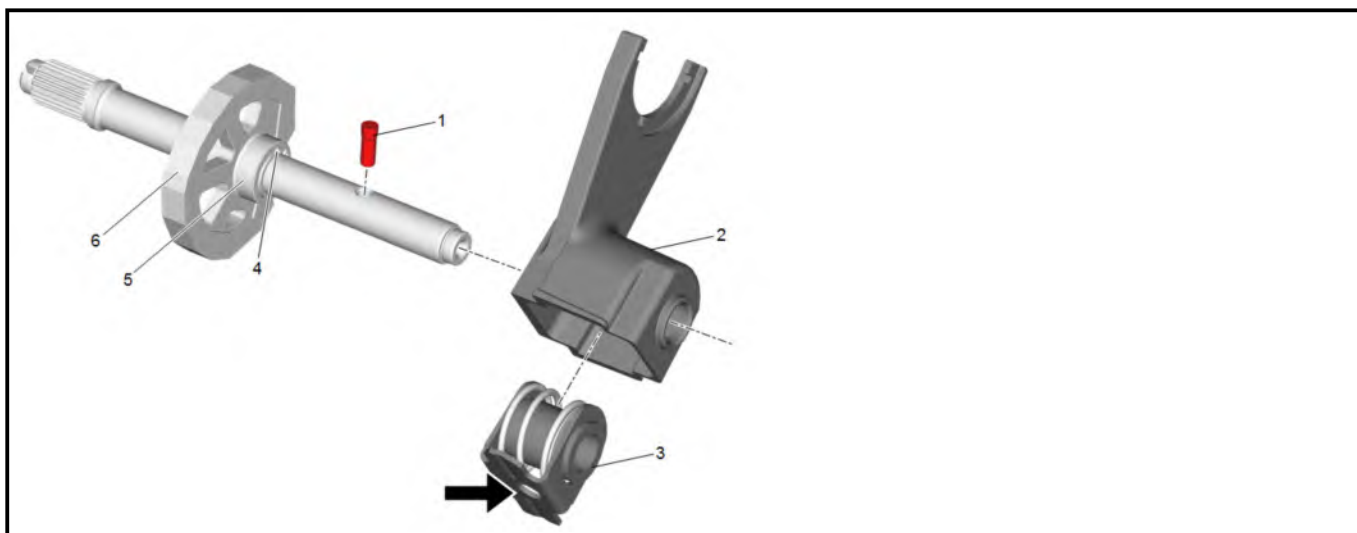
FRONT OUTPUT SHAFT DRIVE SPROCKET BEARING REPLACEMENT



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
Preliminary Procedure Using the DT-35512 bearing installer and an arbor press, remove the bearings from the drive sprocket.	
1	Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly - Rear Procedure 1. Install the rear bearing (1) using the short end of the DT-48211 bearing installer. 2. Using an arbor press, install the bearing until the tool bottoms against the drive sprocket. NOTE: Install the bearing with the numbers on the edge of the bearings facing the installer tool. Special Tools • DT-48211 Drive Sprocket Bearing Installer • GE-8092 Universal Driver For equivalent regional tools, refer to Special Tools.
2	Transfer Case Front Output Shaft Drive Sprocket Bearing Assembly - Front Procedure 1. Install the front bearing (2) using the smaller diameter end of the DT-51336 bearing installer. 2. Using an arbor press, install the bearing until the tool bottoms against the drive sprocket. NOTE: Install the bearing with the numbers on the edge of the bearings facing the installer tool. Special Tools • DT-51336 Drive Sprocket Bearing Installer • GE-8092 Universal Driver

HIGH/LOW SHIFT FORK REPLACEMENT



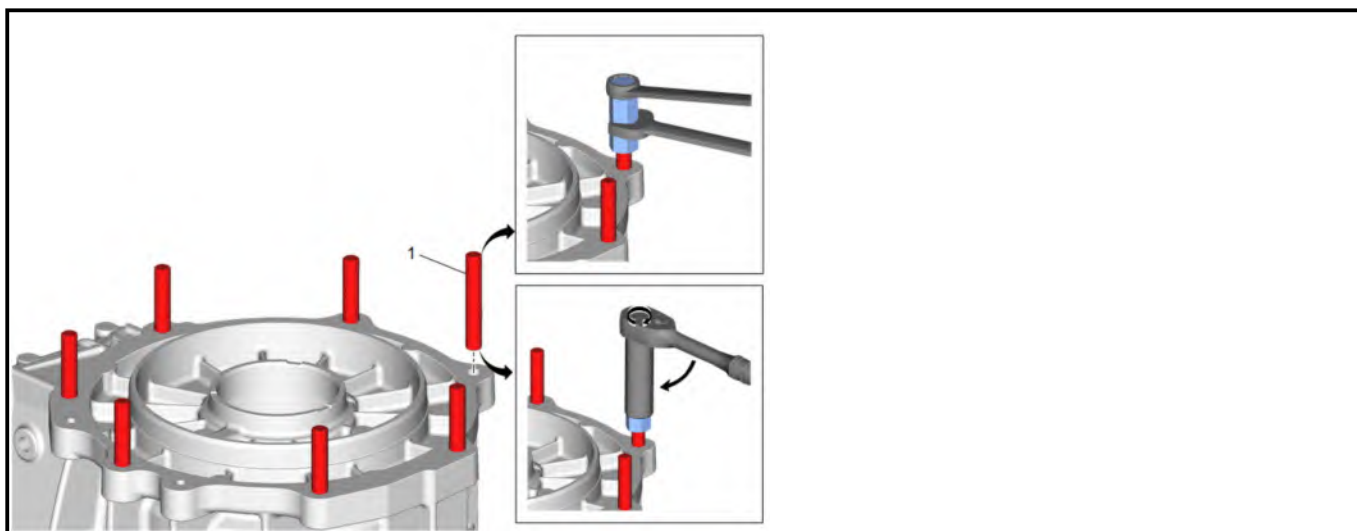
NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Transfer Case High/Low Shift Fork Pin Procedure Drive the pin out using a drift punch and hammer. Discard the pin if removed. NOTE: First Design might have a different pin and guide screw. 1. Apply a small amount of threadlock to the shaft of the pin before installation. 2. Press the pin into the control actuator shaft using a brass drift until bottom. 3. Apply a small amount of threadlock to the screw threads. CAUTION: Refer to Fastener Caution .

Callout	Component Name
	4. Tighten 5 N.m (44 lb in)
2	Transfer Case High/Low Shift Fork Procedure Inspect for wear or damage in the spring seat locations. The component must be replaced if damage is found.
3	Transfer Case High/Low Shift Fork Spring Procedure 1. When assembling the shift fork spring assembly (3) into the shift fork (2), the opening in the flange of the spring assembly should be positioned facing away from the shift cam (6). NOTE: The component must be replaced if the following conditions exist: • The cam lobes are worn or rough • The spring is broken
4	Transfer Case Two/Four Wheel Drive Actuator Cam Retaining Ring
5	Transfer Case Two/Four Wheel Drive Actuator Cam Spacer
6	Transfer Case Two/Four Wheel Drive Actuator Cam

TRANSFER CASE ASSEMBLE

Transfer Case Stud Installation

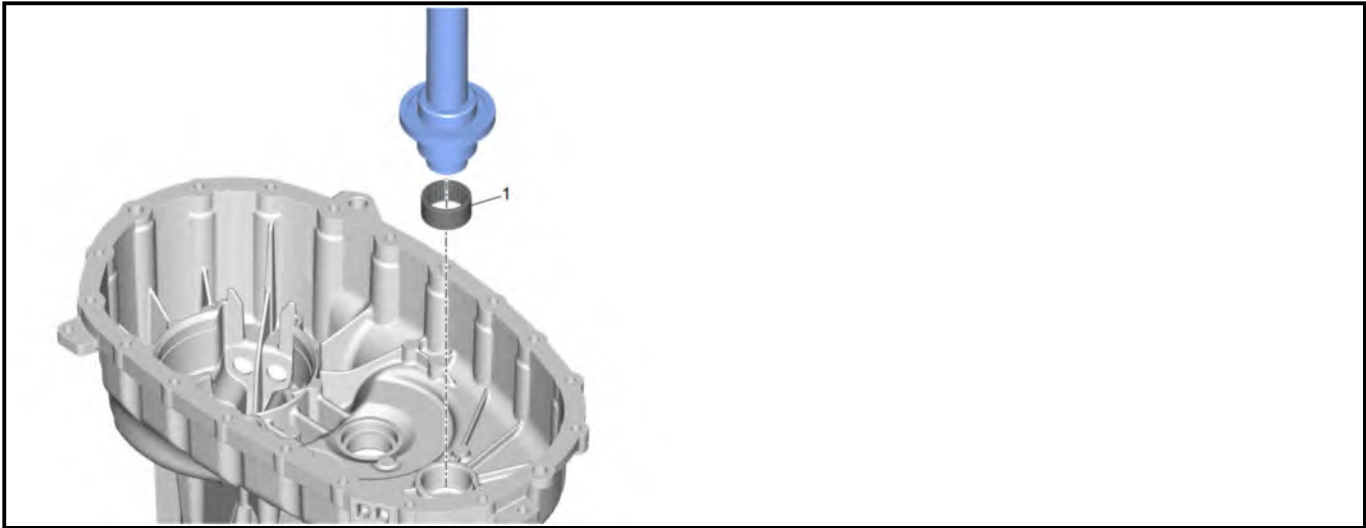


NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Stud Installation

Callout	Component Name
1	Transfer Case Stud - Transmission Interface CAUTION: Refer to Fastener Caution . Procedure 1. Apply sealer to the threads of the stud. Adhesives, Fluids, Lubricants, and Sealers 2. Install the DT-49308 Stud Remover and Installer onto the stud. 3. Rotate the bolt until it contacts the top of the stud. 4. Install a deep socket over both the head of the bolt and the long nut and tighten the stud to specifications. 5. Loosen the long nut and remove the tool from the stud. 6. Inspect the studs for the proper installation height and a properly installed stud should protrude from the face of the case 40 mm (1.58 in). Special Tools DT-49308 Stud Remover and Installer Equivalent regional tools: Special Tools

Transfer Case Front Output Shaft Rear Bearing Installation

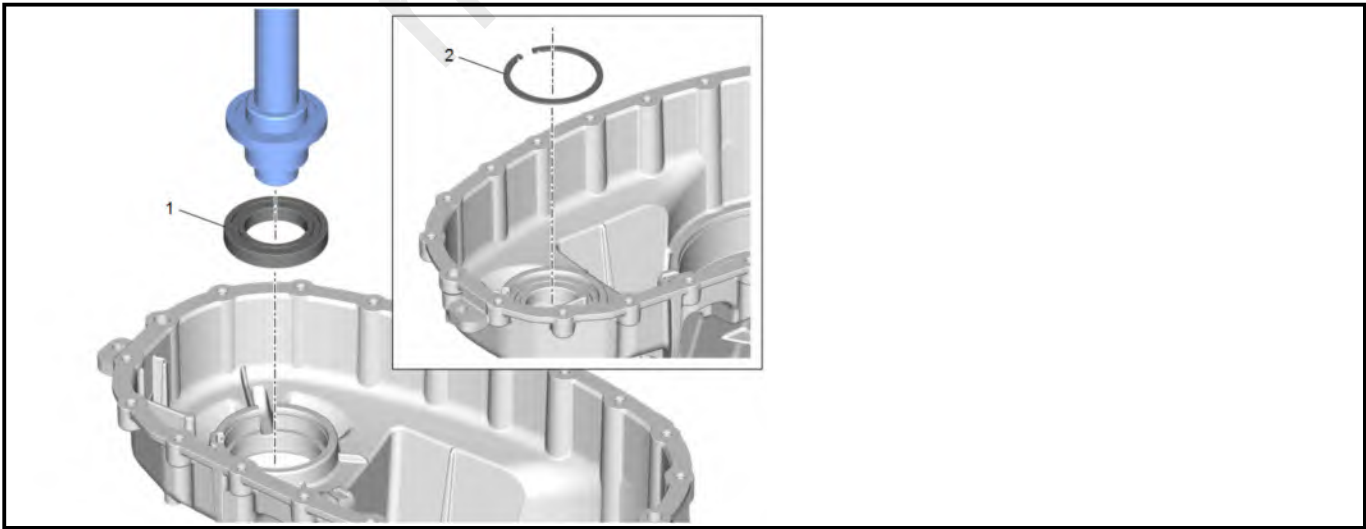


NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Front Output Shaft Rear Bearing Installation

Callout	Component Name
1	Transfer Case Front Output Shaft Rear Bearing Procedure 1. Install the bearing with the numbers on the edge of the bearings facing the installer tool. 2. Press the front output shaft rear bearing into rear case using DT-51336 Bearing Installer. 3. Install the bearing until the tool bottoms against the case half. Special Tools • DT-51336 Bearing Installer • GE-8092 Driver Handle Equivalent regional tools: <u>Special Tools</u>

Transfer Case Front Output Shaft Front Bearing Installation

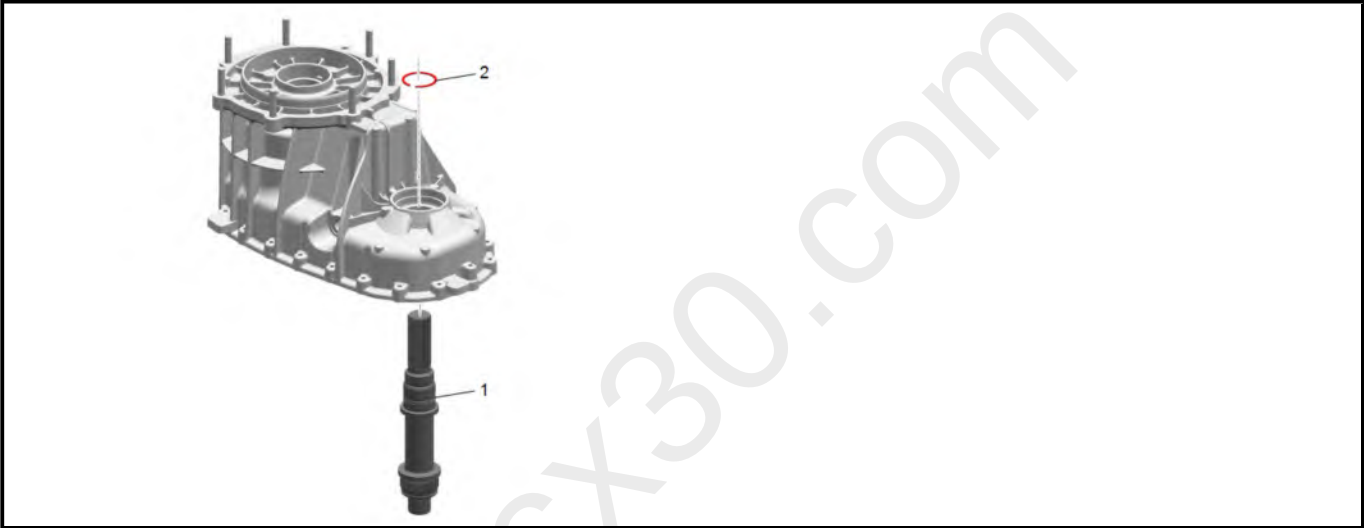


NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Front Output Shaft Front Bearing Installation

Callout	Component Name
1	Transfer Case Front Output Shaft Front Bearing Procedure 1. Use the larger diameter end of the DT-51336 Driver to install the bearing. 2. Install the bearing until it bottoms against case half bore. Special Tools • DT-51336 Driver • GE-8092 Driver Handle Equivalent regional tools: Special Tools
2	Transfer Case Front Output Shaft Front Bearing Retaining Ring

Transfer Case Front Output Shaft Front Bearing Removal

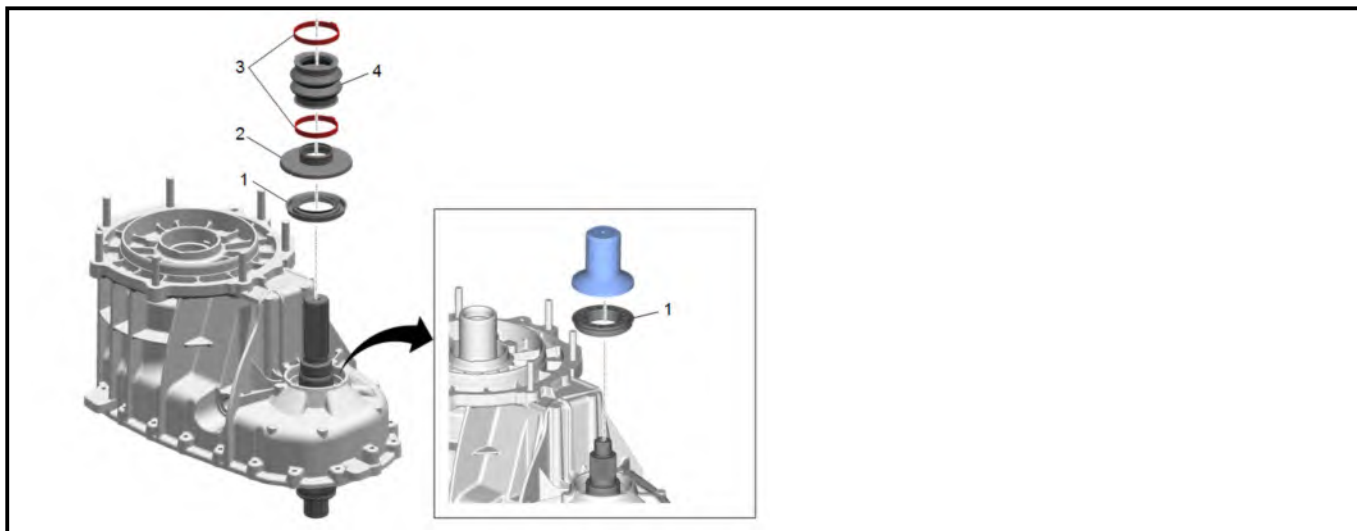


NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Front Output Shaft Front Bearing Installation

Callout	Component Name
1	Transfer Case Front Output Shaft
2	Transfer Case Front Output Shaft Retaining Ring

Transfer Case Front Output Shaft Seal, Oil Slinger and Boot Installation

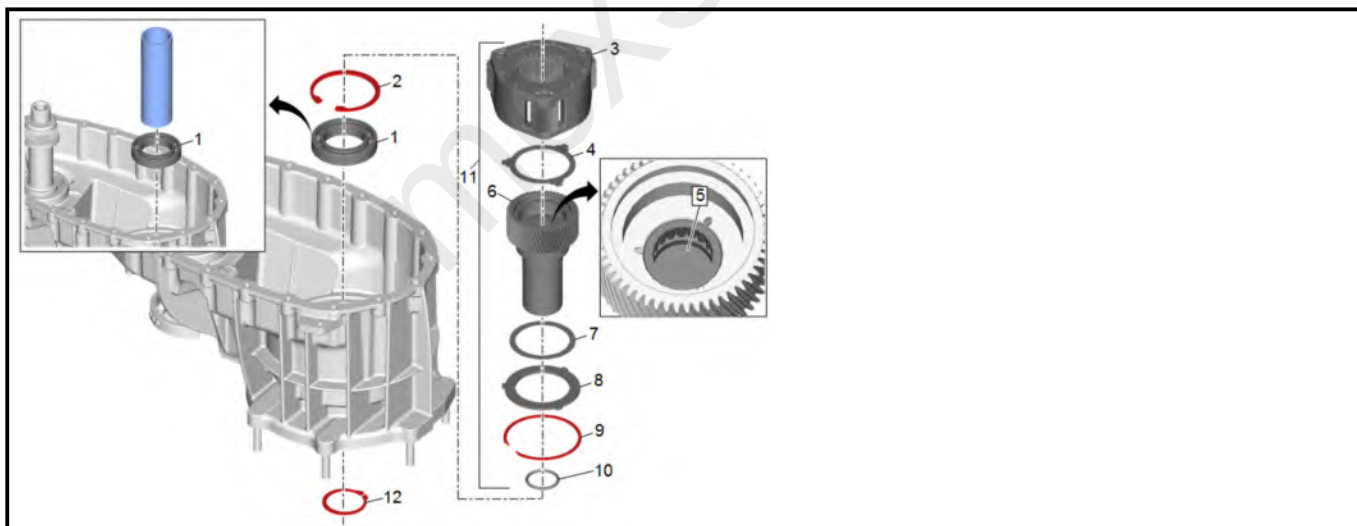


NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Front Output Shaft Seal, Oil Slinger and Boot Installation

Callout	Component Name
1	Transfer Case Front Output Shaft Seal Procedure Use the end of the tool marked "B" to install the seal. Special Tools DT-51592 Installer Equivalent regional tools: Special Tools
2	Transfer Case Front Output Flange Oil Slinger
3	Transfer Case Front Output Shaft Boot
4	Transfer Case Front Output Shaft Boot Clamp [2x]

Transfer Case Input Shaft and High/Low Planetary Assembly Installation



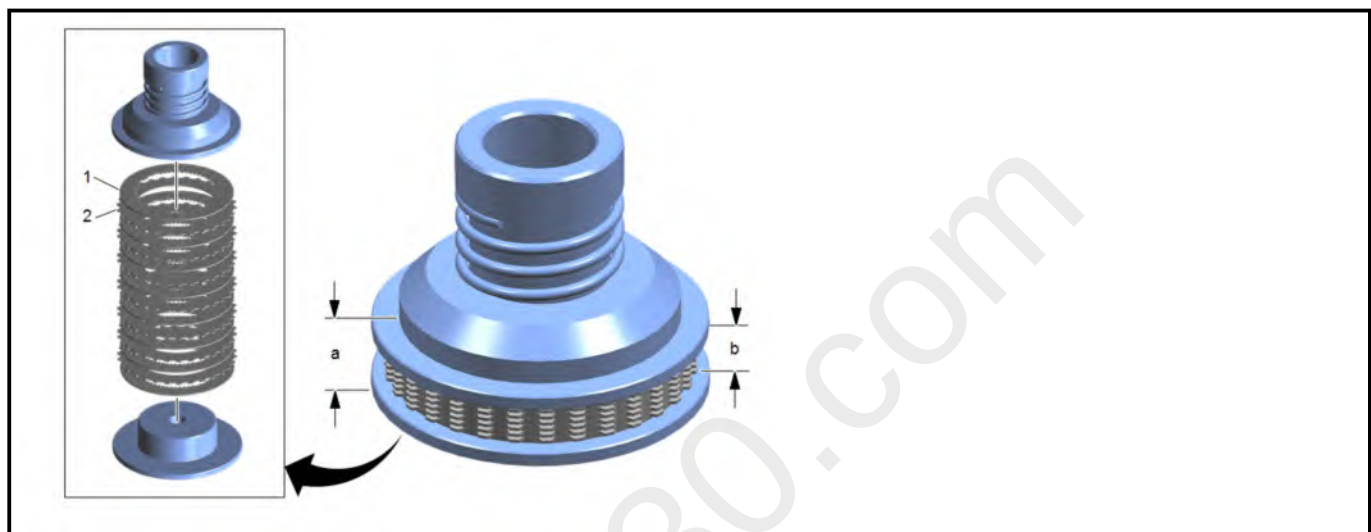
NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Input Shaft and High/Low Planetary Assembly Installation

Callout	Component Name
1	Transfer Case Input Shaft Bearing Special Tools J-36366 - A Pinion Oil Seal Installer Equivalent regional tools: Special Tools
2	Transfer Case Input Shaft Bearing Outer Retaining Ring
3	Transfer Case High/Low Planetary Carrier

Callout	Component Name
4	Transfer Case High/Low Planetary Carrier Pinion Gear Thrust Washer
5	Transfer Case Input Shaft Pilot Bearing Input Shaft Pilot Bearing Replacement
6	Transfer Case Input Shaft
7	Transfer Case Input Shaft Washer
8	Transfer Case High/Low Locking Plate
9	Transfer Case Input Shaft Retaining Ring
10	Transfer Case Input Shaft Seal Procedure Lubricate the O-ring prior to installation. Adhesives, Fluids, Lubricants, and Sealers
11	Transfer Case High/Low Planetary Assembly
12	Transfer Case Input Shaft Inner Retaining Ring

Measuring Clutch Pack Height



NOTE: Callouts in the following chart represent components shown in graphic above.

Measuring Clutch Pack Height

Callout	Component Name
Preliminary Procedure	
- The DT-48213 gauge applies a DT-48213 Clutch Pack Height Gauge amount of pressure to the clutch pack in order to properly measure the clutch pack height. Do not use any other method than what is outlined below. - Micrometers or depth gauges may also be used in conjunction with the DT-48213 Clutch Pack Height Gauge to measure the clutch pack height. - Two variations are available to measure clutch pack height, outside measurement or inside measurement. Either variation will determine the correct height.	
1	Transfer Case Four Wheel Drive Clutch Friction Plate [8x] Procedure Install the friction and steel clutch plates into the DT-48213 Clutch Pack Height Gauge, alternating until 8 friction plates and 7 steel plates are installed. Special Tools DT-48213 Clutch Pack Height Gauge Equivalent regional tools: Special Tools
2	Transfer Case Four Wheel Drive Clutch Pressure Plate [7x] Procedure 1 - Outside Measurement: 1. Tighten the DT-48213 Clutch Pack Height Gauge until the upper portion of the tool contacts the lower portion of the tool. The screw will be flush with the bottom surface of

Callout	Component Name
	the tool to indicate the tool has fully compressed the clutch plates. - Using an outside caliper, measure the total combined height of the clutch pack and the DT-48213 Clutch Pack Height Gauge, dimension a. Subtract the thickness of both the upper and lower portion of the DT-48213 Clutch Pack Height Gauge, 14 mm (0.551 in), and record the results. - Repeat the process in 2 additional locations, 120 degrees from each other. - The average of the 3 measurements is the clutch pack height. Procedure 2 - Inside Measurement: - Tighten the DT-48213 gauge until the upper portion of the tool contacts the lower portion of the tool. The screw will be flush with the bottom surface of the tool to indicate the tool has fully compressed the clutch plates. - Using an inside caliper, measure the height of the clutch pack, dimension b, and record the results. - Repeat the process in 2 additional locations, 120 degrees from each other. - The average of the 3 measurements is the clutch pack height. Special Tools DT-48213 Clutch Pack Height Gauge

Clutch Assembly Installation

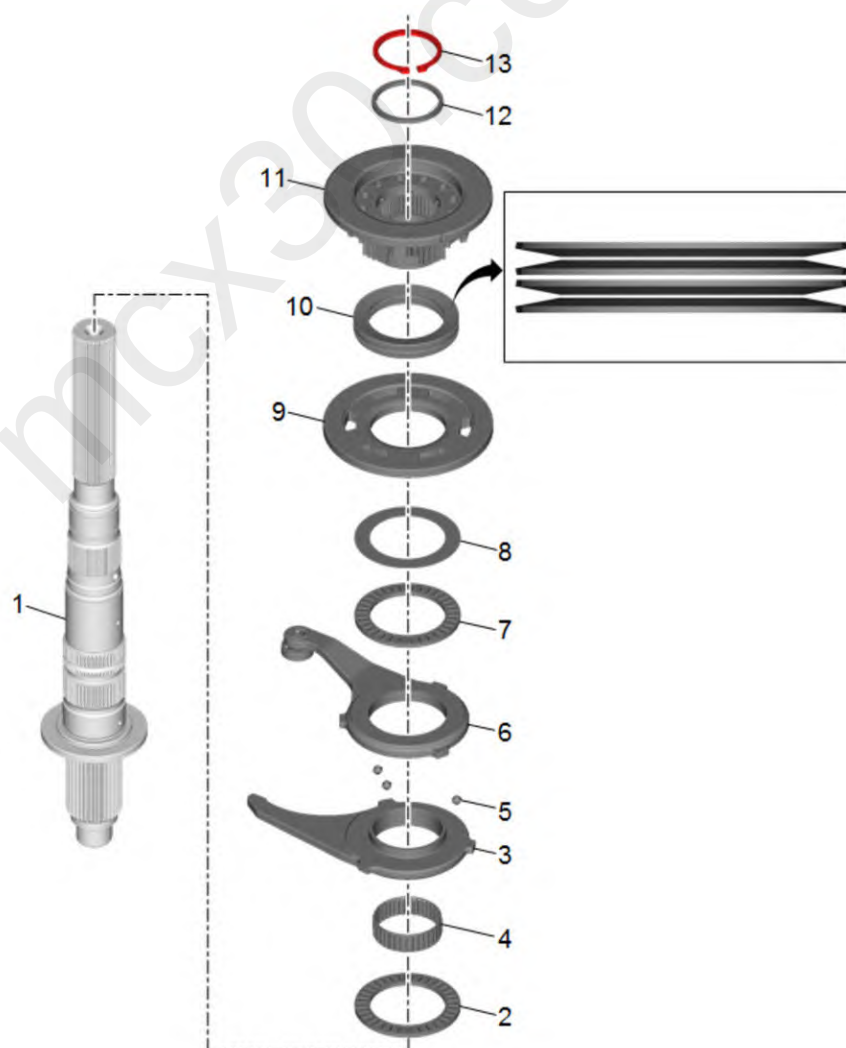


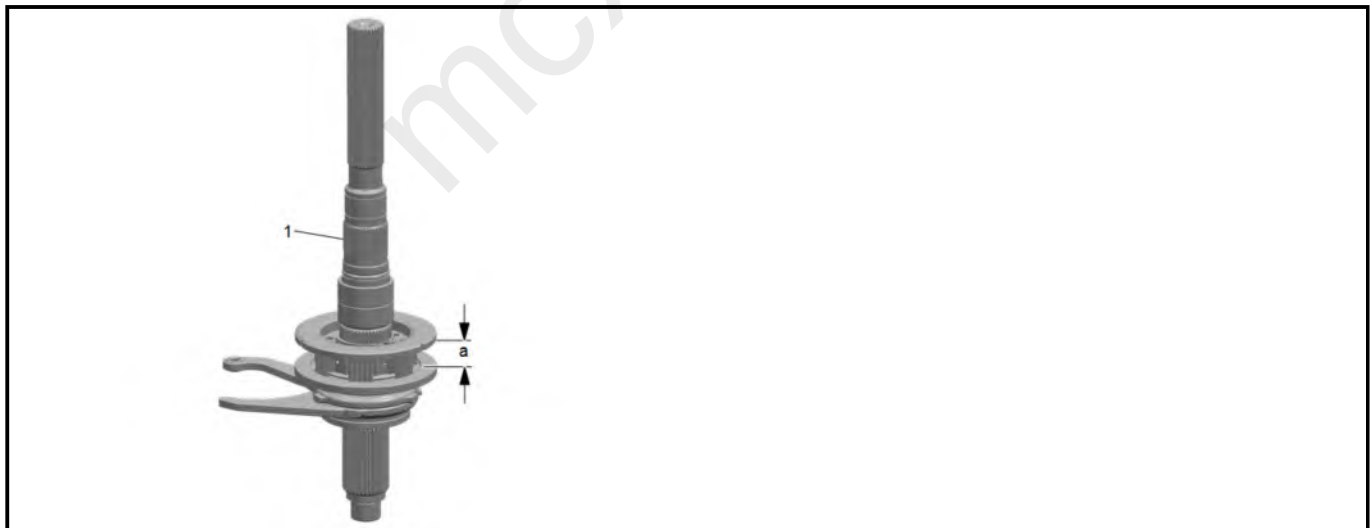
Fig. 10: Clutch Assembly Components Location
 Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Clutch Assembly Installation

Callout	Component Name
1	Transfer Case Rear Output Shaft
2	Transfer Case Control Actuator Thrust Bearing
3	Transfer Case Scissor Mechanism Lever
4	Transfer Case Control Actuator Lever Bearing
5	Transfer Case Scissor Lever Ball [3x]
6	Transfer Case Scissor Mechanism Lever
7	Transfer Case Control Actuator Thrust Bearing
8	Transfer Case Control Actuator Lever Washer
9	Transfer Case Four Wheel Drive Clutch Pressure Plate - Apply Procedure Ensure the scissor mechanism lever washer is seated into the apply plate groove.
10	Transfer Case Four Wheel Drive Clutch Pressure Plate Spring [4x]
11	Transfer Case Four Wheel Drive Clutch Hub
12	Transfer Case Four Wheel Drive Clutch Shim Procedure 1. Use a 3 mm (0.118 in) shim as a base to do the initial measurements with, this shim may be changed in the following steps depending on the results of the stack clearance. 2. Use the original shim if reassembling a transfer case. This shim may be changed in the following steps depending on the results of the stack clearance.
13	Transfer Case Two/Four Wheel Drive Clutch Retaining Ring Procedure If the clutch shim is not seated against the retaining ring, replace the clutch pressure plate springs.

Measuring/Adjusting Clutch Assembly Height



NOTE: Callouts in the following chart represent components shown in graphic above.

Measuring/Adjusting Clutch Assembly Height

Callout	Component Name
1	Transfer Case Clutch Pack Assembly Procedure

Callout	Component Name
	1. Using an inside caliper, measure the height of the clutch assembly in the location shown and record the results. 2. Repeat the process in 2 additional locations, 120 degrees from each other. 3. The average of the 3 measurements is the clutch assembly height. 4. A 3.1 mm (0.122 in) clearance +/- 0.1 mm (0.004 in) is necessary between the clutch pack height and the assembly height. It may be necessary to replace the clutch shim with a thicker shim or a thinner shim, to achieve the proper clearance in the clutch. 5. Subtract the clutch pack height from the clutch assembly height. The difference should be between 3.0 mm (0.118 in) and 3.2 mm (0.126 in) clearance. NOTE: • A variety of shims are available to properly adjust the clearance height of the clutch assembly. • An inside micrometer may also be used to measure the clutch assembly height.

Clutch Pressure Plate Installation

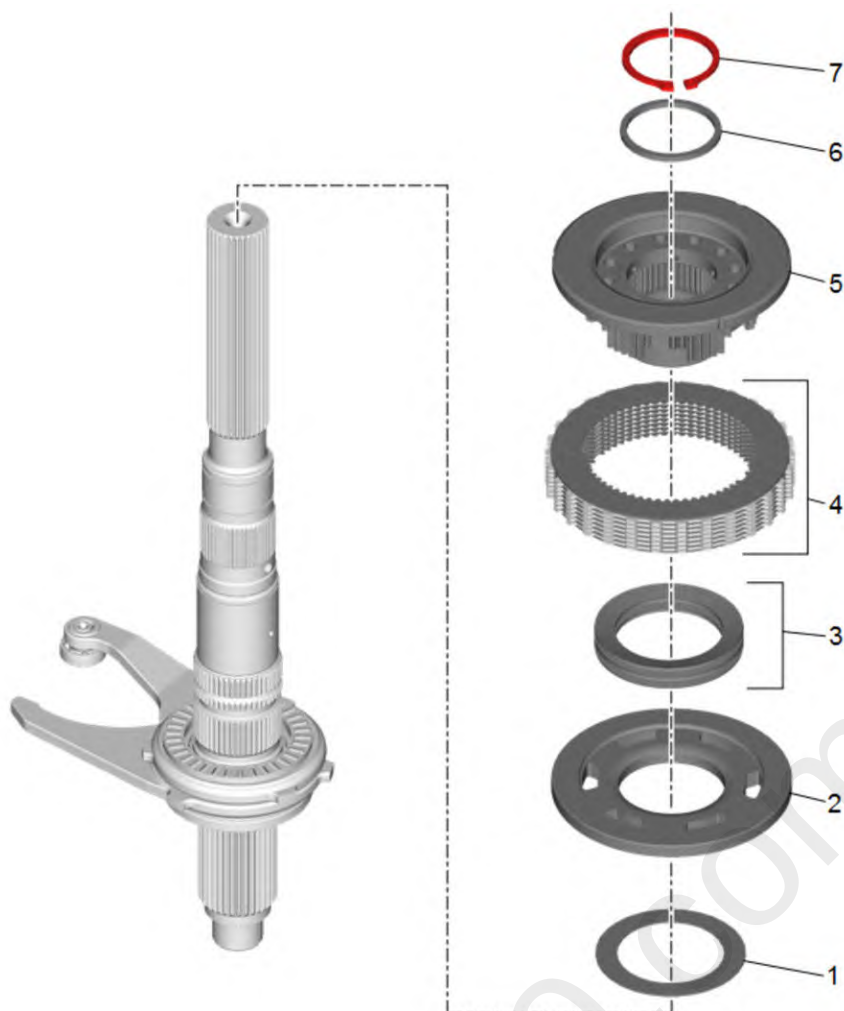


Fig. 11: Exploded View Of Clutch Pressure Plate Components

Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Clutch Pressure Plate Installation

Callout	Component Name
1	Transfer Case Control Actuator Lever Washer
2	Transfer Case Four Wheel Drive Clutch Pressure Plate - Apply
3	Transfer Case Four Wheel Drive Clutch Pressure Plate Spring [4x]
4	Transfer Case Four Wheel Drive Clutch Pressure Plate- Friction and Steel
5	Transfer Case Four Wheel Drive Clutch Hub
6	Transfer Case Four Wheel Drive Clutch Shim
7	Transfer Case Two/Four Wheel Drive Clutch Retaining Ring
Procedure The Transfer Case High/Low Clutch Reset (NQ6) must be performed after the transfer case is installed in the vehicle.	

Transfer Case Rear Output Shaft Assembly

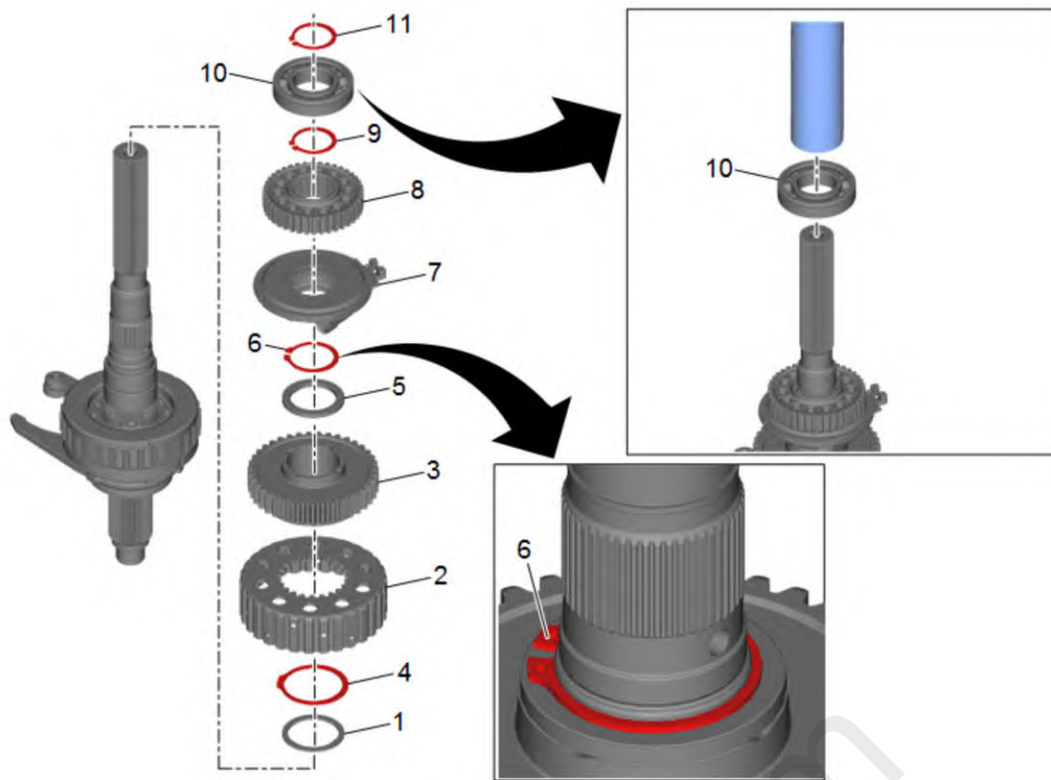


Fig. 12: Exploded View Of Transfer Case Rear Output Shaft Assembly Components
 Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Rear Output Shaft Assembly

Callout	Component Name
1	Transfer Case Front Output Shaft Driven Sprocket Spacer- Front
2	Transfer Case Four Wheel Drive Clutch Housing
3	Transfer Case Front Output Shaft Drive Sprocket
4	Transfer Case Four Wheel Drive Clutch Housing Retaining Ring
5	Transfer Case Front Output Shaft Driven Sprocket Spacer- Rear
6	Transfer Case Front Output Shaft Drive Sprocket Retaining Ring Procedure Ensure the retaining ring is installed into the correct retaining ring groove on the rear output shaft.
7	Transfer Case Oil Pump
8	Transfer Case Rear Output Shaft Speed Reluctor Wheel
9	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
10	Transfer Case Rear Output Shaft Rear Bearing Procedure 1. Use an arbor press or suitable installer to install the bearing to the rear output shaft. 2. Ensure the retaining ring groove in the outer race is positioned toward the rear. 3. Avoid using excessive press force when installing the bearing. Press the bearing on until light contact with the snap ring (8). DO NOT exceed a press force of 16.75 kPa (350 lb ft). Special Tools DT-24433 Pinion Cone and Side Bearing Installer Equivalent regional tools: Special Tools
11	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring

Transfer Case Front Output Shaft Driven Sprocket, Clutch Assembly, Drive Chain, High/Low Shift Fork Assembly, High/Low Clutch and Chip Collector Magnet Installation

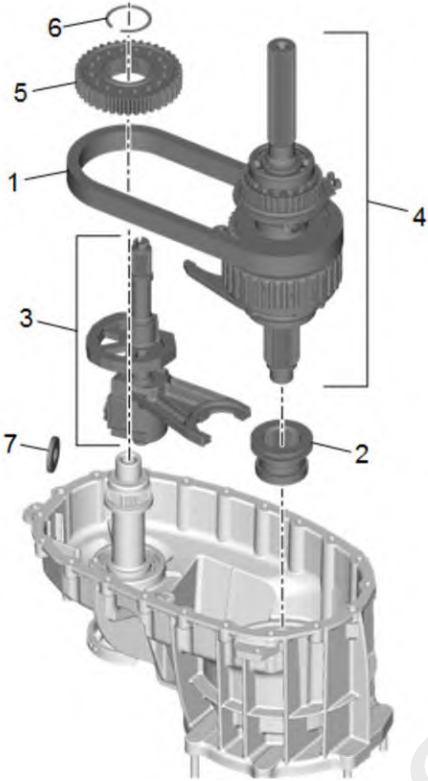


Fig. 13: Transfer Case Components Location
Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Front Output Shaft Driven Sprocket, Clutch Assembly, Drive Chain, High/Low Shift Fork Assembly, High/Low Clutch and Chip Collector Magnet Installation

Callout	Component Name
Preliminary Procedure Install components simultaneously.	
1	Transfer Case Front Output Shaft Drive Chain Assembly Procedure Install the chain with the blue color links up and facing away from case half.
2	Transfer Case High/Low Clutch
3	Transfer Case High/Low Shift Fork Assembly
4	Transfer Case Clutch Pack Assembly
5	Transfer Case Front Output Shaft Driven Sprocket Procedure Align the ID splines of the drive sprocket and the OD splines of the front output shaft.
6	Transfer Case Front Output Shaft Drive Sprocket Retaining Ring
7	Transfer Case Chip Collector Magnet

Transfer Case Oil Pump Suction Pipe and Actuator Shaft Gear Installation

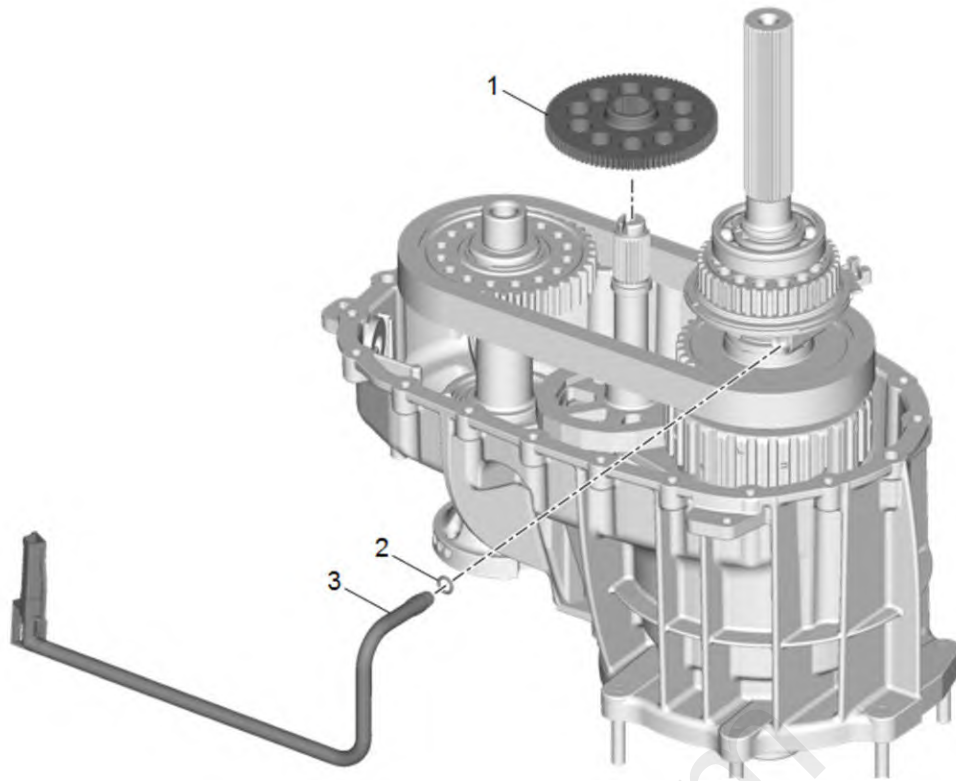


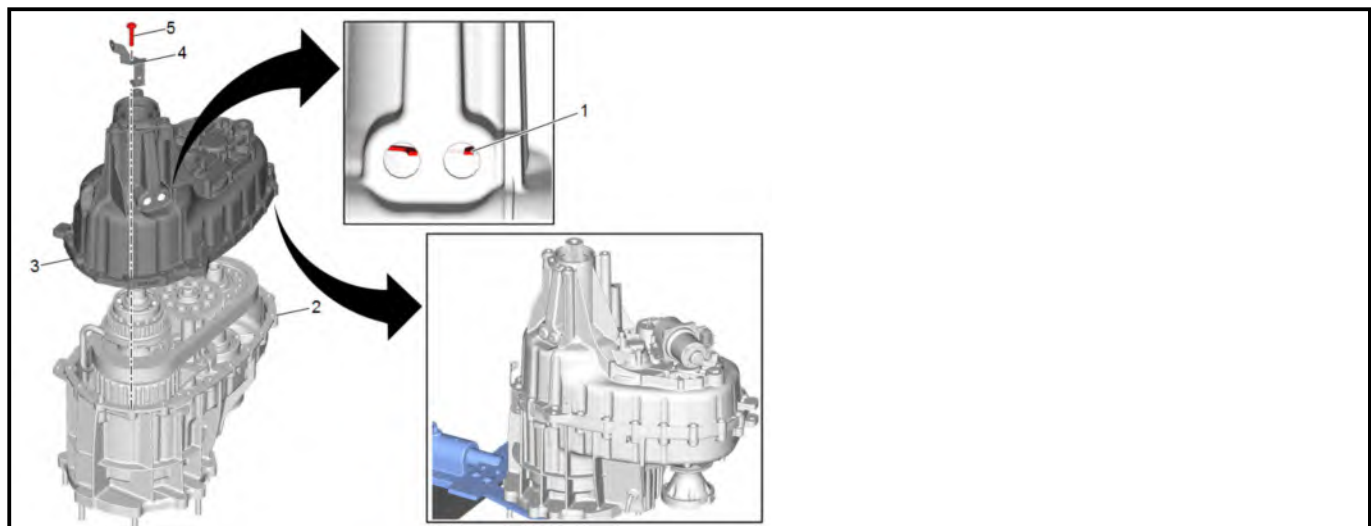
Fig. 14: Transfer Case Oil Pump Suction Pipe And Actuator Shaft Gear Components Location
 Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Oil Pump Suction Pipe and Actuator Shaft Gear Installation

Callout	Component Name
1	Transfer Case Two/Four Wheel Drive Actuator Shaft Gear
2	Transfer Case Oil Pump Suction Pipe Seal Procedure 1. Install a NEW seal. Do NOT reuse the old seal. 2. Lubricate the seal to ease installation. Adhesives, Fluids, Lubricants, and Sealers 3. Install the seal to the pipe prior to inserting the pipe into the pump.
3	Transfer Case Oil Pump Suction Pipe

Transfer Case Rear Extension (Rear Half) Installation



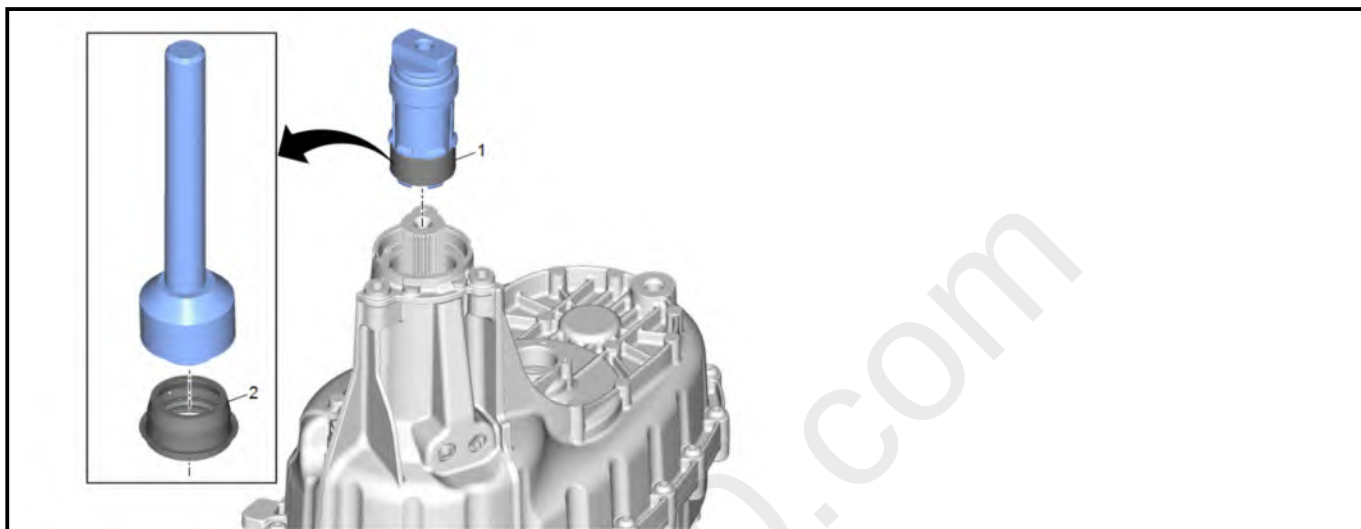
NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Rear Extension (Rear Half) Installation

Callout	Component Name
1	Transfer Case Rear Output Shaft Rear Bearing Retaining Ring
2	Transfer Case Front Case Half CAUTION: Apply the proper amount of sealant to the transfer case (front half) sealing surface when assembling the transfer case. Excessive amounts of sealant can plug the oil pump screen, resulting in internal component failure. Procedure 1. Ensure the sealing surfaces of both the front and rear case halves are free of dirt, oil and cleaning solvent. 2. Apply a 2 mm (0.078 in) bead of sealant to the front case half. Adhesives, Fluids, Lubricants, and Sealers
3	Transfer Case Rear Case Half Procedure 1. Ensure the transfer case rear output shaft outer retaining ring is in place and aligned prior to mating case halves. 2. Use snap ring pliers to open the transfer case rear output shaft outer retaining ring for installation onto the rear output shaft rear bearing.
4	Transfer Case Bracket
5	Transfer Case Half Bolt [20x] CAUTION: Refer to Fastener Caution . Procedure

Callout	Component Name
	1. Rotate the transfer case assembly to position the rear extension (rear half) facing downward. In this orientation, the weight of the rear output shaft assembly will assist to position the rear output shaft bearing into the bore of the rear case half and locate the snap ring into the OD groove of the bearing. 2. Inspect the snap ring for installation into the OD groove of the bearing. 3. Tighten bolts by hand, do not use an air gun. Tighten 24 N.m (18 lb ft)

Transfer Case Rear Output Shaft Seal and Bushing Installation



NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Rear Output Shaft Seal and Bushing Installation

Callout	Component Name
1	Transfer Case Rear Output Shaft Bushing Procedure 1. If the bushing was removed, a new bushing must be installed. 2. Install the bushing on the finger section of the DT-45380 Transfer Case Rear Bushing Remover and Installer. 3. Install the finger section to the main body of the DT-45380 Transfer Case Rear Bushing Remover and Installer. 4. Position the bushing and tool to the rear case half. 5. Install the bushing until the tool bottoms against the rear case half. 6. Ensure the bushing is installed squarely into the bushing bore. Special Tools DT-45380 Transfer Case Rear Bushing Remover and Installer Equivalent regional tools: Special Tools
2	Transfer Case Rear Output Shaft Seal Procedure Install the seal with the notched area on the OD of the seal with the case half as seen above. Special Tools • DT-48210 Seal Installer

Callout	Component Name
	GE-8092 Driver Handle

Transfer Case Access Hole Plugs, Fill and Drain Plug, Vent, 4 Wheel Drive Actuator, 2/4 Wheel Drive Actuator Position Sensor, Shift Detent Plunger Plug, and Vehicle Speed Sensor Installation

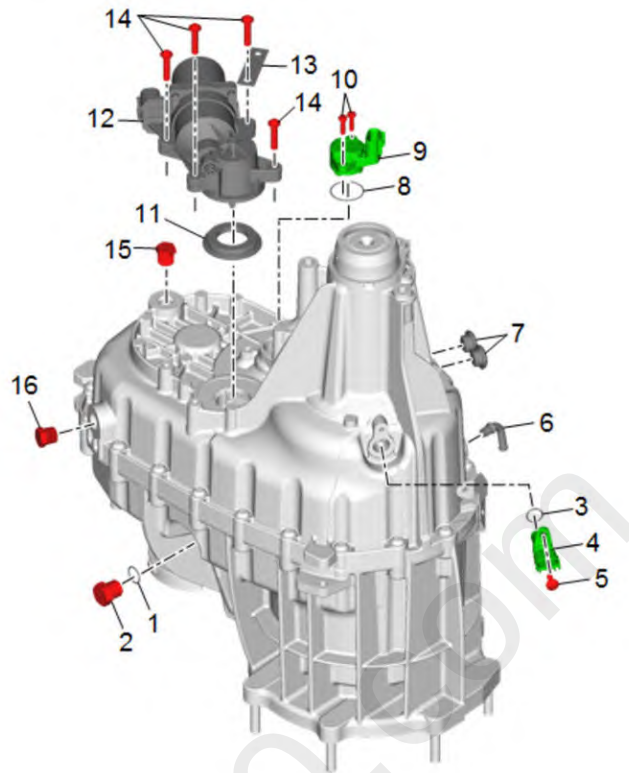


Fig. 15: Transfer Case Components Location
Courtesy of GENERAL MOTORS COMPANY

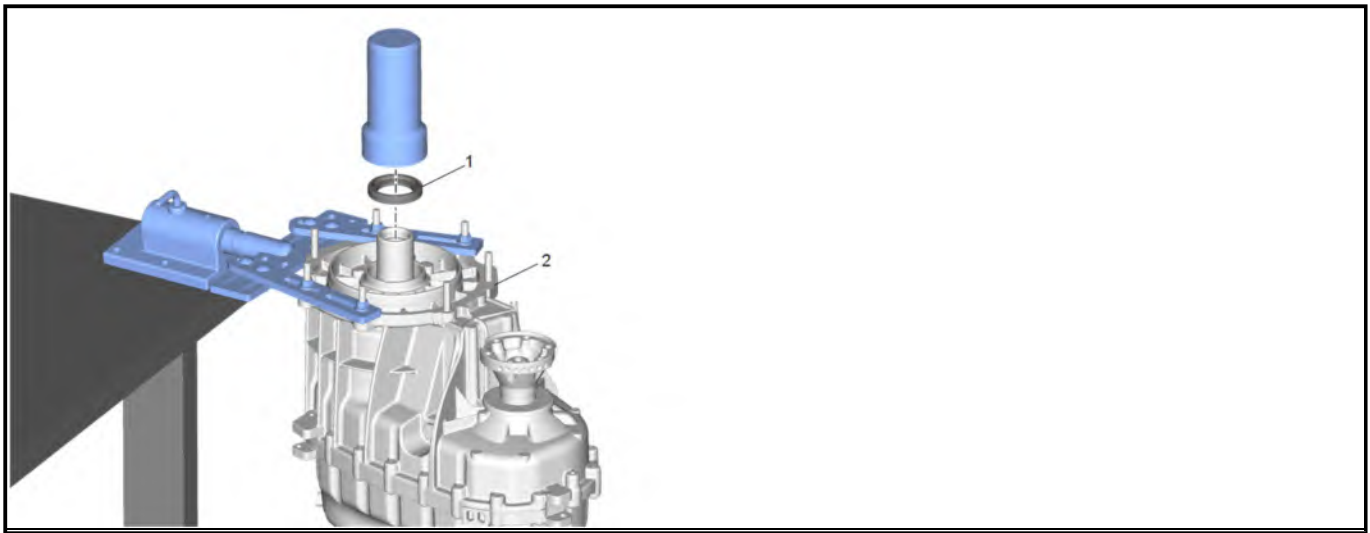
NOTE: Callouts in the following chart represent components shown in graphic above.

Transfer Case Access Hole Plugs, Fill and Drain Plug, Vent, 4 Wheel Drive Actuator, 2/4 Wheel Drive Actuator Position Sensor, Shift Detent Plunger Plug, and Vehicle Speed Sensor Installation

Callout	Component Name
1	Transfer Case Shift Detent Plunger Plug Seal Procedure Lubricate the O-ring with clean DEXRONB® VI.
2	Transfer Case Shift Detent Plunger Plug Tighten 24 N.m (18 lb ft)
3	Vehicle Speed Sensor O-Ring Procedure Lightly lubricate the O-ring with clean DEXRONB® VI.
4	Vehicle Speed Sensor
5	Vehicle Speed Sensor Bolt Procedure Apply threadlock to the threads of the bolt. Tighten 8 N.m (69 lb in)
6	Transfer Case Vent Procedure Apply retaining compound to OD of the NEW vent pipe before installation.
7	Transfer Case Access Hole Plug [2x]

Callout	Component Name
8	Transfer Case Two/Four Wheel Drive Actuator Position Sensor Procedure NOTE: Lightly lubricate the O-ring with clean DEXRONB® VI.
9	Transfer Case Two/Four Wheel Drive Actuator Position Sensor
10	Transfer Case Two/Four Wheel Drive Actuator Position Sensor Bolt [2x] Tighten 10 N.m (89 lb in)
11	Transfer Case Two/Four Wheel Drive Actuator Seal
12	Transfer Case Four Wheel Drive Actuator
13	Transfer Case Actuator Harness Bracket
14	Transfer Case Two/Four Wheel Drive Actuator Bolt/Screw [3x] Tighten 19 N.m (14 lb ft)
15	Transfer Case Fill Plug Procedure 1. Apply pipe sealant to the oil fill plug before installation. 2. Install NEW Tighten 25 N.m (18 lb ft)
16	Transfer Case Drain Plug CAUTION: Refer to <u>Component Fastener Tightening Caution</u> . Procedure 1. Apply pipe sealant to the oil fill plug before installation. 2. Install NEW Tighten 25 N.m (18 lb ft)

Input Shaft Seal Installation and Transfer Case Holding Fixture Removal



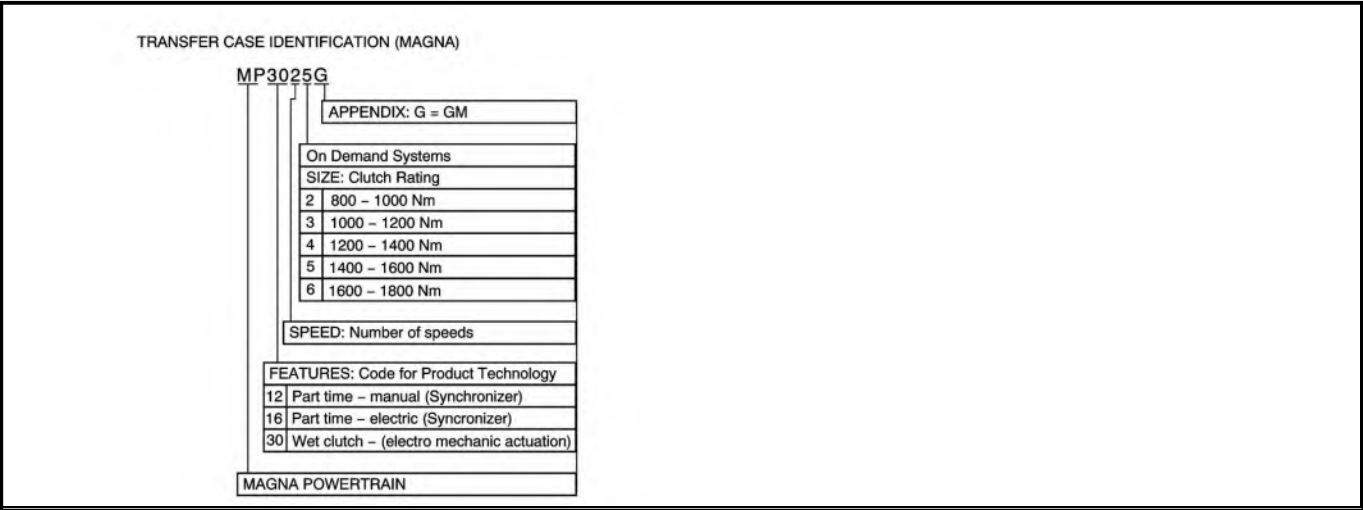
NOTE: Callouts in the following chart represent components shown in graphic above.

Input Shaft Seal Installation and Transfer Case Holding Fixture Removal

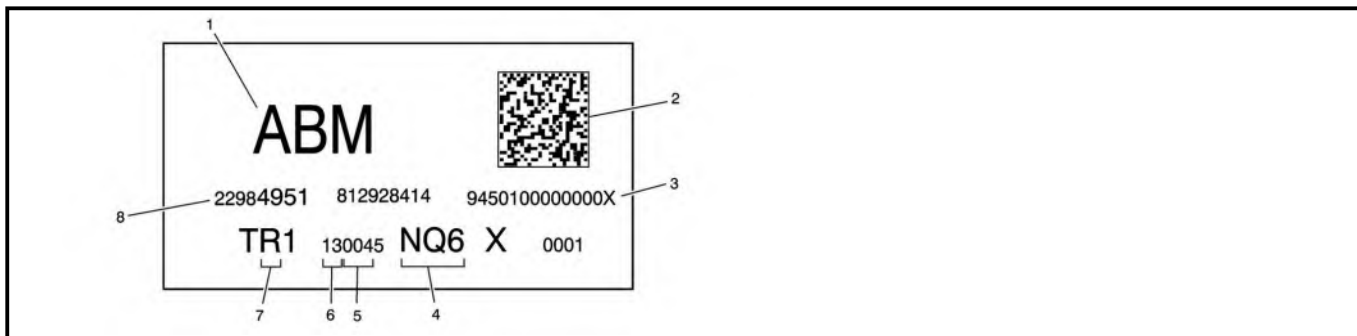
Callout	Component Name
1	Transfer Case Input Shaft Seal Procedure Ensure the bore of the front case half is free of dirt, oil, and cleaning solvent. Special Tools DT-50648 - A Case Seal Installer Equivalent regional tools: Special Tools
2	Transfer Case Procedure Remove the transfer case and DT-36842 from the DT-3289-20 Holding Fixture and remove the DT-36842 Transaxle Holding Fixture from the transfer case. Special Tools DT-3289-20 Holding Fixture DT-36842 Transaxle Holding Fixture

DESCRIPTION AND OPERATION

TRANSFER CASE IDENTIFICATION



Magna Transfer Case Bar Code Label



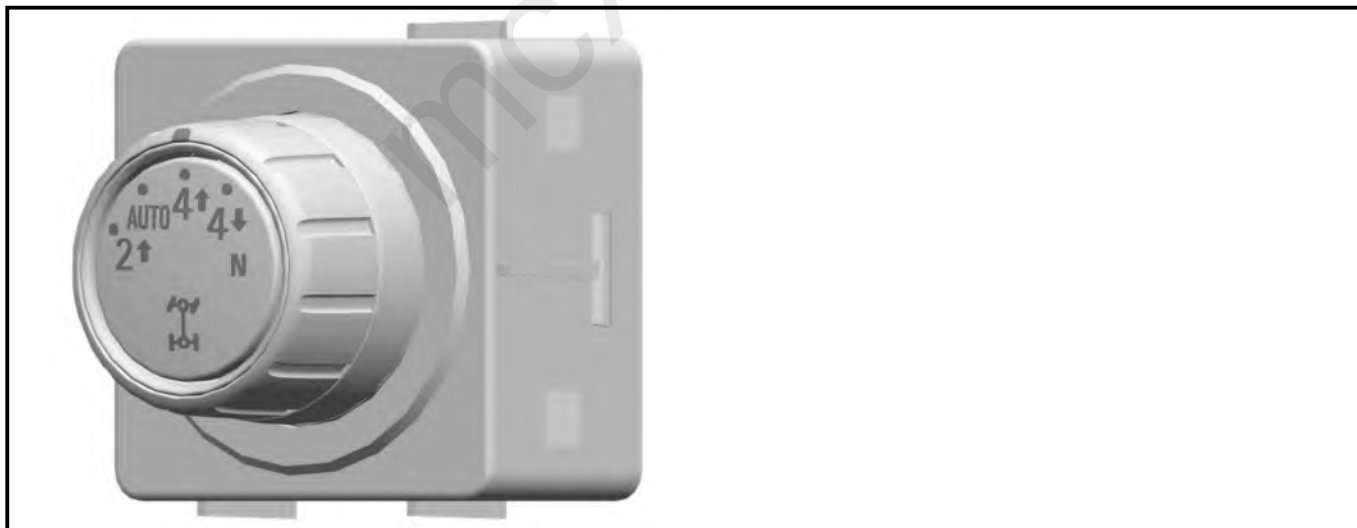
NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	GM Broadcast Code
2	2D Bar Code
3	VPPS Code
4	Broadcast Code
5	Julian Date of the Year
6	Calendar Year
7	Build Location - R-Ramos/T-Troy/M-Muncie
8	GM Assembly Part Number

TRANSFER CASE DESCRIPTION AND OPERATION

The Magna Powertrain (MP) model MP-3025G RPO-NQ6 transfer case is a 2 speed automatic, active transfer case (ATC). The MP 3025G RPO-NQ6 ATC provides 5 modes, Auto 4WD, 4HI, 4LO, 2HI and NEUTRAL. The Auto 4WD position allows the capability of an active transfer case, which provides the benefits of on-demand torque biasing wet clutch and easy vehicle tuning through software calibrations. The software calibrations allow more features such as flexible adapt ready position and clutch preload torque levels. The technology allows for vehicle speed dependent clutch torque levels to enhance the performance of the system.

Transfer Case Shift Control Switch



The MP 3025G ATC transfer case RPO-NQ6 features a 5 mode shift control switch located on the instrument panel. When the ignition key is in the RUN position, the transfer case shift control module monitors the transfer case shift control switch to determine if the driver desires a new mode/range position. At a turn of the transfer case shift control switch, the lamp of the new desired position will begin flashing to inform the driver that the transfer case shift control module has received the request for a new mode/range position. The lamp continues to flash until all shifting criteria has been met and the new mode/range position has been reached, or has been engaged. Once the new mode/range position is fully active, the switch indicator lamp for the new position will remain ON constantly.

During normal driving situations, the transfer case can operate in the Auto 4WD mode. In the Auto 4WD mode, the transfer case shift control module monitors rear wheel slip speed, based on the inputs from the wheel speed sensors and/or vehicle speed sensor. When the vehicle experiences a rear wheel slip condition, the transfer case shift control module sends a pulse width modulated (PWM) signal to an electronic motor, which is the transfer case 2/4 wheel drive actuator assembly. This actuator rotates the transfer case control actuator shaft, applying a clutch. The clutch is designed to deliver a variable amount of torque, normally delivered to the rear wheels, and transfers it to the front wheels. Torque is ramped up to the front wheels until the front wheel speed sensor signal matches that of the rear wheel speed sensors and/or vehicle speed sensor. Torque is ramped down to the front wheels. The process would repeat if rear wheel slip is detected again.

The MP 3025G transfer case RPO-NQ6 has the added feature of also providing the driver with 4 manual mode/range positions:

- 4HI - 4 Wheel Drive high range
- 2HI - 2 Wheel Drive high range
- 4LO - 4 wheel drive low range, 2.72:1 gear ratio reduction.
- Neutral

The driver may choose to select any of these mode/range positions while driving the vehicle. However, the transfer case will not allow a shift into or out of 4LO unless the following criteria have been met:

- The ignition switch is in RUN.
- The automatic transmission is in NEUTRAL.
- The vehicle speed is below 5 km/h (3 mph).

This transfer case also has a NEUTRAL position. A shift to the NEUTRAL position allows the vehicle to be towed without rotating the transmission output shaft. In the NEUTRAL position, the rear propeller shaft rotates the transfer case rear output shaft, in turn rotating the oil pump, thus providing constant lubrication during towing. NEUTRAL position may be obtained only if the following criteria have been met:

- The ignition switch is in RUN.
- The automatic transmission is in NEUTRAL.
- The vehicle speed is below 5 km/h (3 mph).
- The transfer case is in 2HI mode.

Once these conditions have been met, turn the rotary switch clockwise past 4 low and hold for 10 seconds. When the system completes the shift to NEUTRAL, the red NEUTRAL lamp will illuminate.

2WD Mode Power Flow

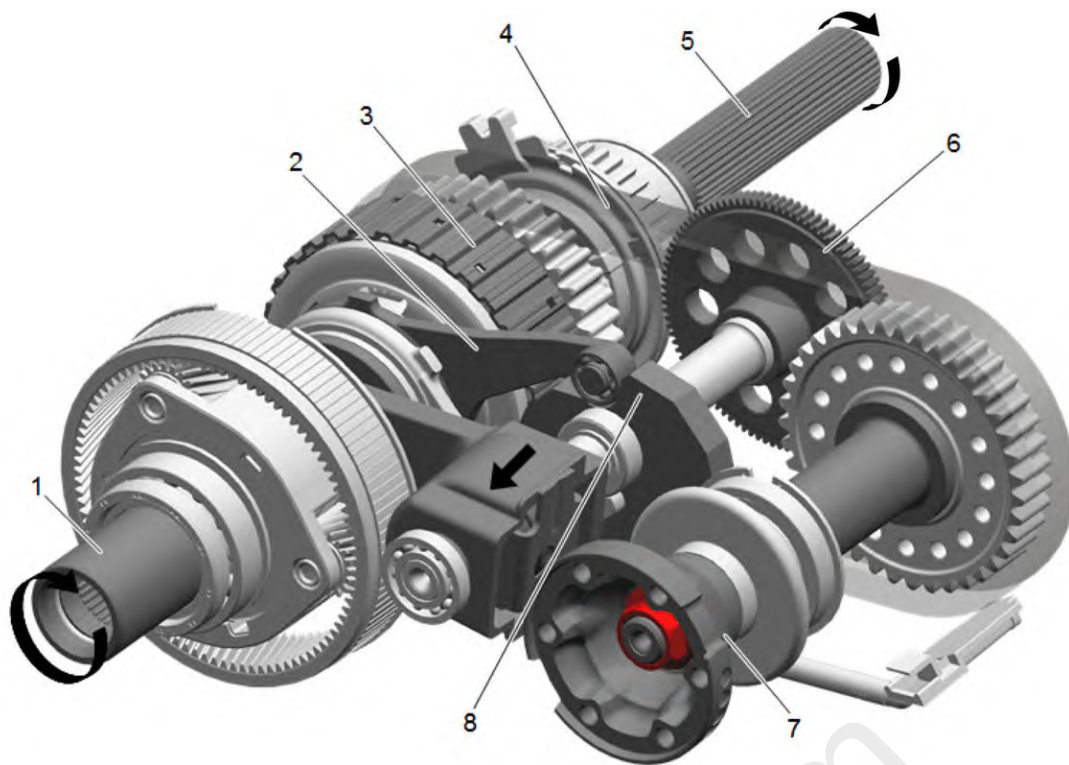
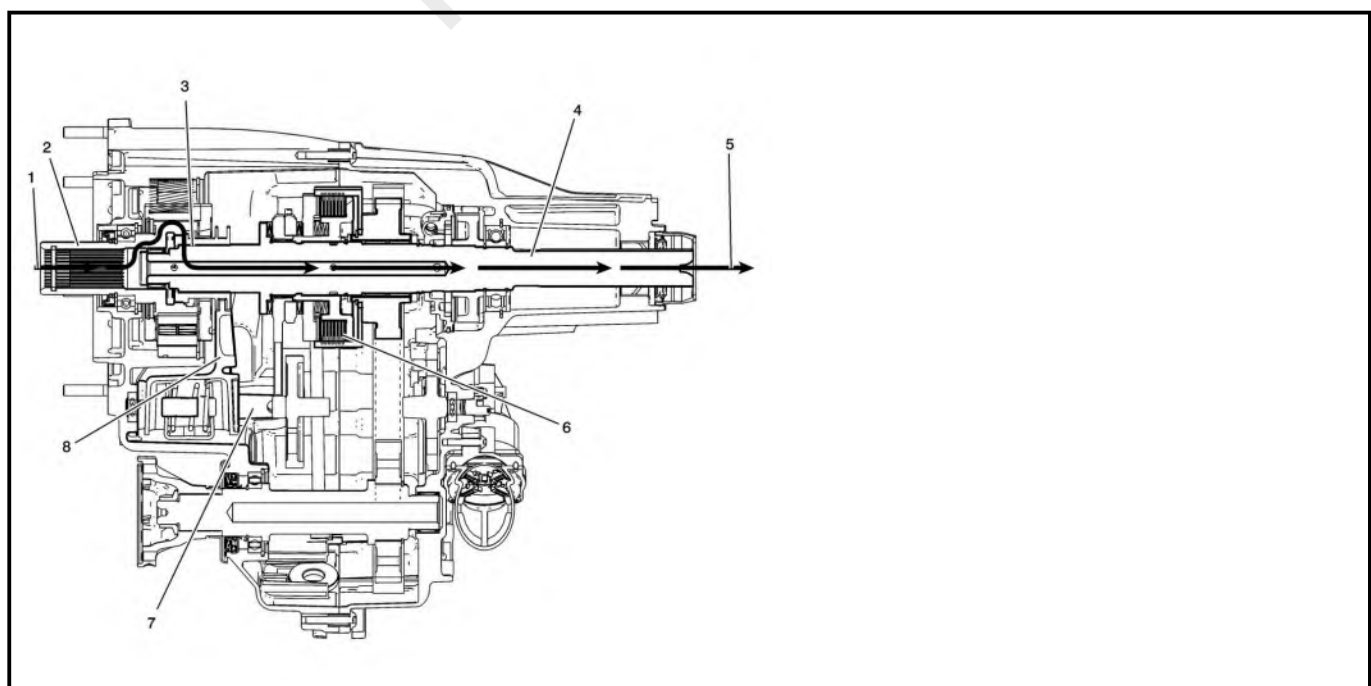


Fig. 16: 2WD Mode Power Flow Components Location
 Courtesy of GENERAL MOTORS COMPANY

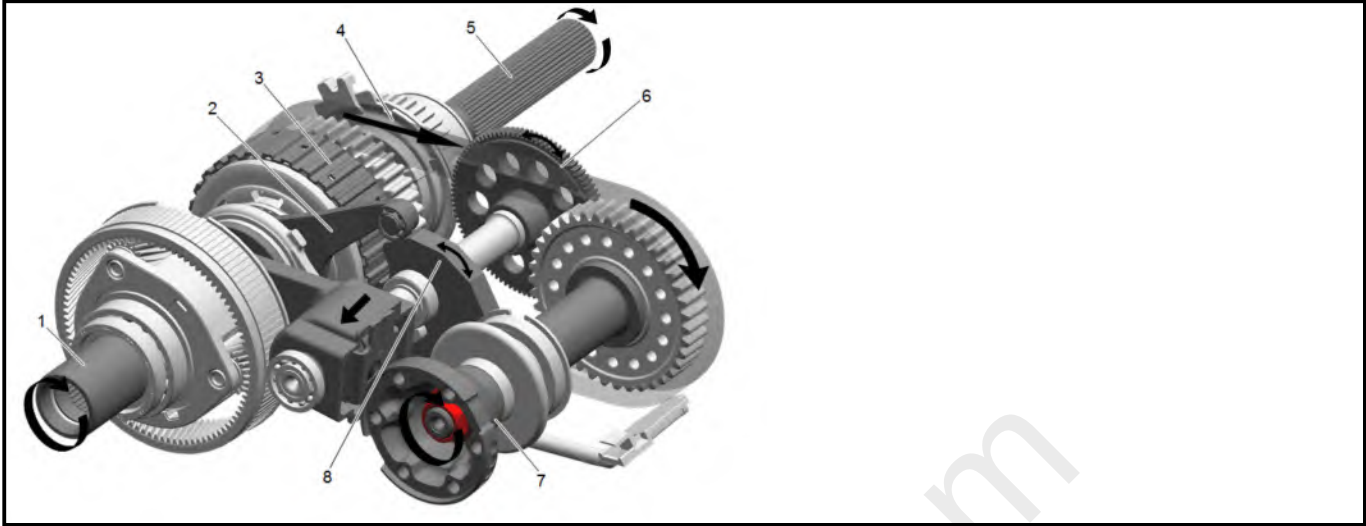
NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Input Shaft
2	Scissor Mechanism Lever
3	Clutch Pack
4	Drive Chain
5	Rear Output Shaft
6	Actuator Shaft Gear
7	Front Output Flange/Shaft
8	Actuator Cam



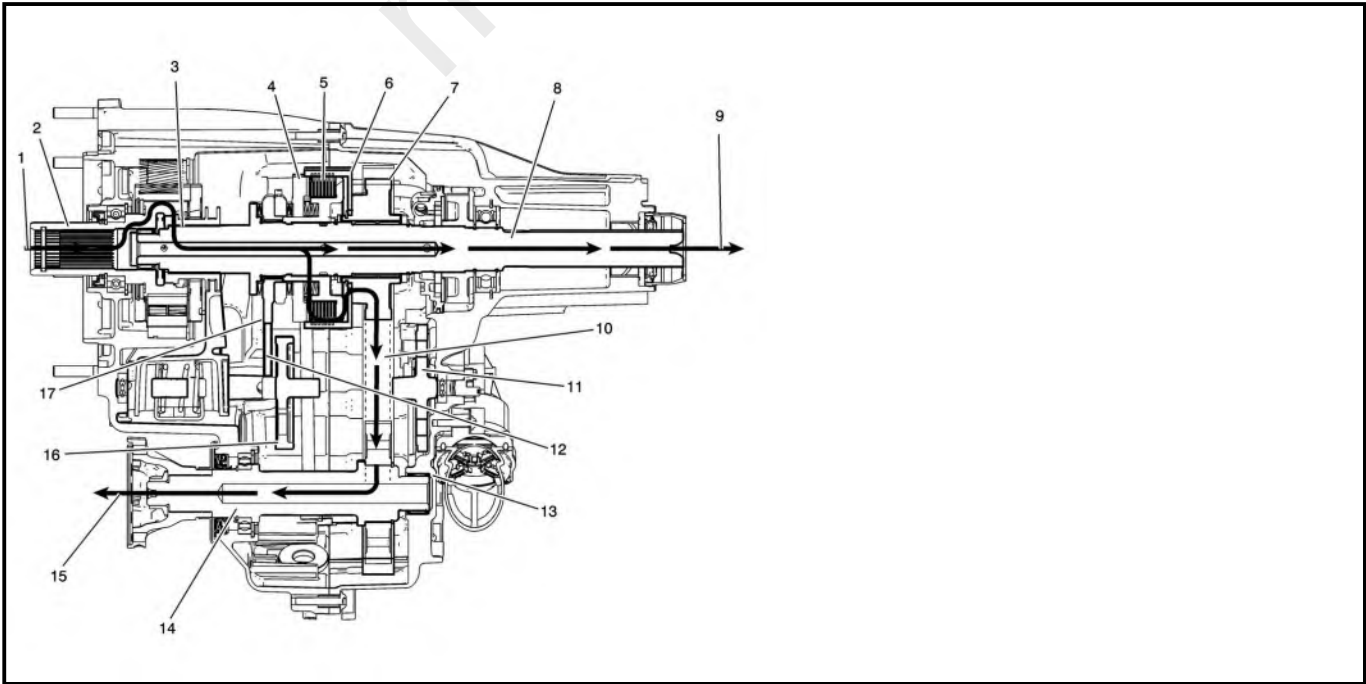
When the MP 3025G transfer case RPO-NQ6 is in the 2WD mode, the power flows from the transmission (1) to the input shaft (2). The input shaft (2) is connected to the rear output shaft (4) by the high/low clutch (3). The high/low clutch (3) outer teeth are engaged with the input shaft (2) inner, high-speed position teeth. At the same time the high/low clutch is slip splined to the rear output shaft (4). The rear output shaft (4) delivers the power flow to the rear propshaft (5). The position of the control actuator shaft (7) allows no clutch (6) engagement. The high/low range shift fork (8), is in the high-speed position on the control actuator shaft (7).

4HI Mode Power Flow



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Input Shaft
2	Scissor Mechanism Lever
3	Clutch Pack
4	Drive Chain
5	Rear Output Shaft
6	Actuator Shaft Gear
7	Front Output Flange/Shaft
8	Actuator Cam



In the 4HI mode, the power flow to the rear propshaft (9) is the same as it is in the 2WD mode. To deliver power flow to the front propshaft (15) during the 4HI position, the transfer case control module commands the 2/4 wheel drive actuator assembly (13) to apply the clutch to a calibrated torque. The 2/4 wheel drive actuator assembly (13) turns the control actuator shaft. A brake in the 2/4 wheel drive actuator assembly (13) holds the control actuator shaft in the full clutch position. The control actuator shaft is cam designed and the cam action moves the scissor mechanism lever (12). The scissor mechanism lever (12) pivots against the control lever (17) and moves toward the clutch pressure plate (4), to engage the clutch (5). As more pressure is applied to the clutch pressure plate (4), the clutch discs (5) are compressed. Using inner clutch discs, which are engaged with the clutch hub, and the outer clutch discs, which are engaged with the clutch housing (6), the power flow is delivered to the clutch housing (6). The clutch hub is splined to the rear output shaft (8), and the clutch housing (6) rotates on a needle bearing on the rear output shaft (8). The chain drive sprocket (7) is splined to the clutch housing (6). The power flows from the drive sprocket (7), through the chain (10), to the chain driven sprocket. The driven sprocket is splined to the front output flange/shaft (14). The power flow is delivered to the front propshaft (15) through the front output flange/shaft (14).

During the Auto 4WD mode, the power flow is the same as it is in the 4HI mode. Except, during the Auto 4WD mode, the 2/4 wheel drive actuator assembly (13) rotates the control actuator shaft to the correct torque level positions. Rotating the control actuator shaft to the various positions changes the clutch torque level. When a difference of front wheel speed to rear wheel speed is recognized, the transfer case control module commands for more, or less clutch torque.

4HI Mode Active Power Flow

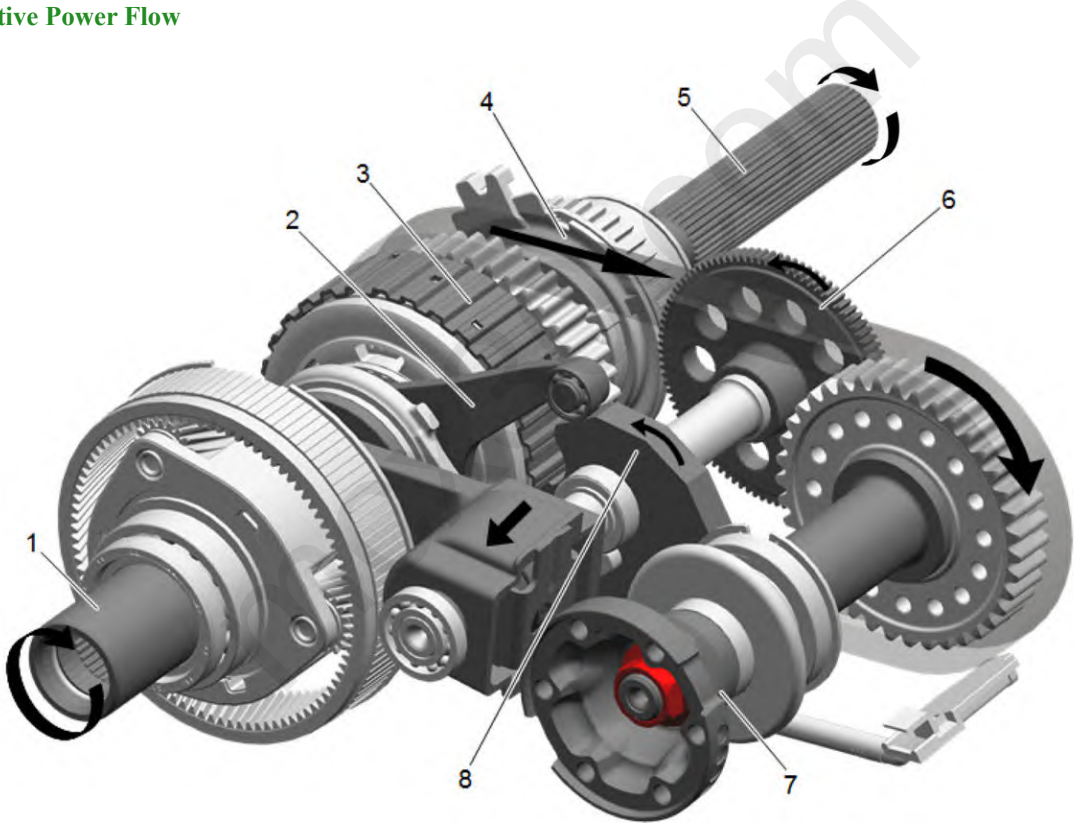
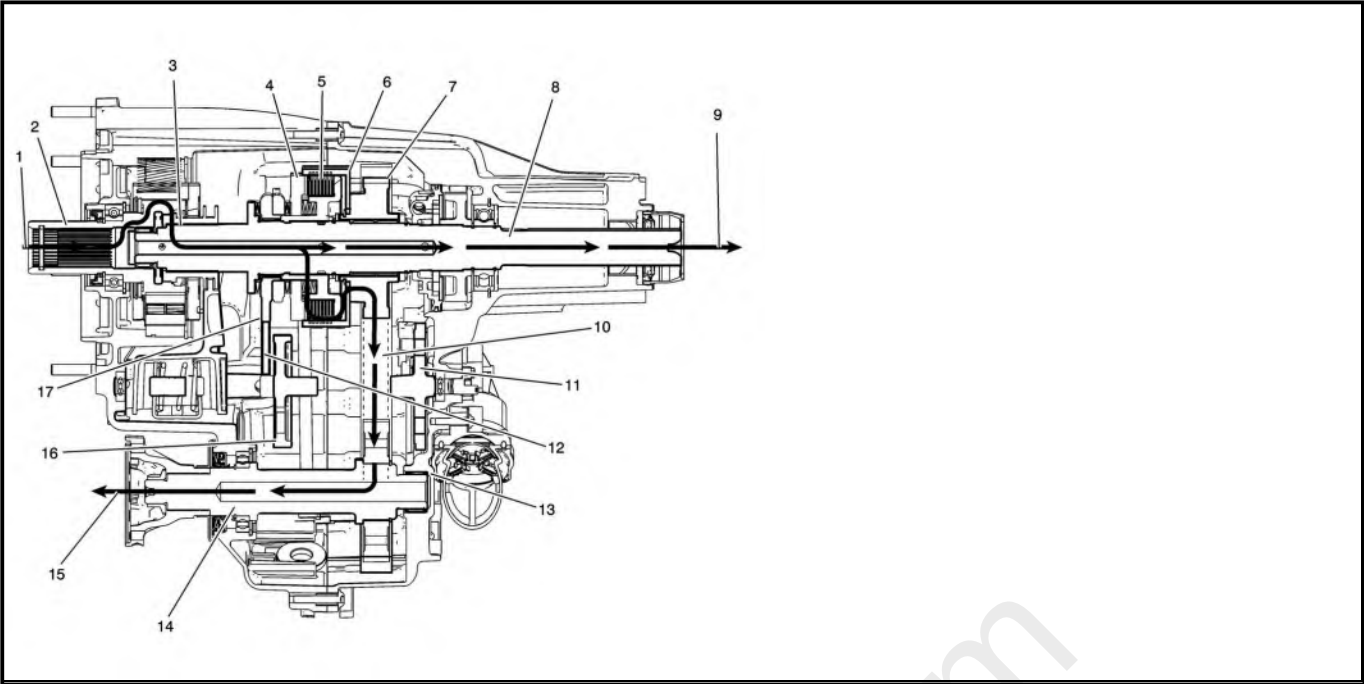


Fig. 17: 4HI Mode Active Power Flow Components Location
Courtesy of GENERAL MOTORS COMPANY

NOTE: Callouts in the following chart represent components shown in graphic above.

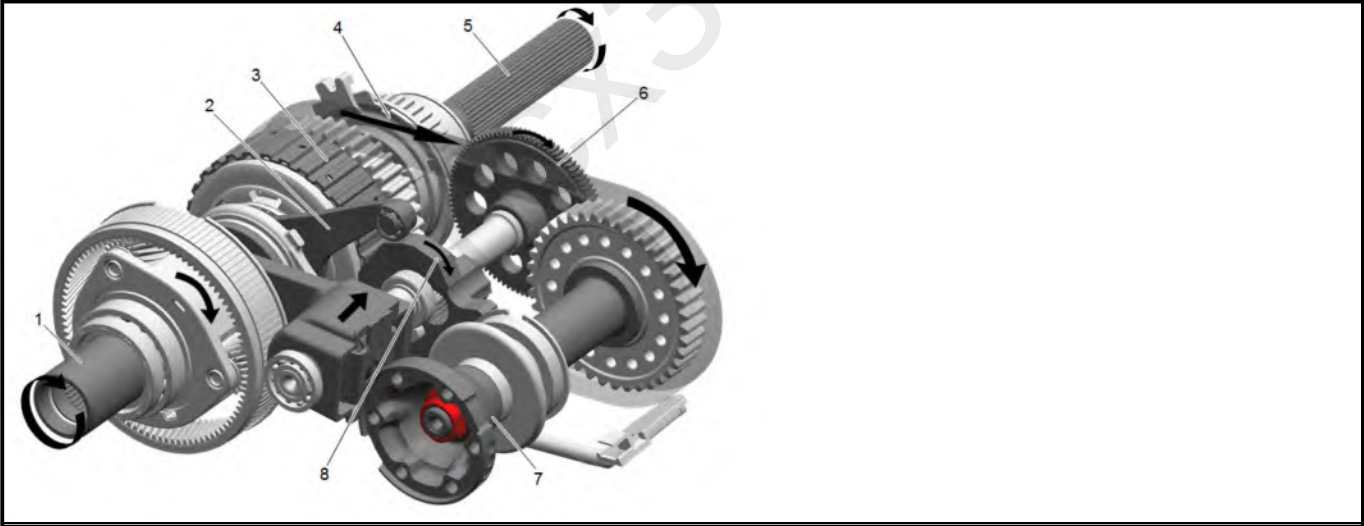
Callout	Component Name
1	Input Shaft
2	Scissor Mechanism Lever
3	Clutch Pack
4	Drive Chain
5	Rear Output Shaft
6	Actuator Shaft Gear
7	Front Output Flange/Shaft

Callout	Component Name
8	Actuator Cam



During the Auto 4WD mode, the power flow is the same as it is in the 4HI mode. Except, during the Auto 4WD mode, the 2/4 wheel drive actuator assembly (13) rotates the control actuator shaft to the correct torque level positions. Rotating the control actuator shaft to the various positions changes the clutch torque level. When a difference of front wheel speed to rear wheel speed is recognized, the transfer case control module commands for more or less clutch torque.

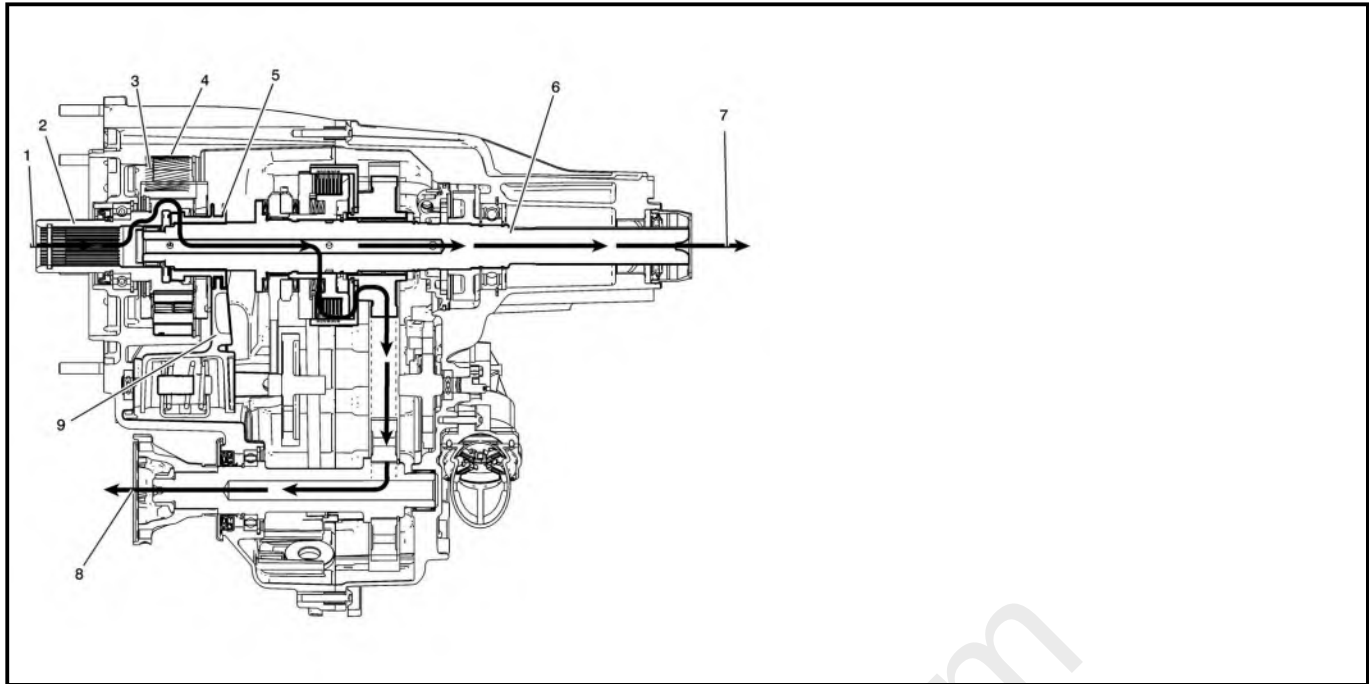
4LO Mode Power Flow



NOTE: Callouts in the following chart represent components shown in graphic above.

Callout	Component Name
1	Input Shaft
2	Scissor Mechanism Lever
3	Clutch Pack
4	Drive Chain
5	Rear Output Shaft
6	Actuator Shaft Gear
7	Front Output Flange/Shaft

Callout	Component Name
8	Actuator Cam

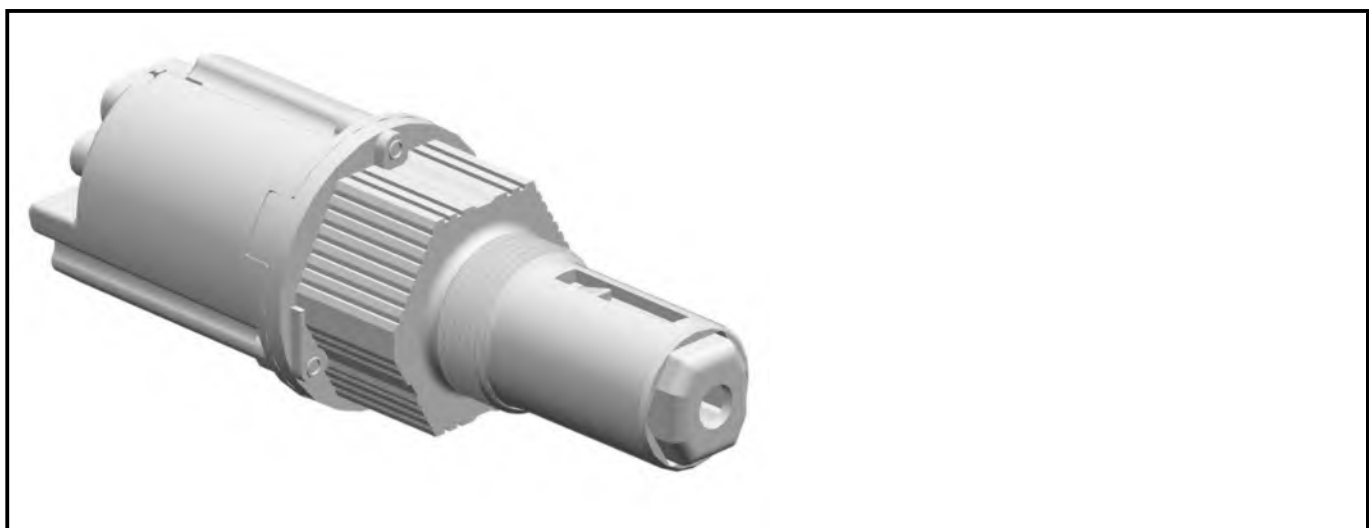


When shifting the transfer case to the 4LO mode, it commands the 2/4 wheel drive actuator assembly to turn the control actuator shaft, to move the high/low shift fork (9). The shift fork (9) moves the high/low clutch (5), which is slip splined on the rear output shaft (6) toward the rear of the transfer case. The high/low clutch (5) outer teeth disengage from the input shaft (2) inner teeth. The high/low clutch (5) outer teeth then engage in the planetary carrier teeth. The power flow is now from the input shaft (2) planetary teeth to the planetary gears (3) in the carrier. Rotating the planetary gears (3), which are engaged in the high/low internal gear (4), the planetary carrier rotates. The planetary carrier engaged to the high/low clutch (5), drives the rear output shaft (6), providing a 2.72:1 reduction to the speed of the rear output shaft (6). The power flow to the front propshaft (8) is the same as it is in the 4HI.

NEUTRAL Mode Power Flow

Shifting to the NEUTRAL position, the high/low clutch is centered between the input shaft and the high/low planetary carrier. The high/low clutch is not engaged with either the input shaft or the high/low planetary carrier teeth.

Front Axle Actuator



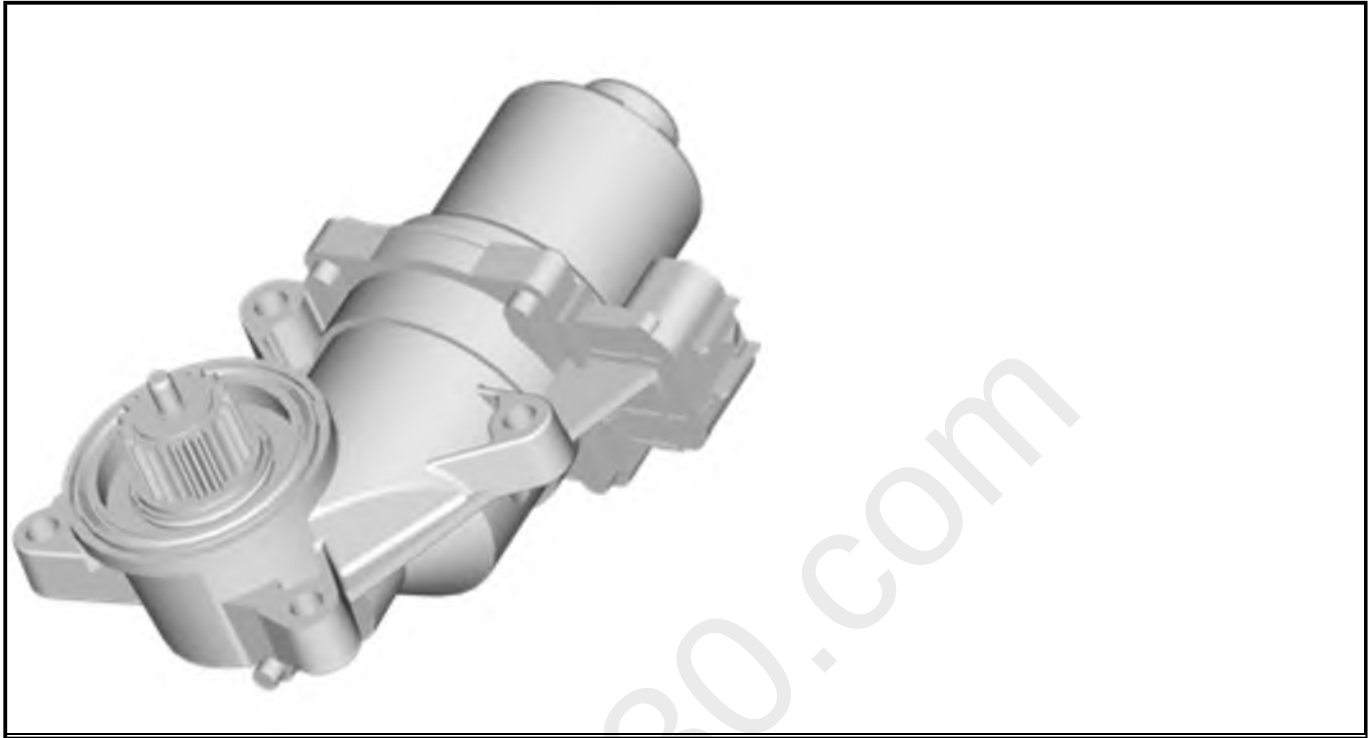
The front axle actuator engages and disengages the front axle. The front axle actuator consists of a permanent magnetic (PM) motor, a worm gear controlled plunger, a front axle switch and an electronic control circuit. When a range shift to 4HI, or 4LO is requested, the transfer case shift control module requests engagement of the front axle

by grounding the axle actuator control circuit through a current limiting driver. The front axle actuator also sends a return signal to the transfer case shift control module indicating when the 4WD is engaged.

Service 4 Wheel Drive Message

The Service 4 Wheel Drive Message is a display within the Drivers Information Center (DIC). This message is used to inform the driver that a transfer case system malfunction has occurred. The Service 4 Wheel Drive Message is controlled by the transfer case shift control module via GMLAN.

Transfer Case Two/Four Wheel Drive Actuator Assembly



The transfer case two/four wheel drive actuator assembly consists of a permanent magnet DC motor and gear reduction assembly. It is located on the left hand side, driver's side, of the transfer case. When activated, it turns the shift detent lever shaft of the transfer case, clockwise or counterclockwise, to shift the transfer case. The motor/encoder is controlled with a PWM signal by the transfer case shift control module. This circuit consists of a driver on both the Motor A and Motor B circuits. The encoder motor is bi-directional in order to allow the motor to shift the transfer case from 2HI or 4HI to NEUTRAL and 4LO positions. Within the motor assembly are the Incremental Sensor and the Actuator Motor Lock.

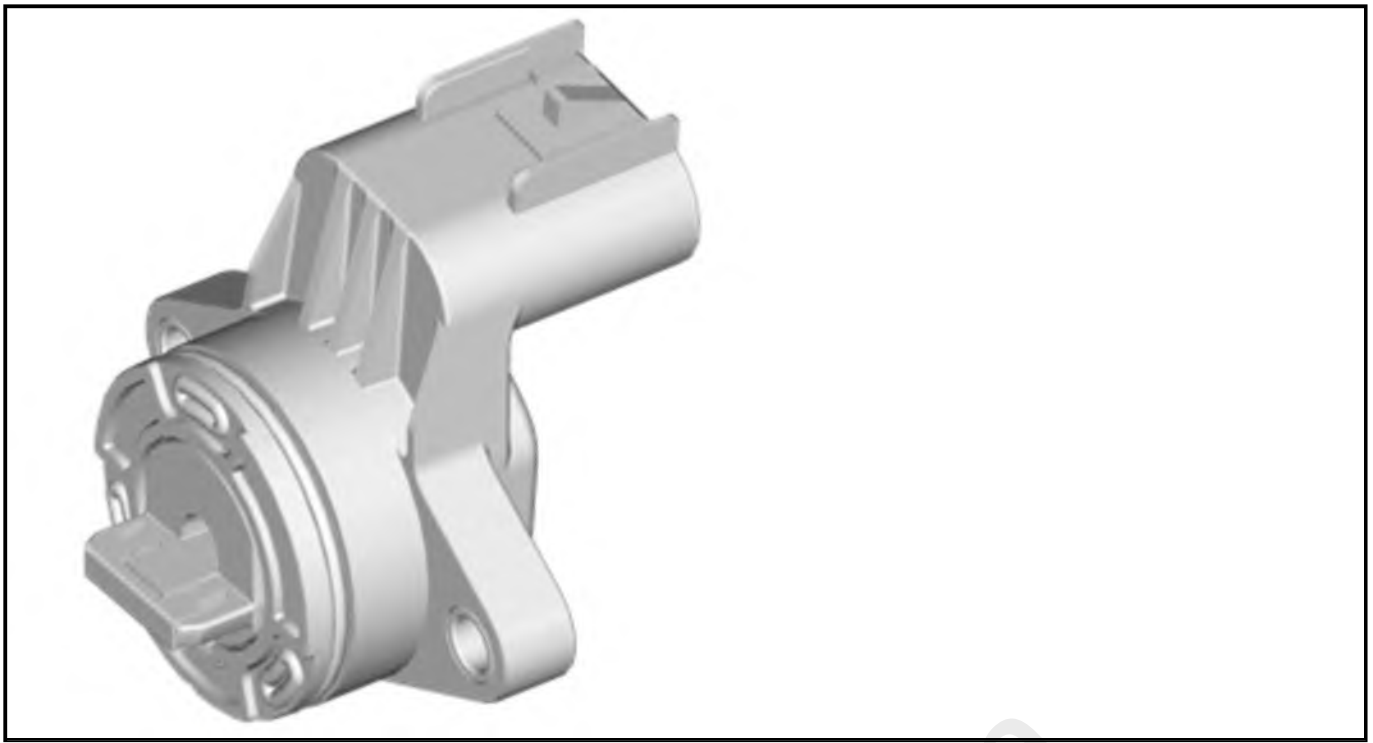
Transfer Case Two/Four Wheel Drive Incremental Sensor

The incremental sensor is mounted within the transfer case actuator and is replaced with the actuator as an assembly. The incremental sensor converts the shift detent lever shaft position, representing a mode or range, into an electrical signal input to the transfer case shift control module. The module detects what position the transfer case is in by monitoring the voltage returned on the incremental encoder impulse signal circuit. This voltage translates into AUTO 4WD, 2HI, 4HI, NEUTRAL, and 4LO or in transition between gears.

Transfer Case Actuator Motor Lock

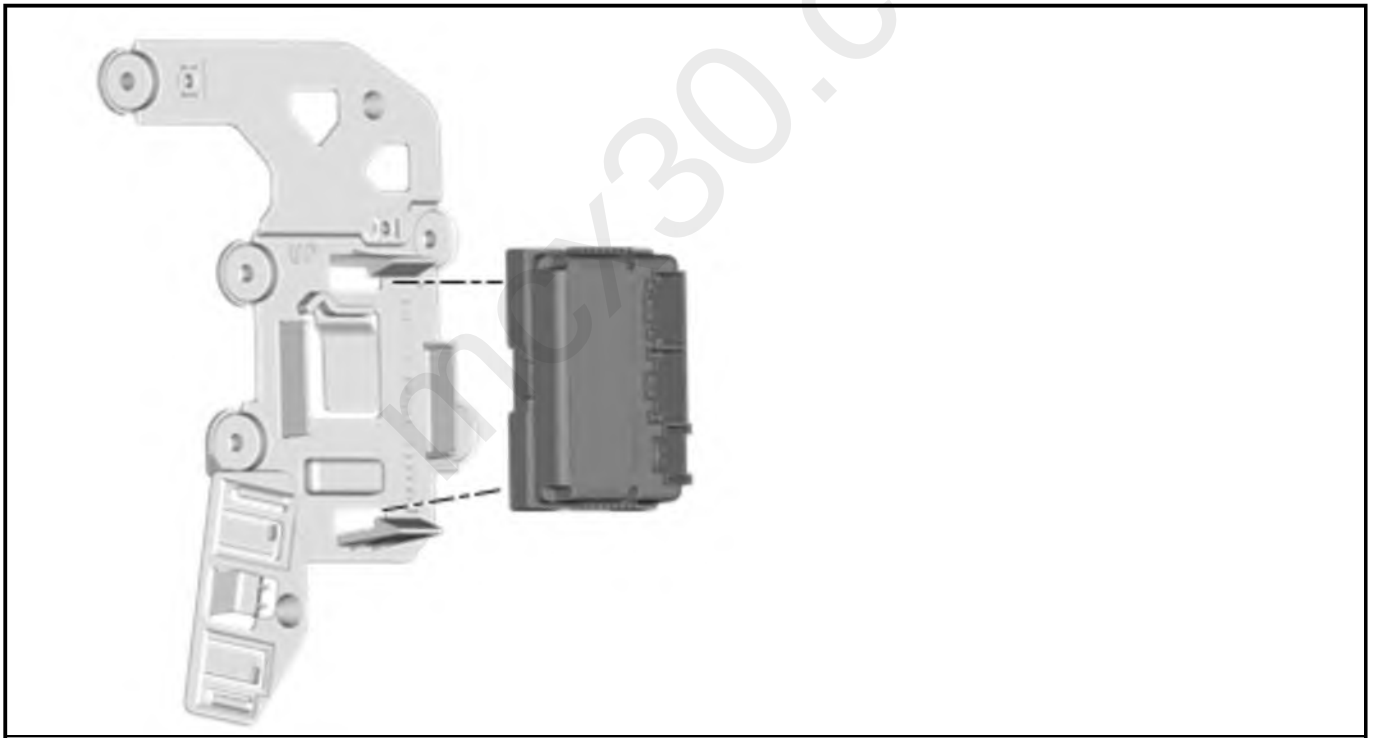
The motor lock is mounted within the transfer case actuator and is replaced with the actuator as an assembly. The transfer case motor lock is used to provide a 2HI, 4HI, and 4LO lock-up feature. When the lock circuit is energized, the transfer case encoder motor is allowed to turn. When the transfer case is placed 2HI, 4HI, or 4LO the motor lock circuit is de-energized and the lock is applied. This assures that the transfer case remains in the current gear position until a new gear position is requested. When AUTO 4WD is selected, the motor lock remains applied until an adaptive mode, torque being applied to the front propshaft, is required. During an adaptive mode the motor lock circuit is energized and the motor lock is released, enabling the encoder motor to turn and apply or release torque at the front propshaft.

Transfer Case Actuator Shaft Position Sensor Assembly



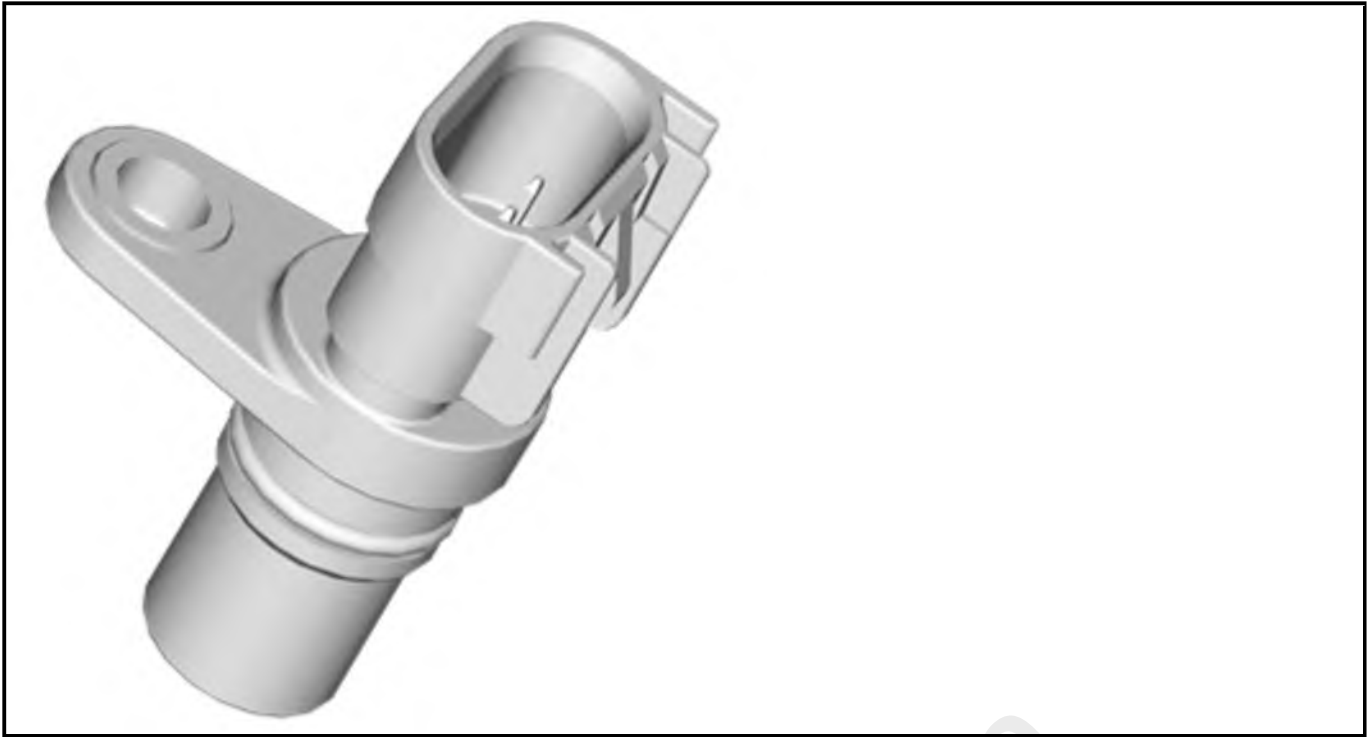
The actuator shaft position sensor works in conjunction with the actuator motor incremental sensor and provides transfer case position (in degrees) to the TCCM.

Transfer Case Shift Control Module



The transfer case shift control module (TCCM) uses the vehicle identification number (VIN) information for calculations based on axle ratio, transmission, tire size, and engine size. For StabiliTrak applications, when the vehicle is in the AUTO 4WD mode, the transfer case shift control module monitors the wheel speed via the four wheel speed sensors in order to detect wheel slippage. For non-StabiliTrak applications, when the vehicle is in the AUTO 4WD mode, the transfer case shift control module monitors the wheel speed via the two front wheel speed sensors and the vehicle speed sensor in order to detect wheel slippage. When wheel slippage is detected, the module applies a clutch pack contained inside the transfer case. This clutch pack is used to lock-in and apply the front propshaft, transferring torque to the front wheels. The clutch pack is applied by a motor/encoder assembly. When slip is no longer detected by the transfer case shift control module, the clutch is no longer applied.

Vehicle Speed Sensor (VSS)



There is a VSS mounted to the transfer case on the rear case half. The VSS is a PM generator. The PM generator produces an AC voltage. The AC voltage and frequency increases as speed increases. The VSS is an input to the powertrain control module (PCM). The PCM sends this information to the transfer case control module via the GM LAN serial data bus.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

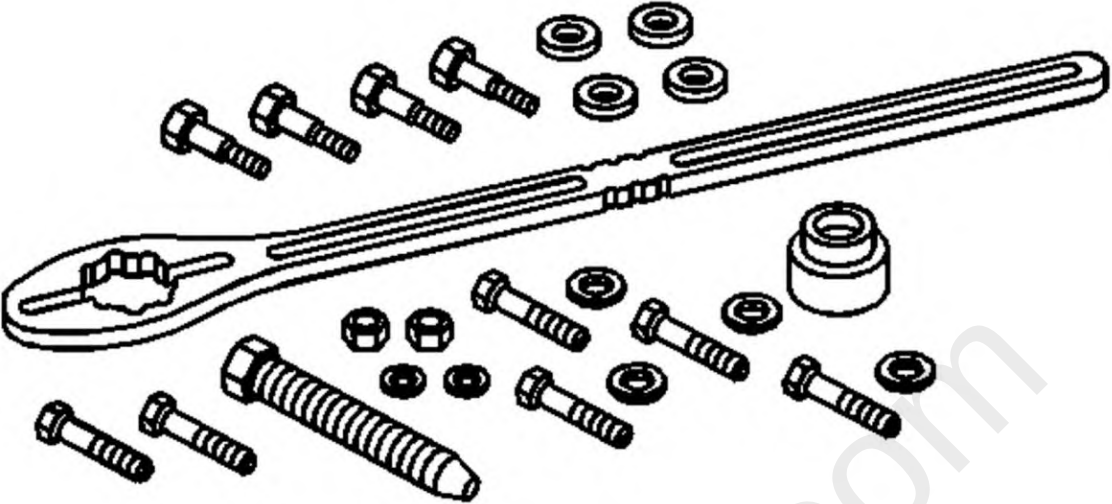
Illustration	Tool Number/Description
	DT-08614-A J-08614-A KM-210-3 7-0004805 Pinion Flange Holder and Remover

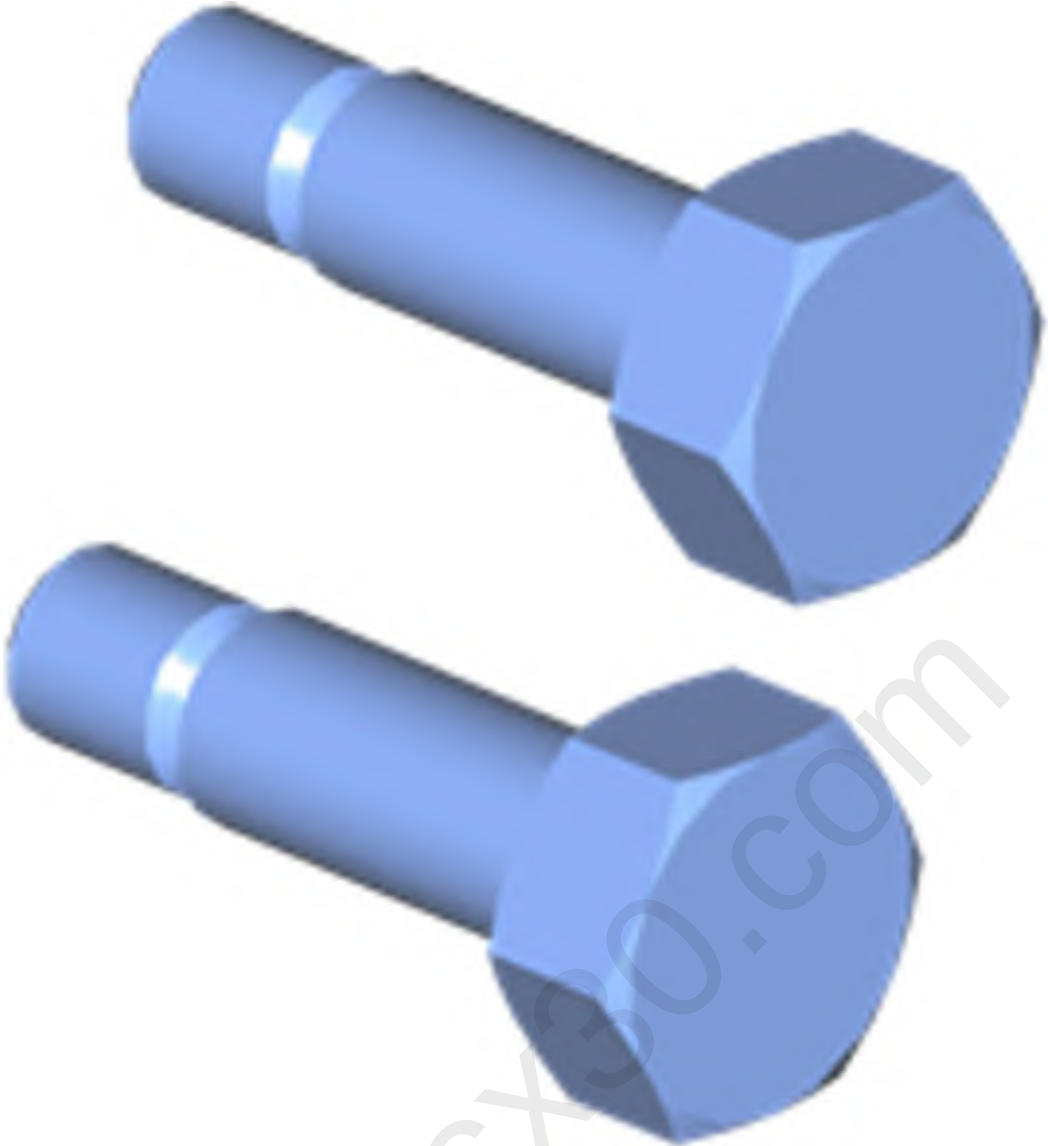
Illustration	Tool Number/Description
 The illustration shows two identical blue hexagonal bolts. Each bolt has a hexagonal head and a cylindrical shaft. A thin silver band is located on the shaft, approximately one-third of the way from the head. The bolts are positioned diagonally, with the top bolt slightly higher and further to the right than the bottom bolt. A large, light gray watermark 'mcx30.com' is oriented diagonally across the entire image area.	DT-08614-20 J-08614-20 Flange Retaining Bolts

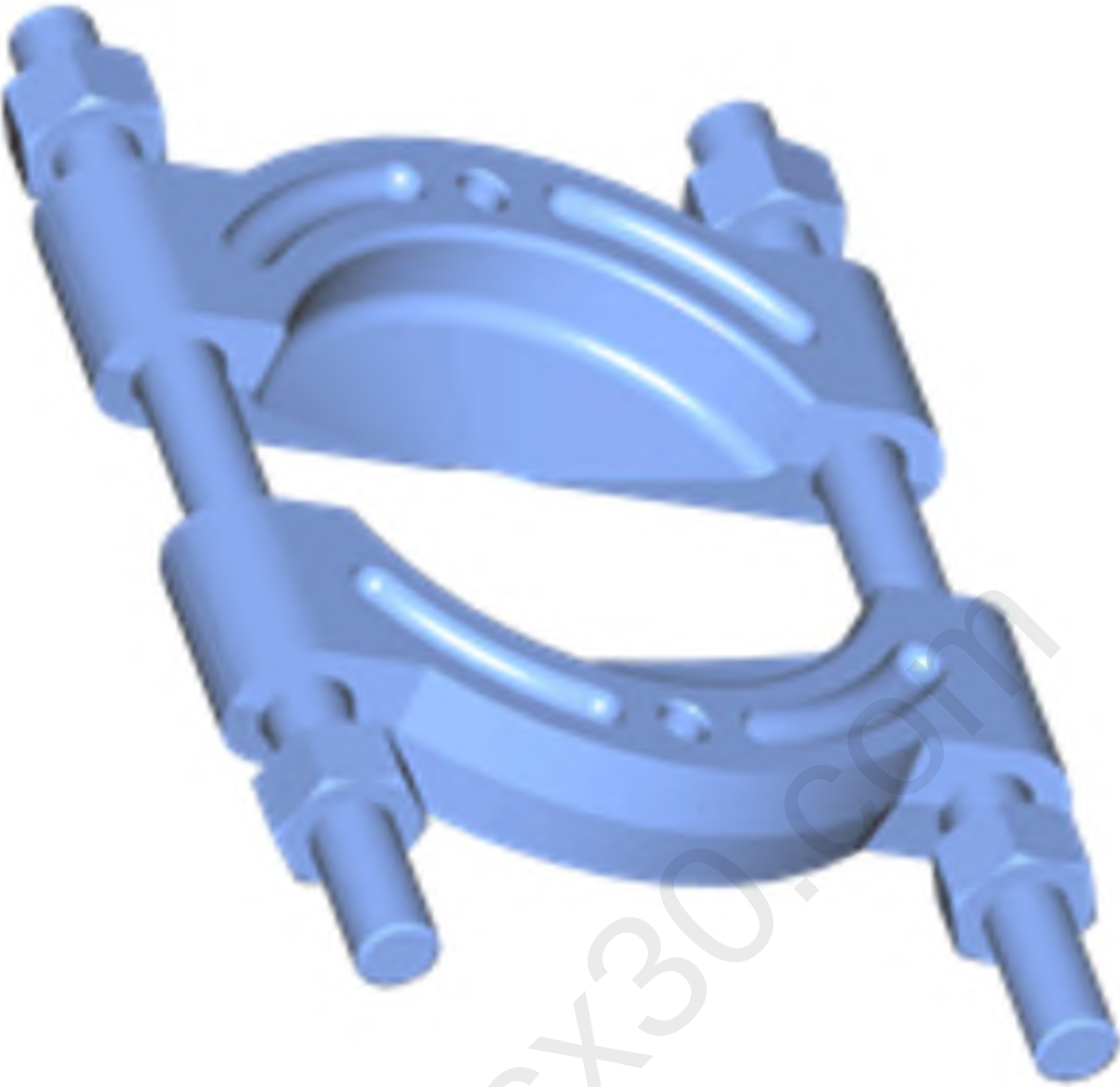
Illustration	Tool Number/Description
	DT-22912-B J-22912-B 6 - 9607356 Split Plate Bearing Puller

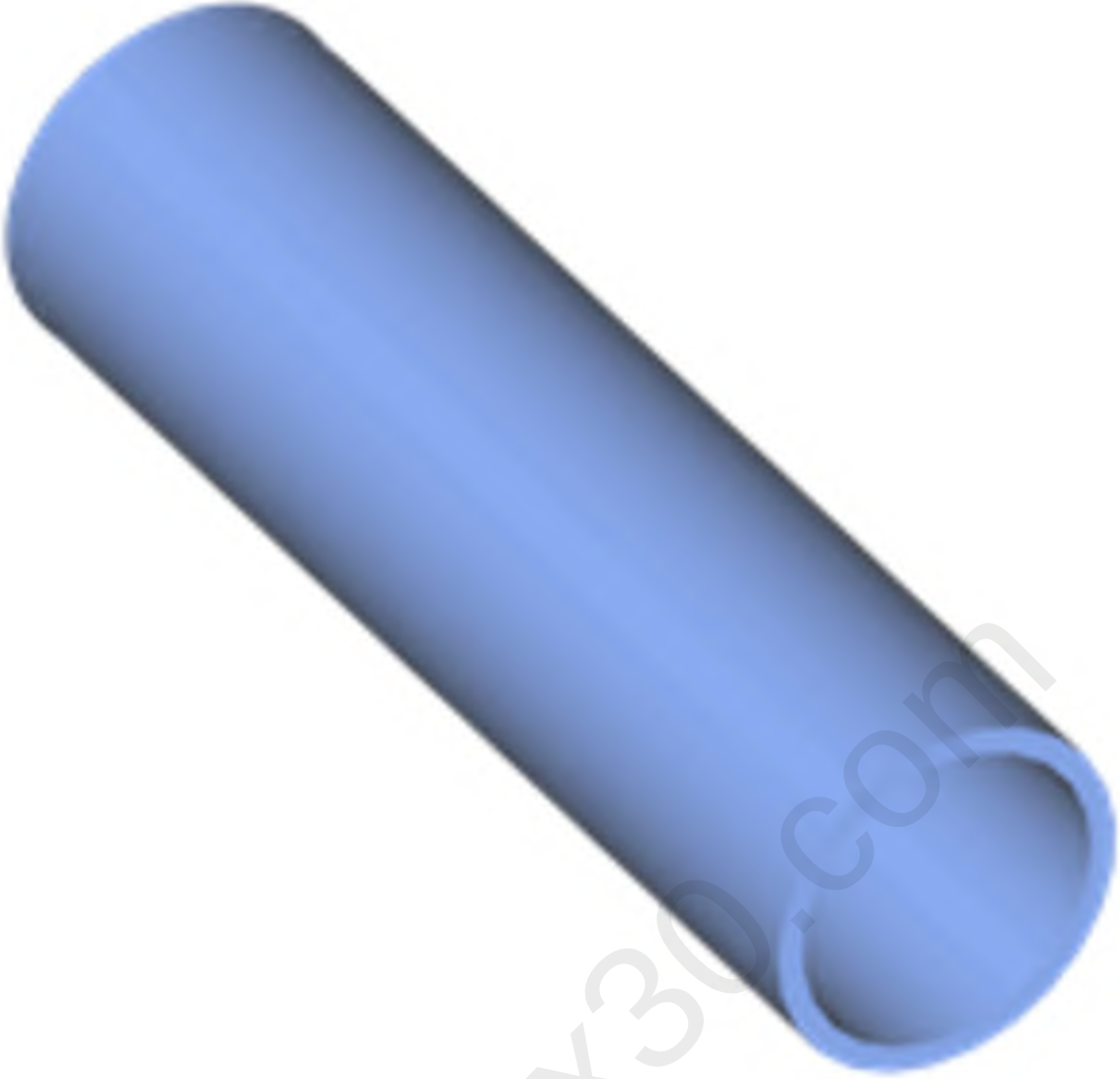
Illustration	Tool Number/Description
	DT-24433 J-24433 Pinion Cone and Side Bearing Installer

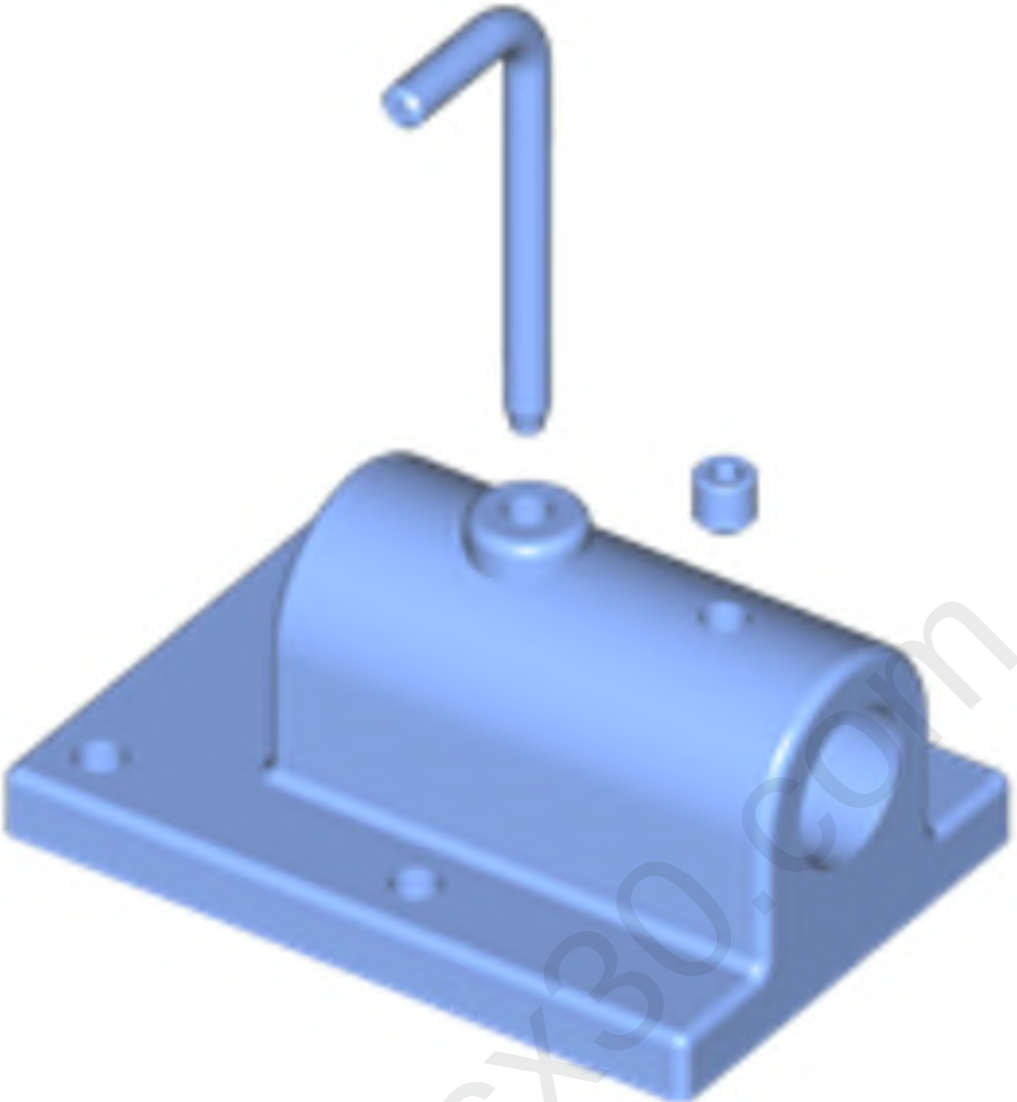
Illustration	Tool Number/Description
	DT-3289 - 20 J-3289-20 Holding Fixture

Illustration	Tool Number/Description
	DT-35512 J-35512 Inner Pinion Bearing Installer

Illustration	Tool Number/Description
 An exploded view diagram of a Transaxle Holding Fixture. The assembly includes two long, flat, rectangular plates with elongated slots and rounded ends. A central cylindrical component is shown with a T-shaped base. Numerous bolts, nuts, and washers are arranged around these components, indicating their assembly points. A large, light gray watermark 'mcx30.com' is diagonally across the image.	DT-36842 J-36842 Transaxle Holding Fixture

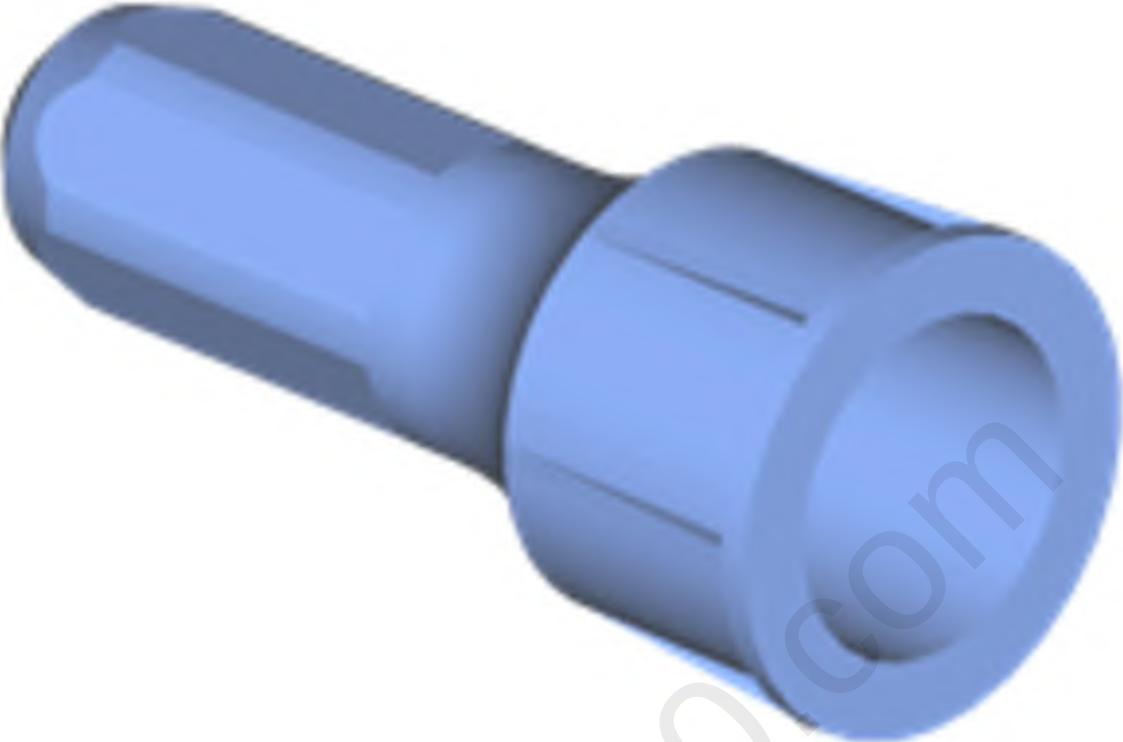
Illustration	Tool Number/Description
 A 3D rendering of a blue, cylindrical seal installer tool. The tool has a hexagonal base and a flared end. A large, light gray watermark 'mcx30.com' is overlaid diagonally across the image.	DT-42738 J-42738 Seal Installer

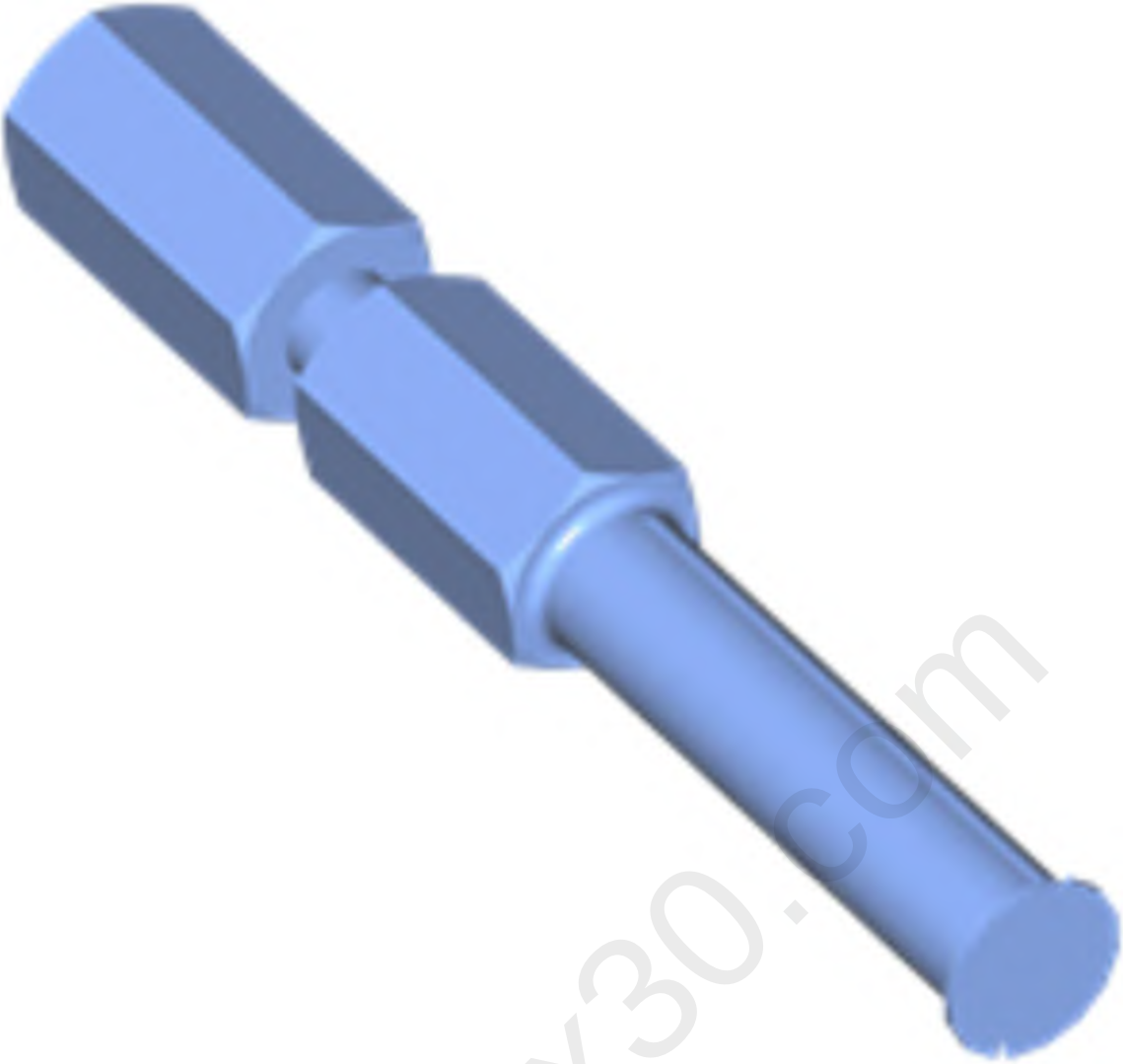
Illustration	Tool Number/Description
	DT-44737 J-44737 Shift Rail Bearing Remover

Illustration	Tool Number/Description
	DT-44907 J-44907 Bearing Installer

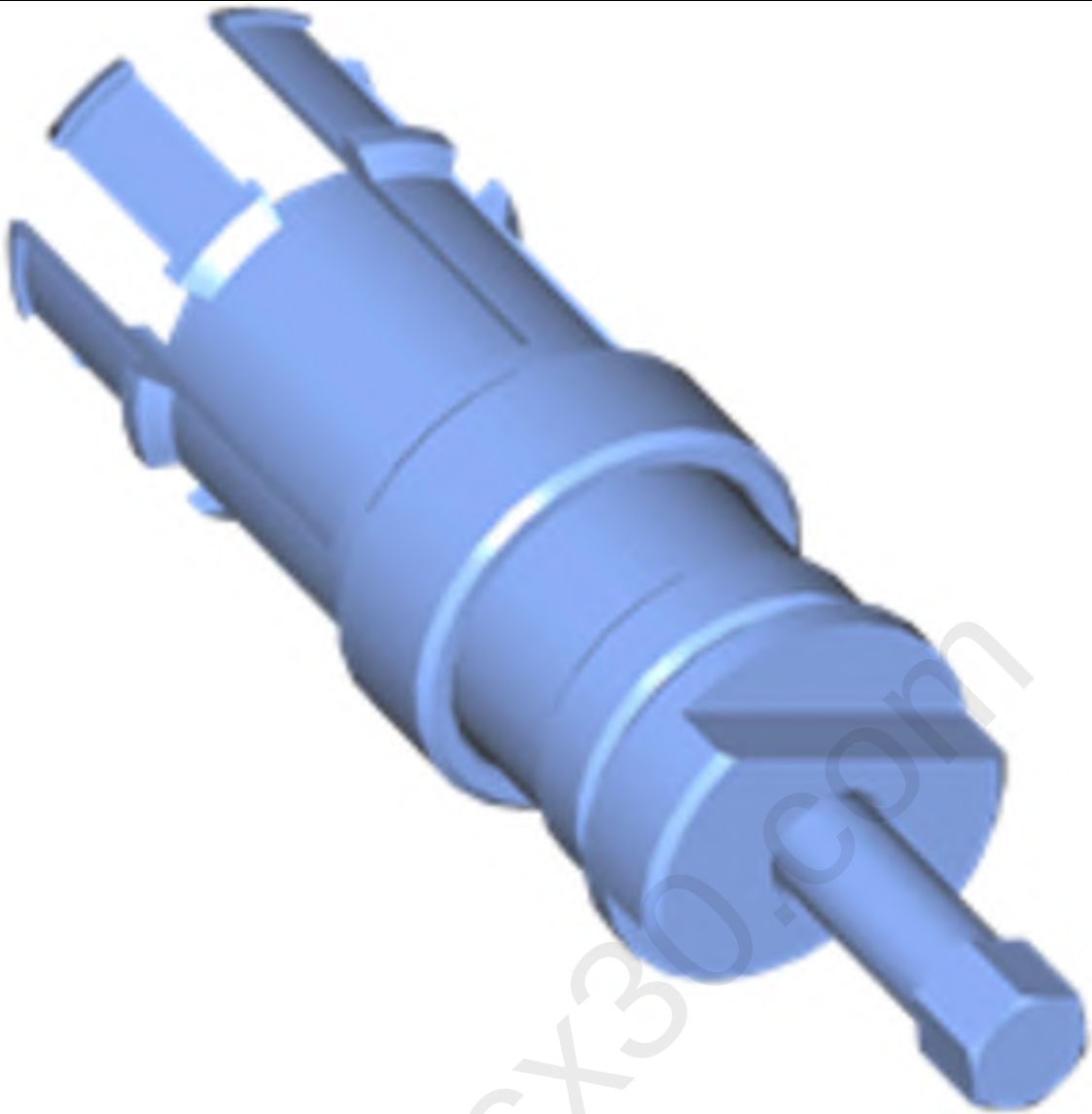
Illustration	Tool Number/Description
	DT-45380 J-45380 Transfer Case Rear Bushing Remover and Installer

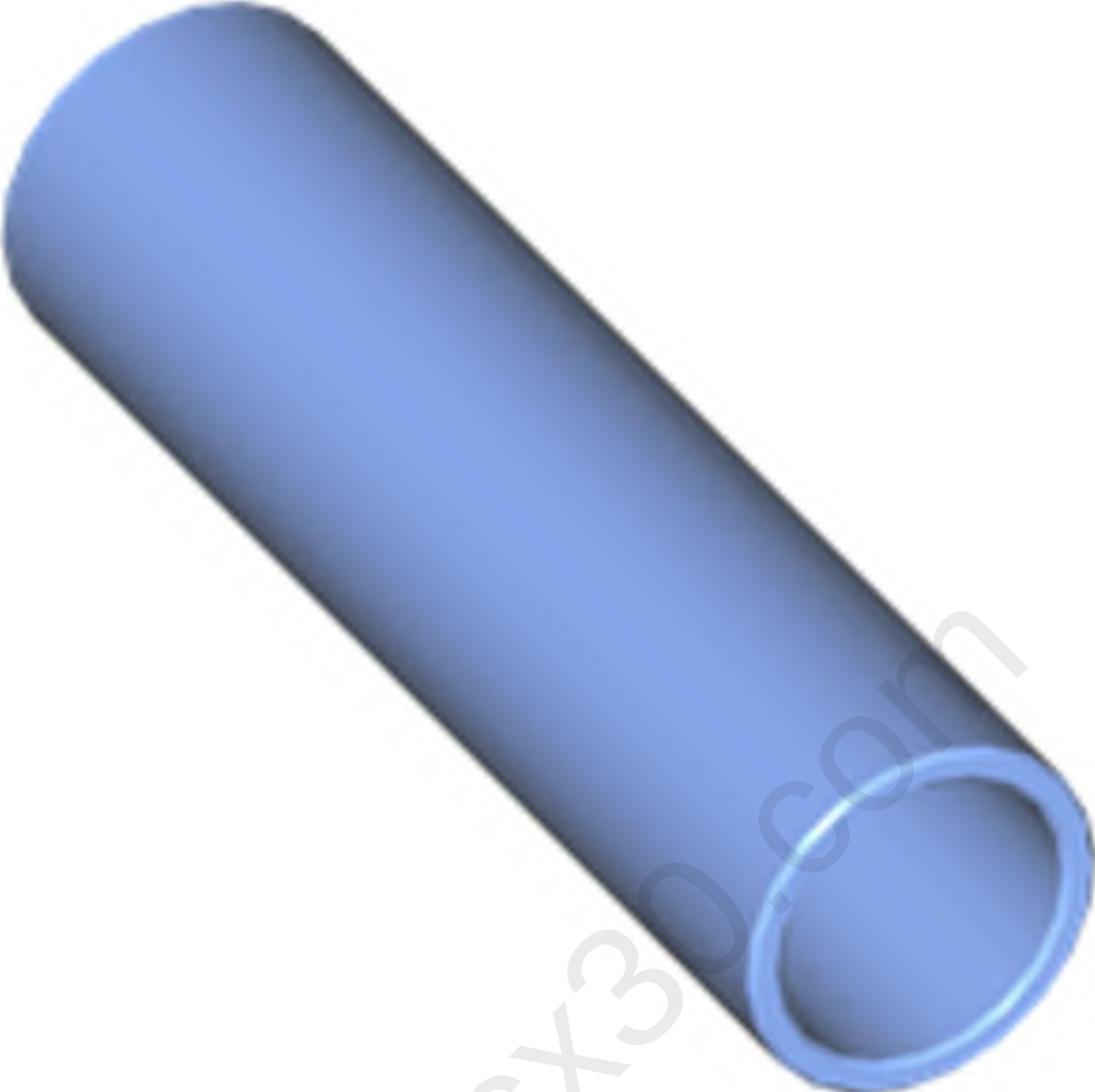
Illustration	Tool Number/Description
	DT-46496 Bearing Installer

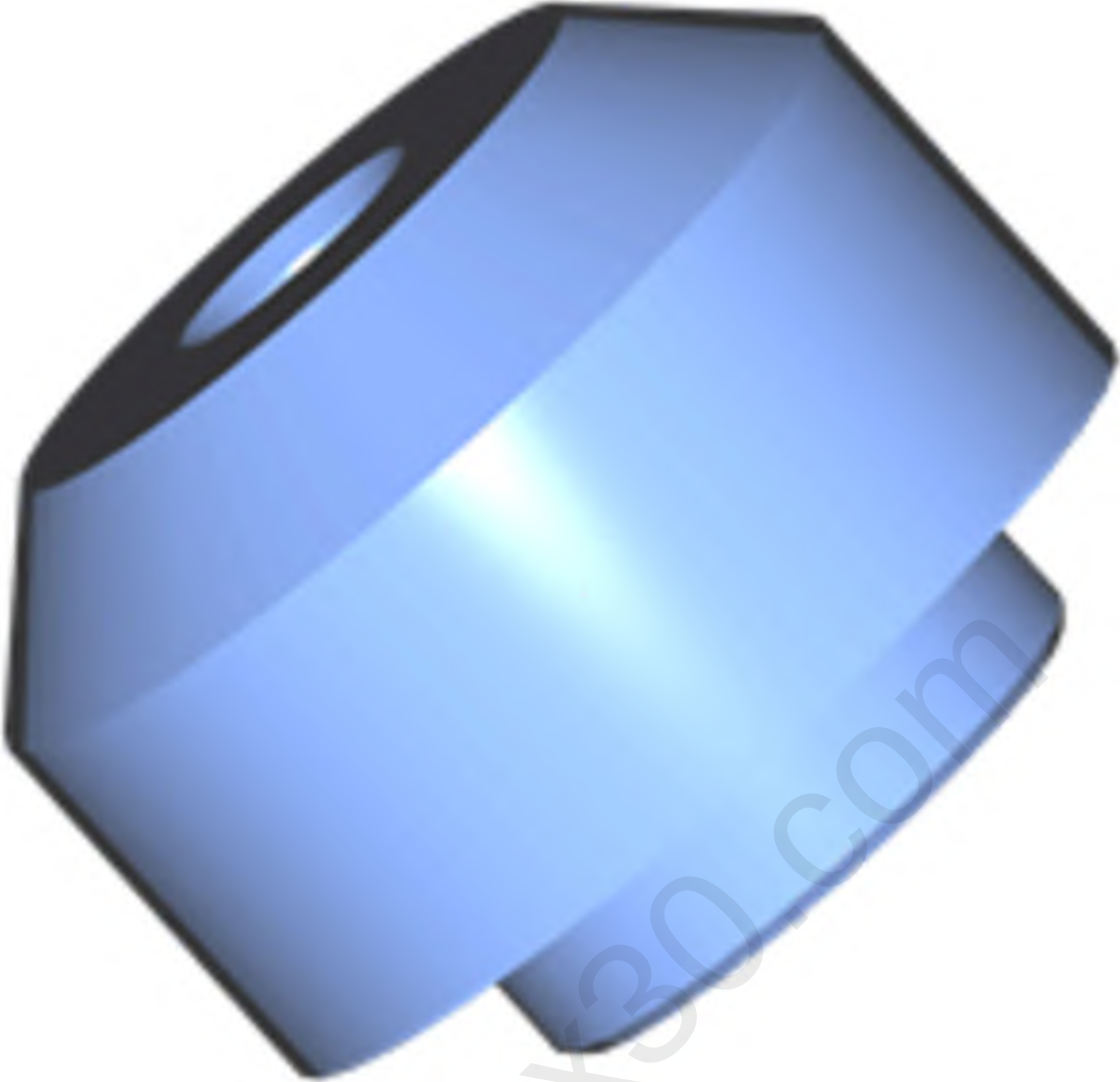
Illustration	Tool Number/Description
	DT-48021 Seal Installer

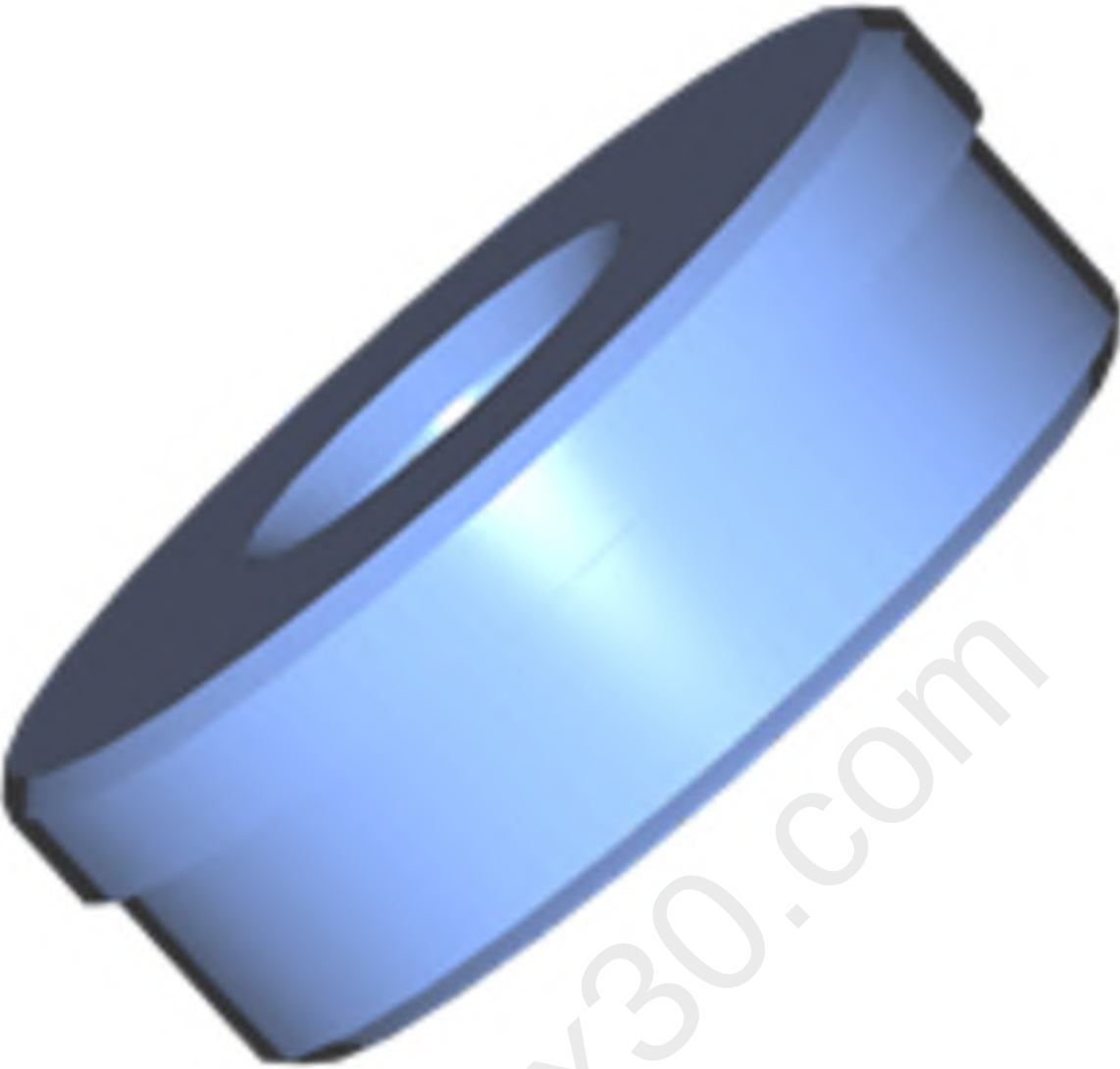
Illustration	Tool Number/Description
	DT-48209 Bushing Remover

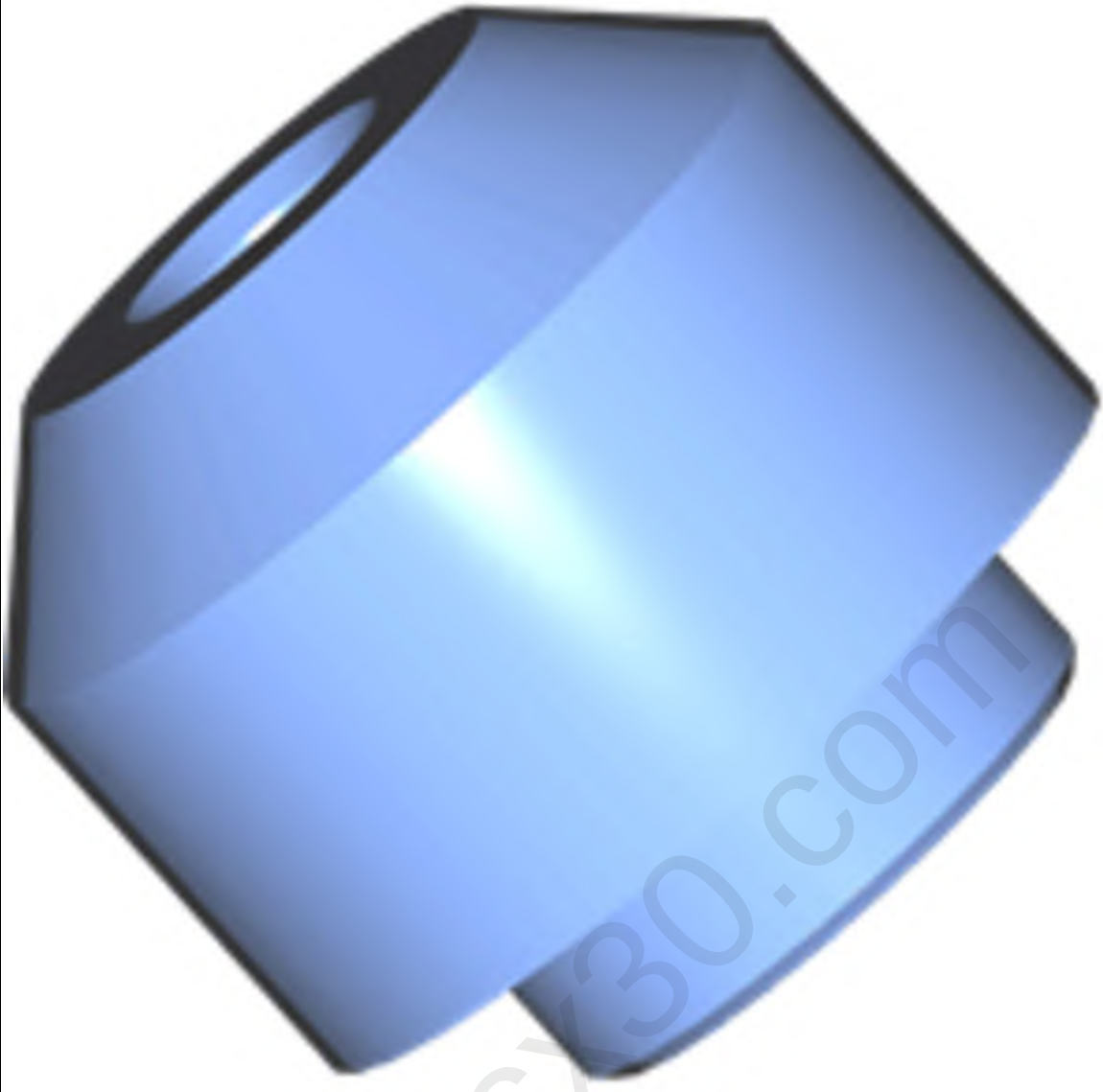
Illustration	Tool Number/Description
	DT-48210 Seal Installer

Illustration	Tool Number/Description
	DT-48211 Drive Sprocket Bearing Installer

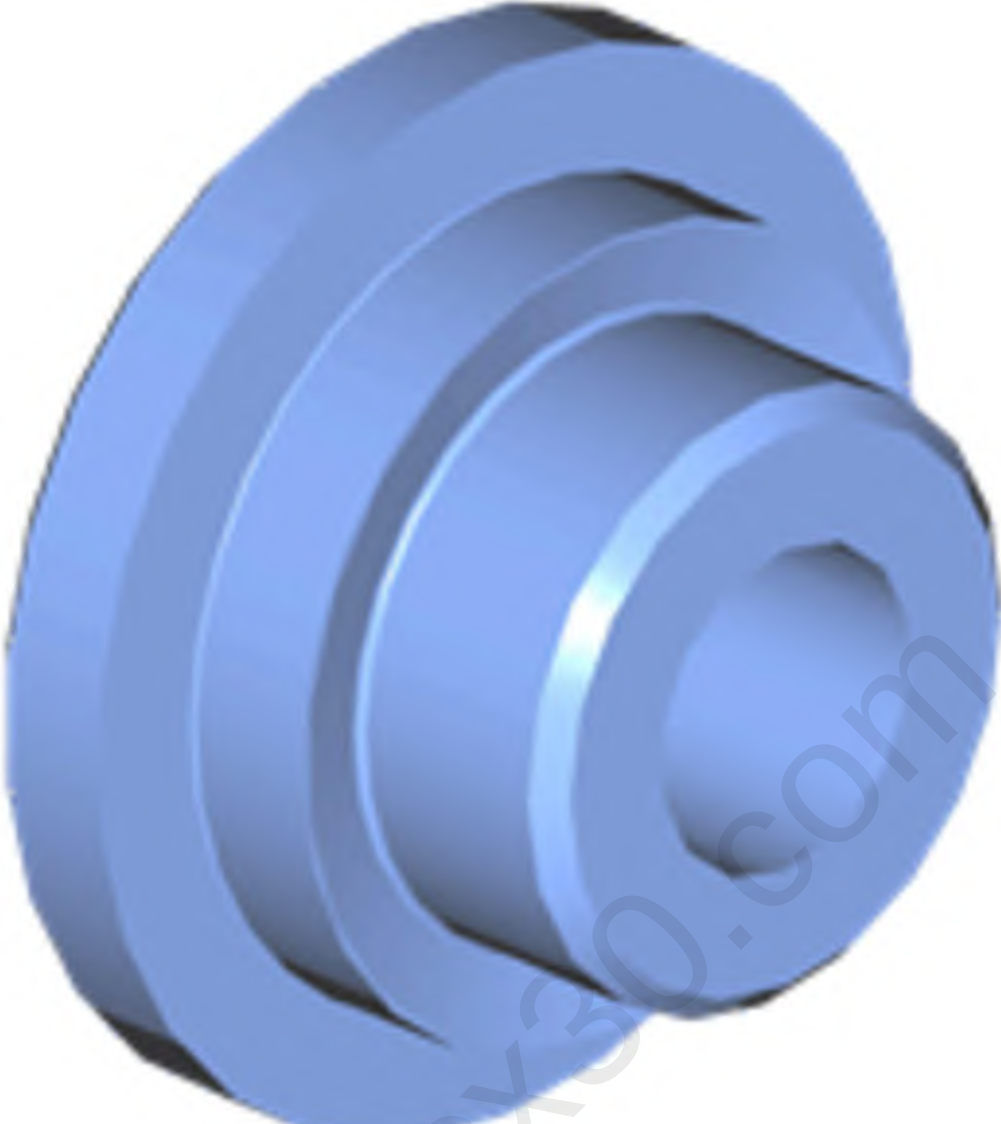
Illustration	Tool Number/Description
	DT-48212 Input Shaft Pilot Bearing Installer

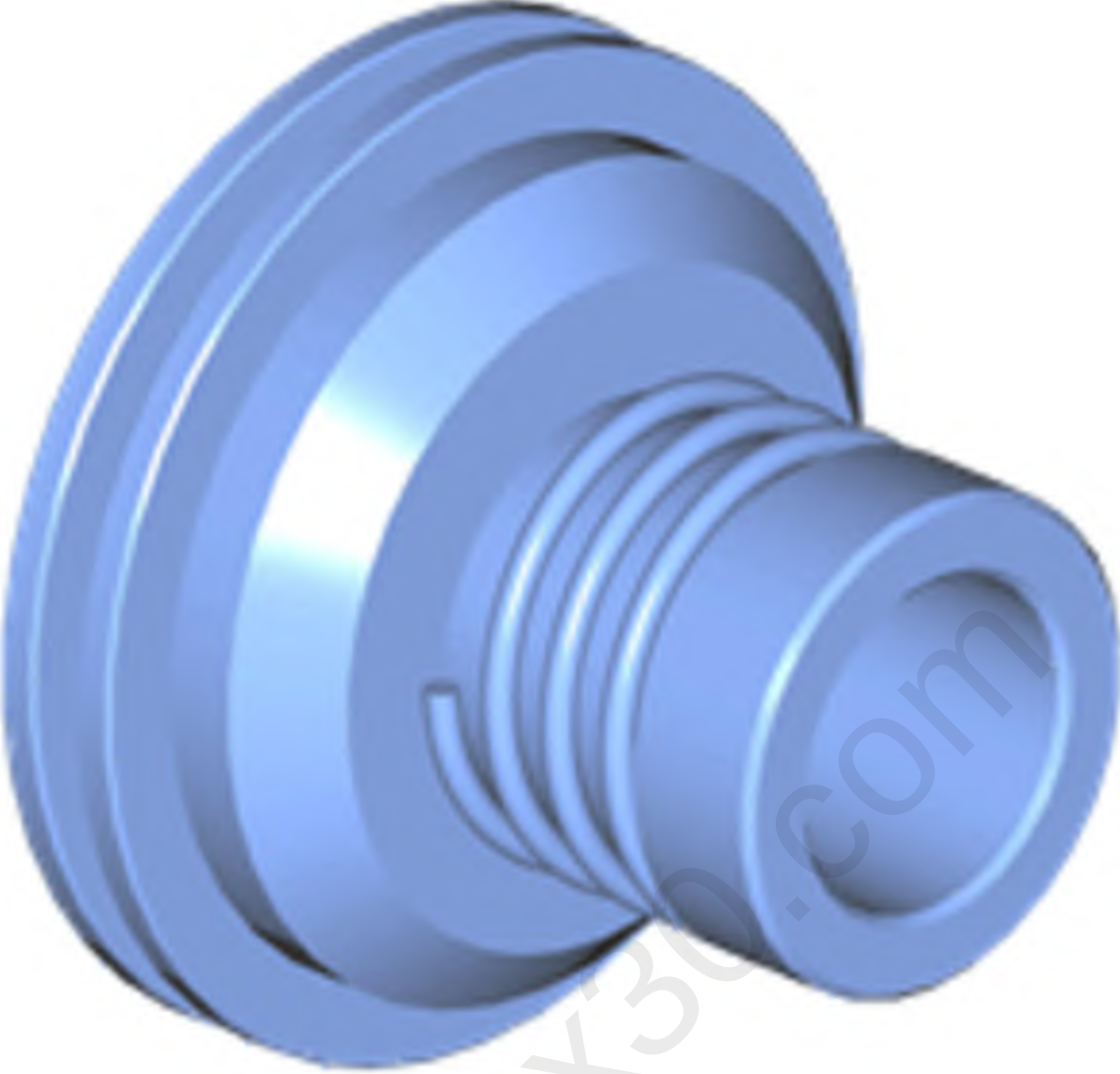
Illustration	Tool Number/Description
	DT-48213 Clutch Pack Height Gauge

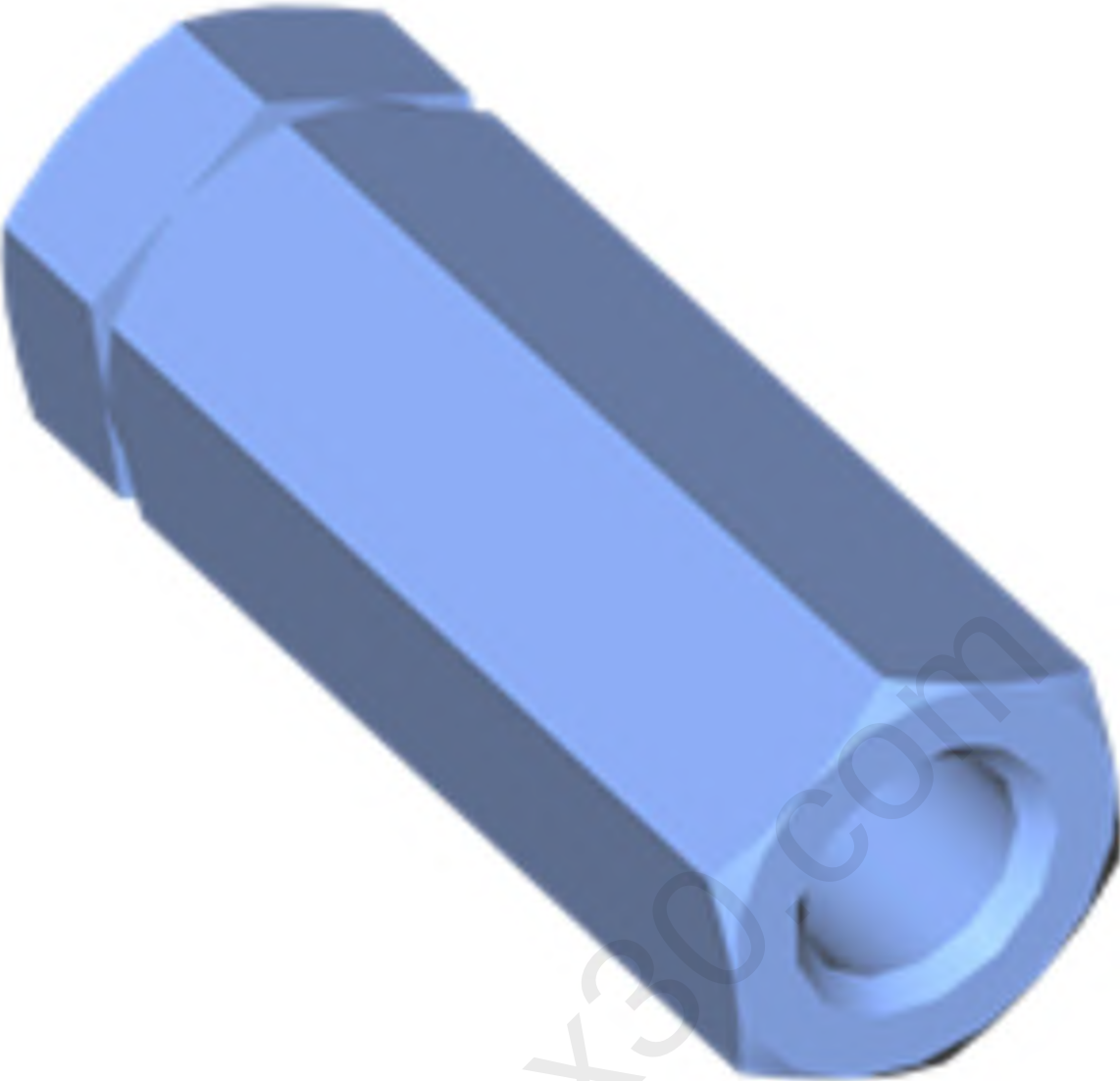
Illustration	Tool Number/Description
	DT-49308 Stud Remover and Installer

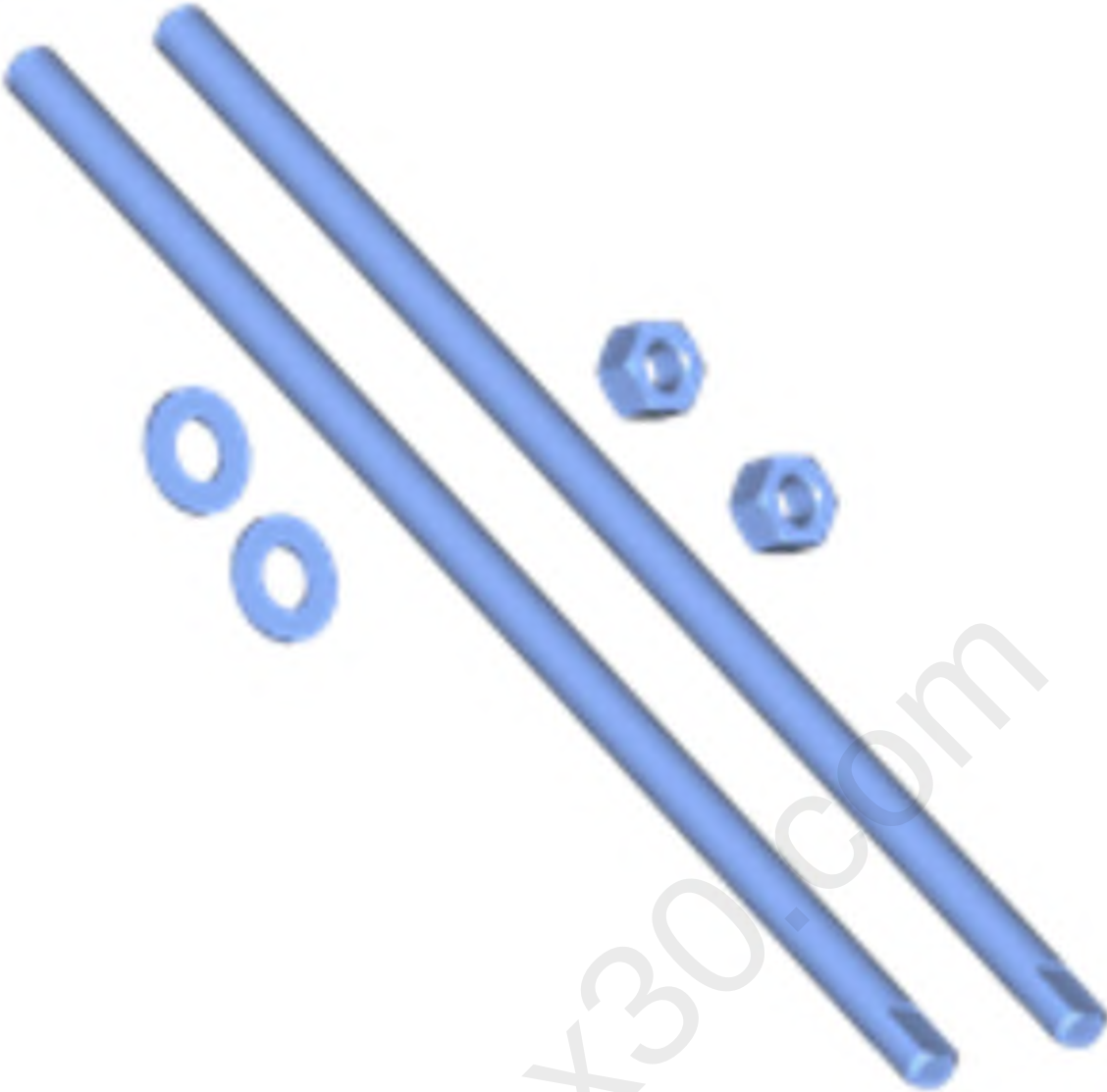
Illustration	Tool Number/Description
 The illustration shows two long, blue cylindrical rods with a hexagonal hole at one end. Accompanying the rods are two blue hexagonal nuts and two blue circular washers. The items are arranged on a white background. A large, light gray watermark 'mcx30.com' is visible diagonally across the image.	DT-50315 Hardware Kit

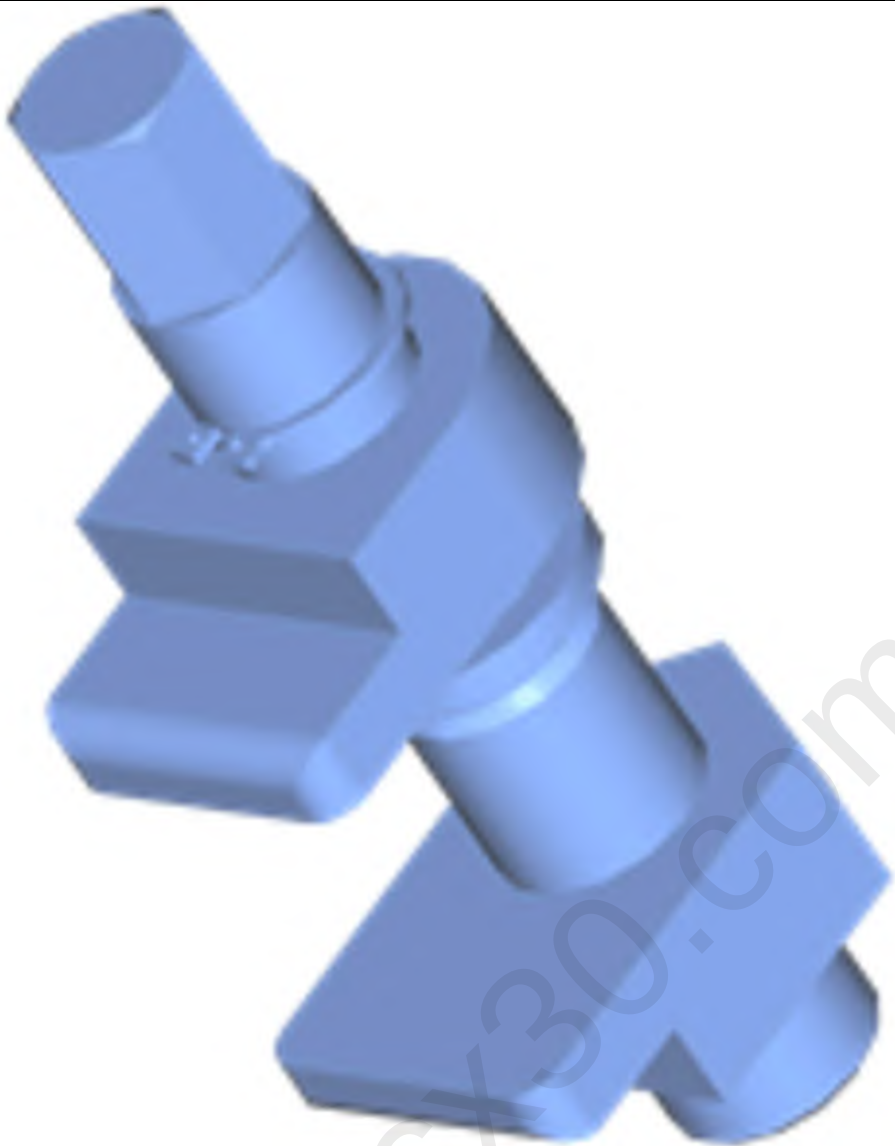
Illustration	Tool Number/Description
	DT-50228 Transfer Case Housing Seperator

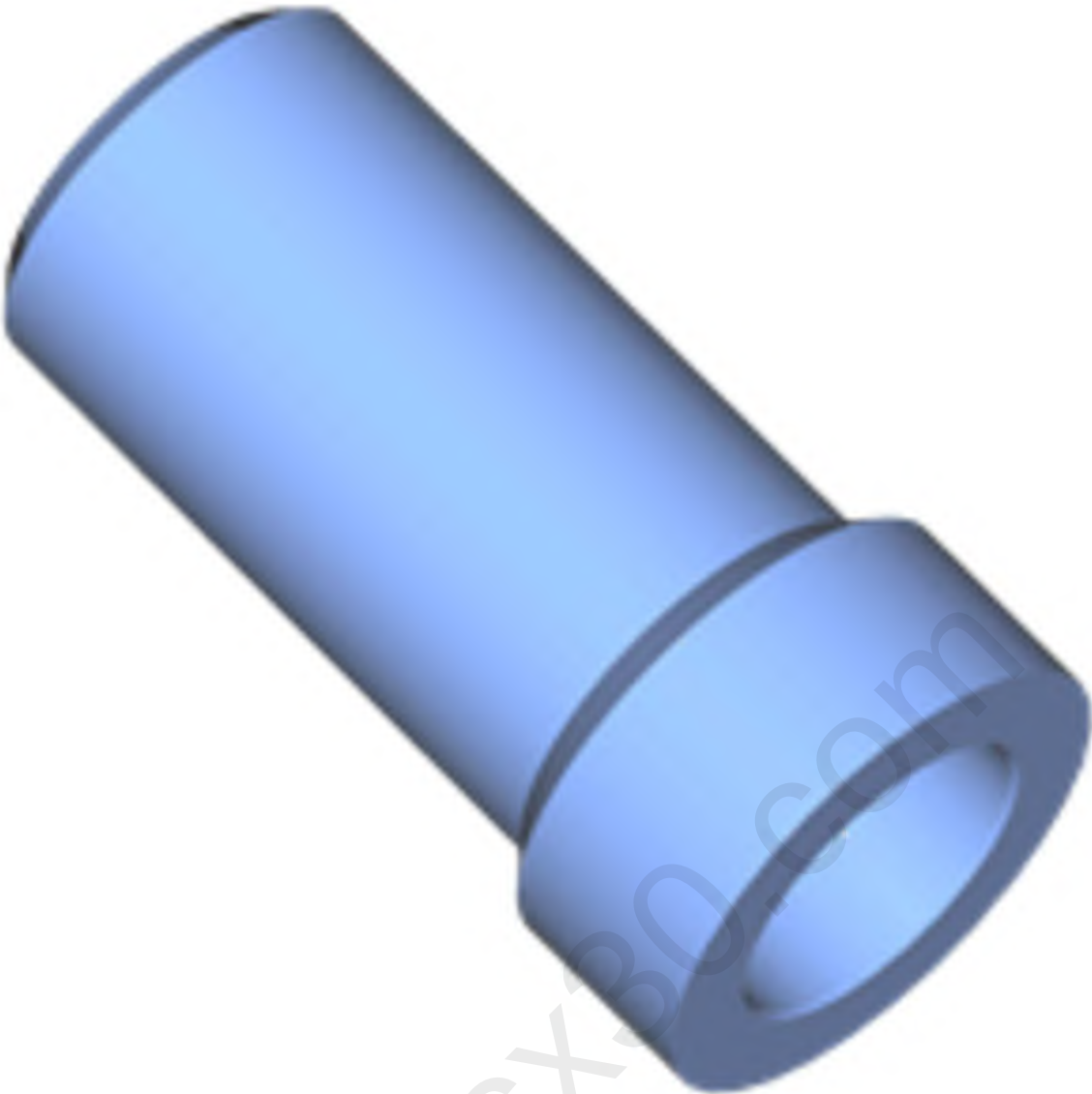
Illustration	Tool Number/Description
	DT-50648 - A Case Seal Installer

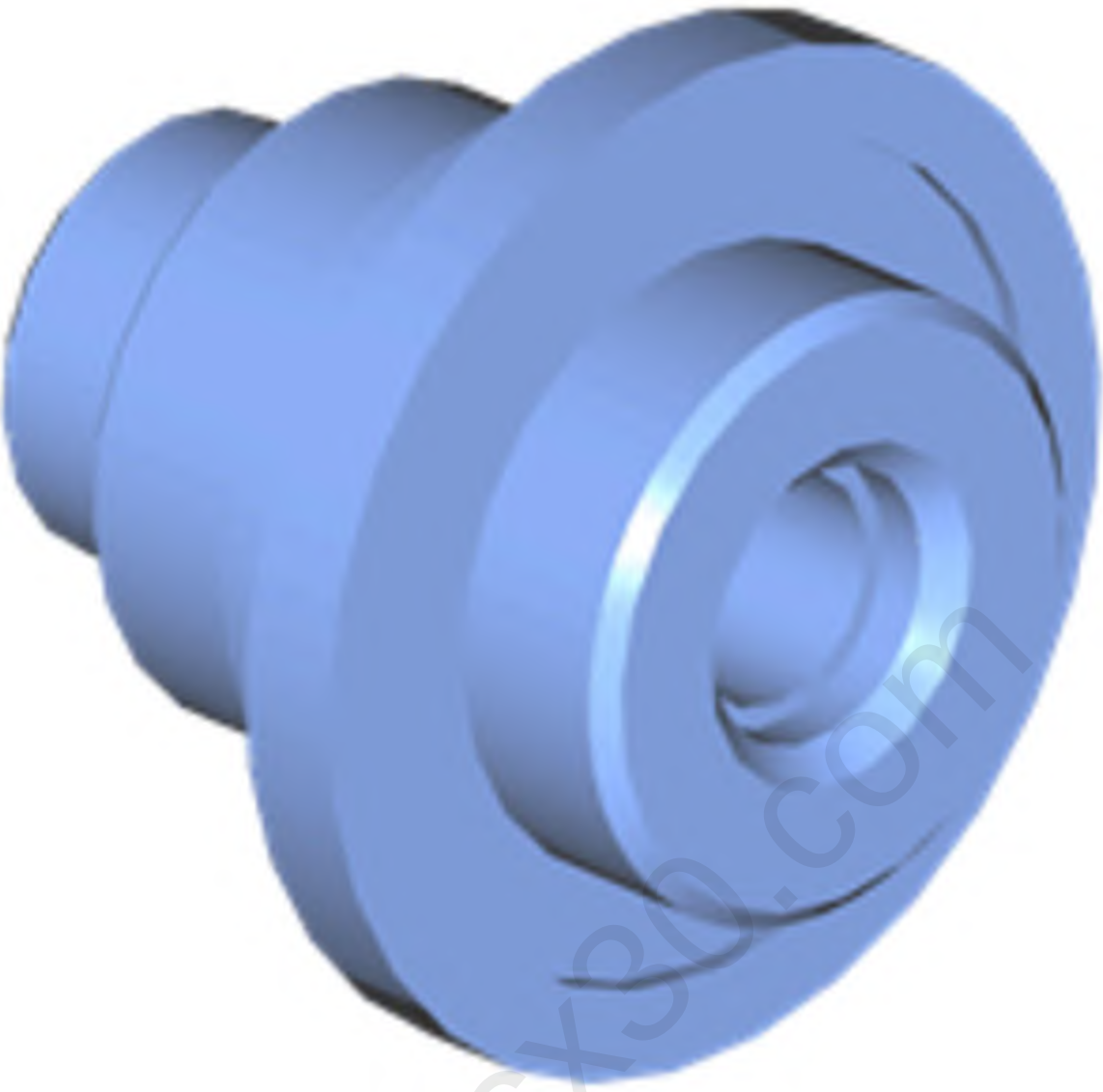
Illustration	Tool Number/Description
	DT-51336 Front Output Shaft Rear Bearing Installer

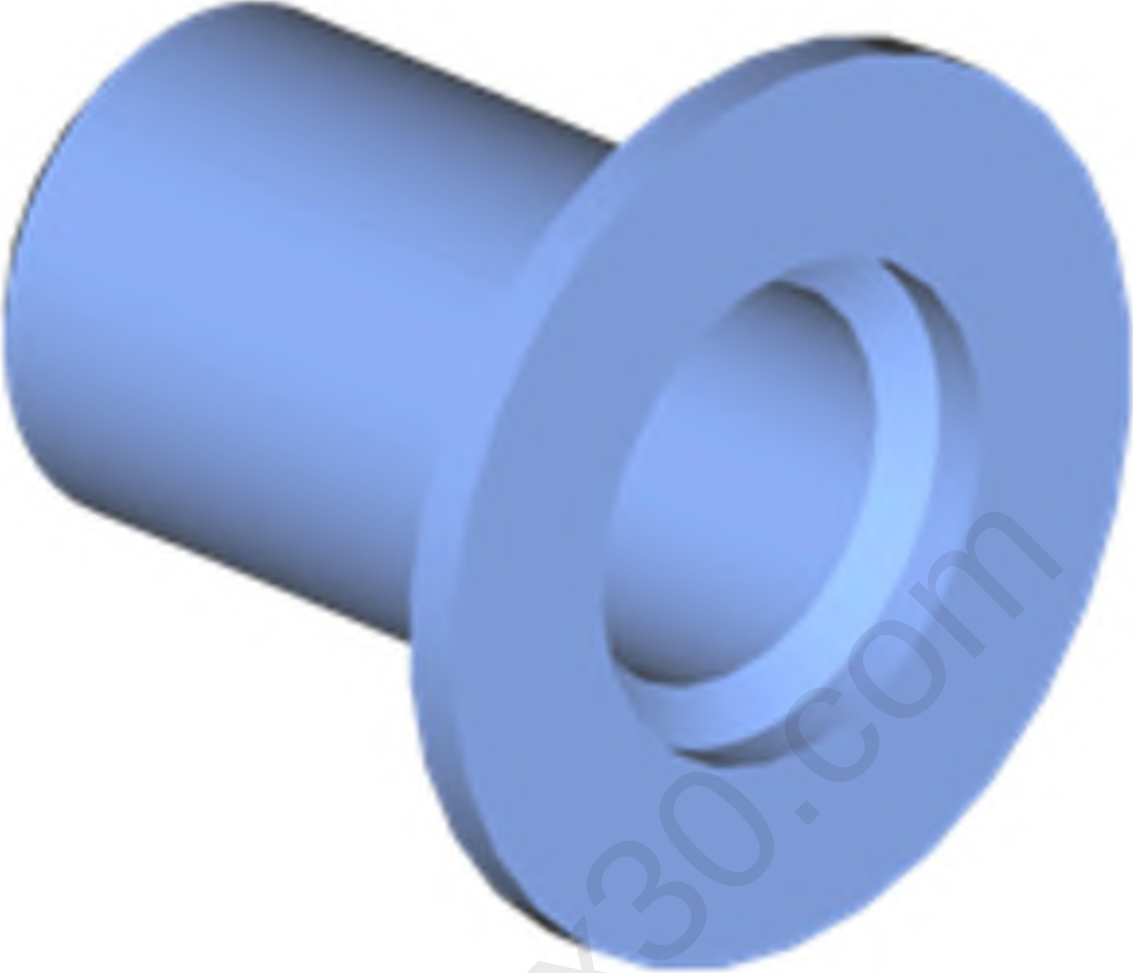
Illustration	Tool Number/Description
	DT-51592 Front Output Shaft Seal Installer

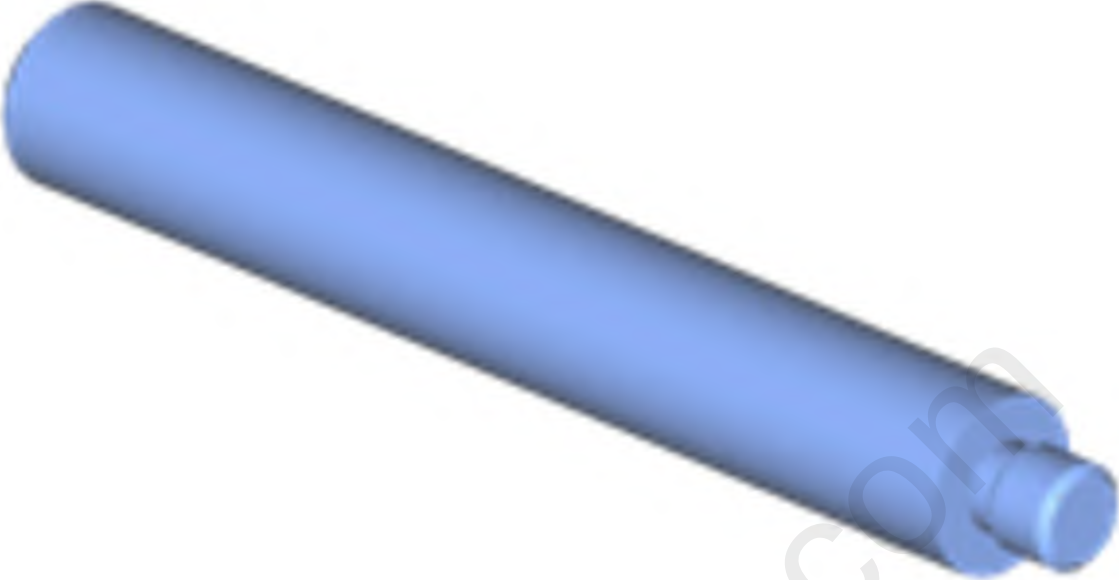
Illustration	Tool Number/Description
 A 3D rendering of a blue cylindrical driver handle. The handle is oriented diagonally from the top-left towards the bottom-right. At the bottom-right end, there is a hexagonal base. The entire handle has a smooth, metallic blue finish. A large, light gray watermark 'mcx30.com' is visible across the lower half of the image.	GE-8092 J-8092 Driver Handle

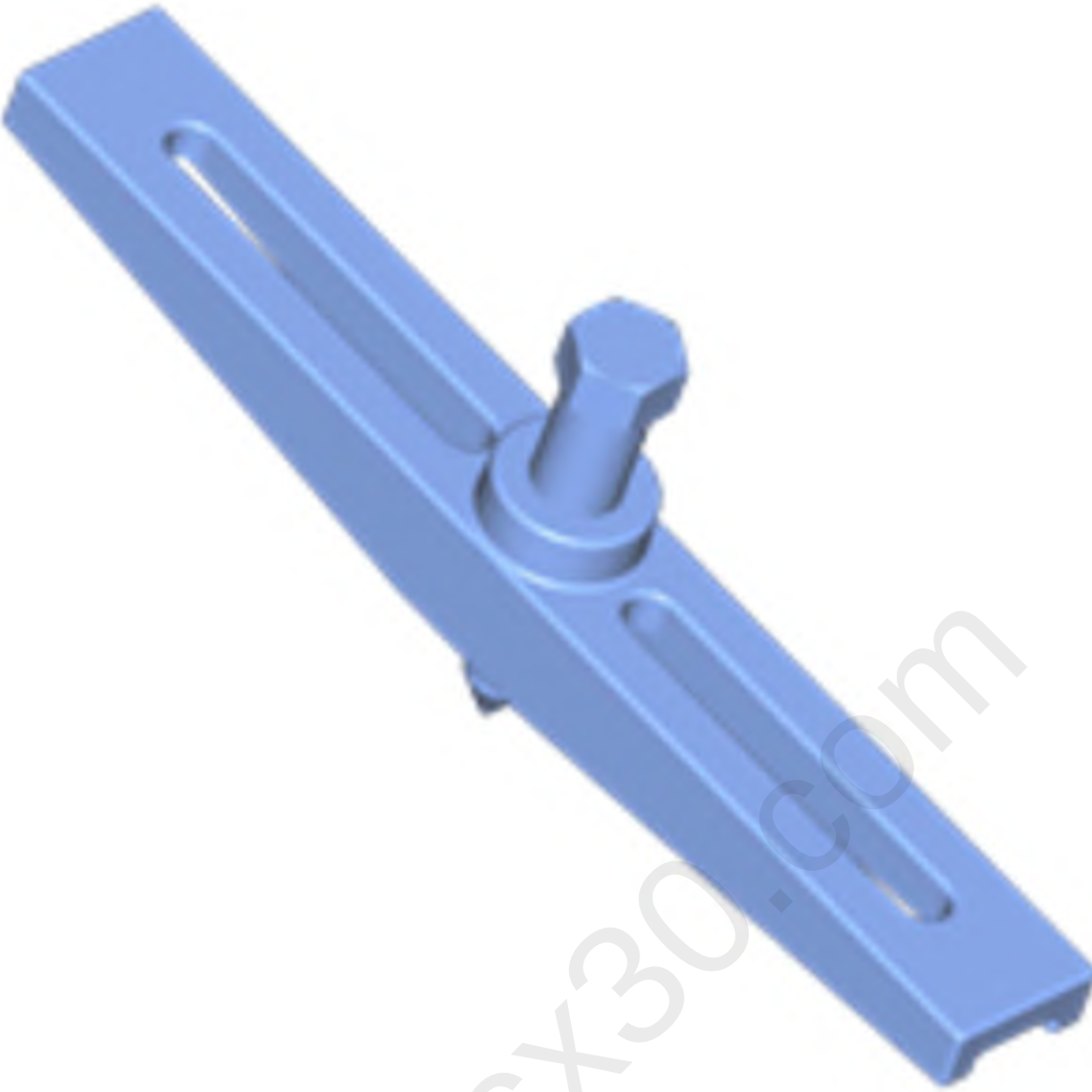
Illustration	Tool Number/Description
	GE-8433 - 1 J-8433 Two Jaw Puller

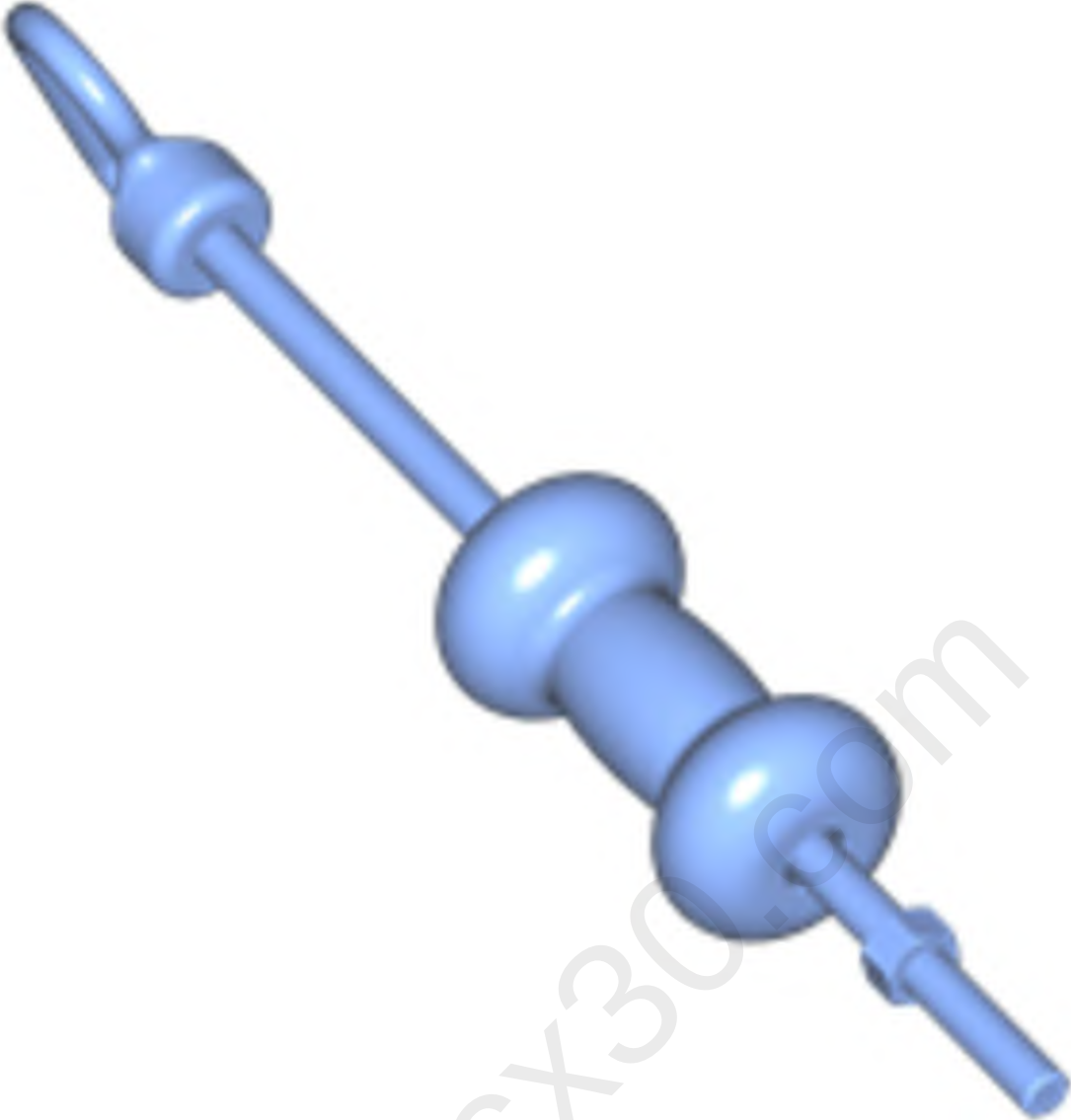
Illustration	Tool Number/Description
	GE-02619 - 01 J-02619-01 Slide Hammer

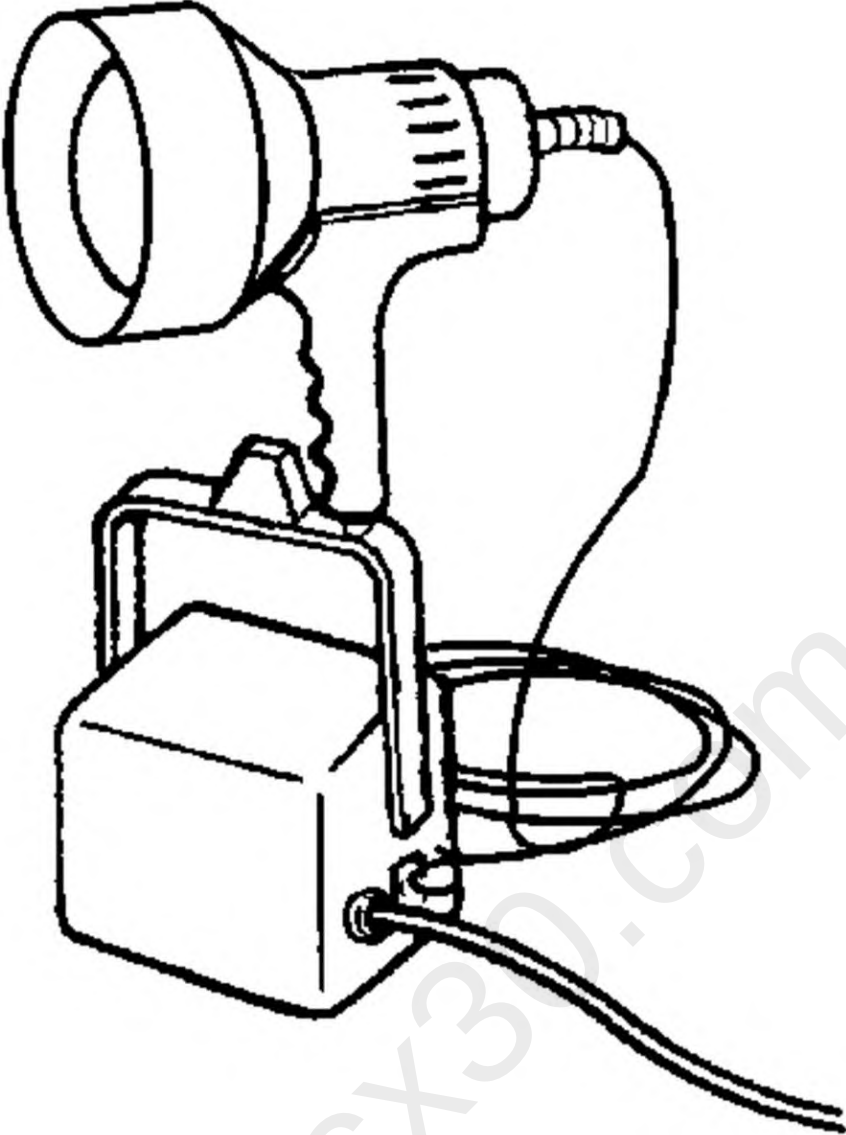
Illustration	Tool Number/Description
	GE-28428 - E J-28428 - E High Intensity Black Light Kit

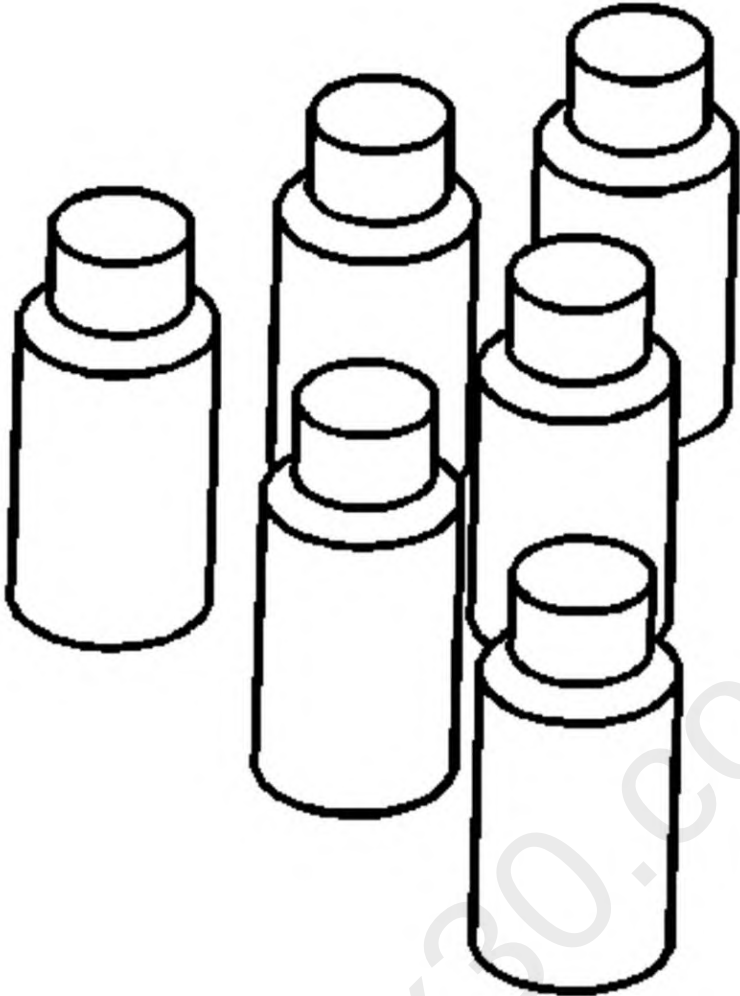
Illustration	Tool Number/Description
	GE-28431 - 6 J-28431 - 6 Fluorescent Oil Dye

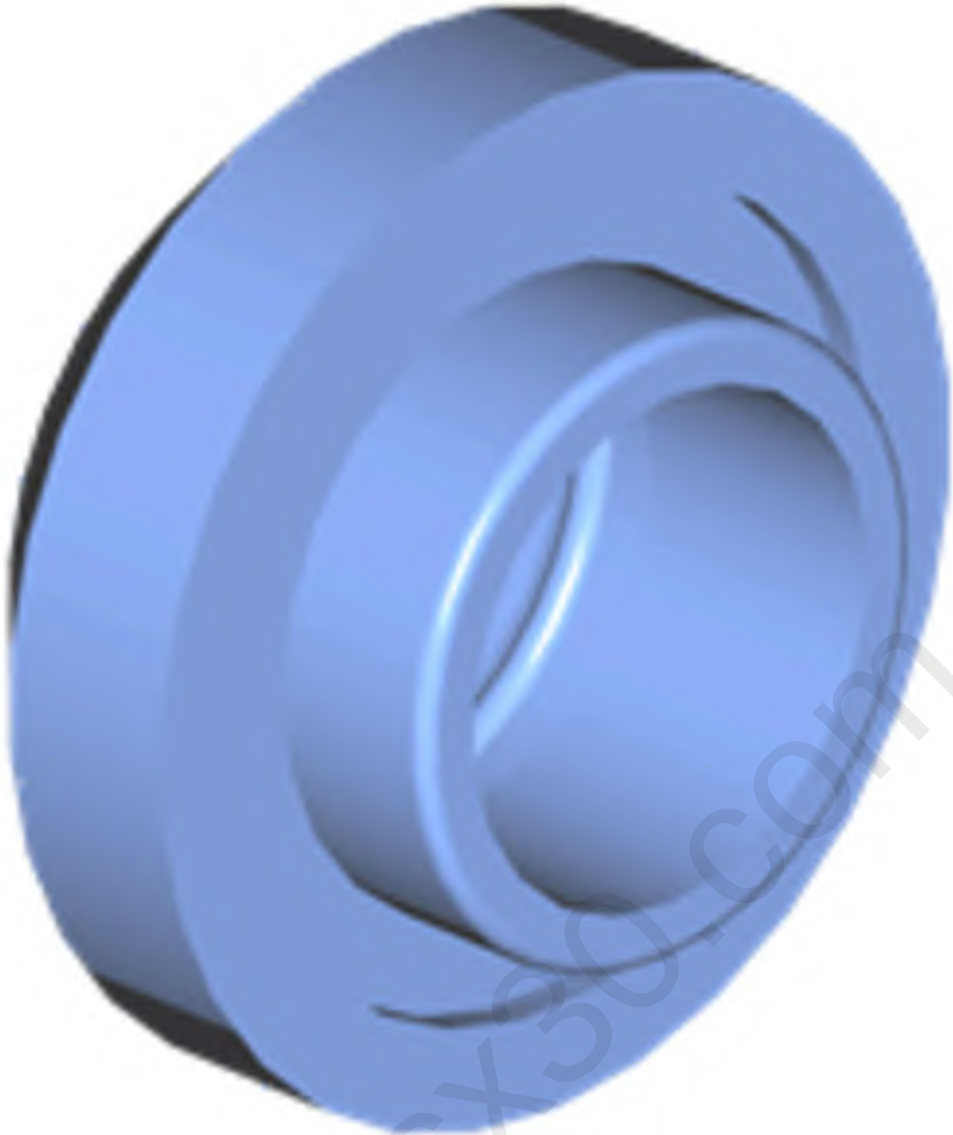
Illustration	Tool Number/Description
	J-36366 - A Pinion Oil Seal Installer

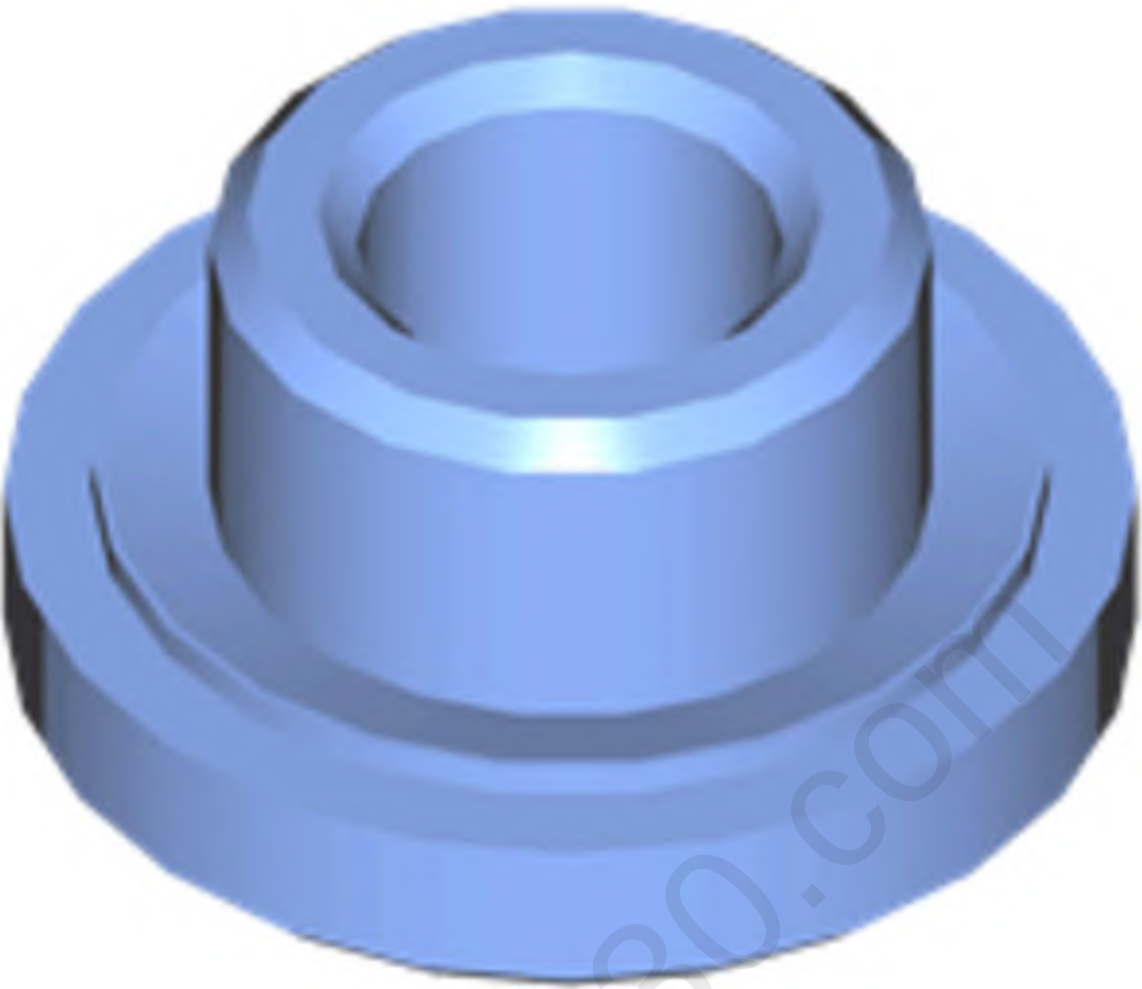
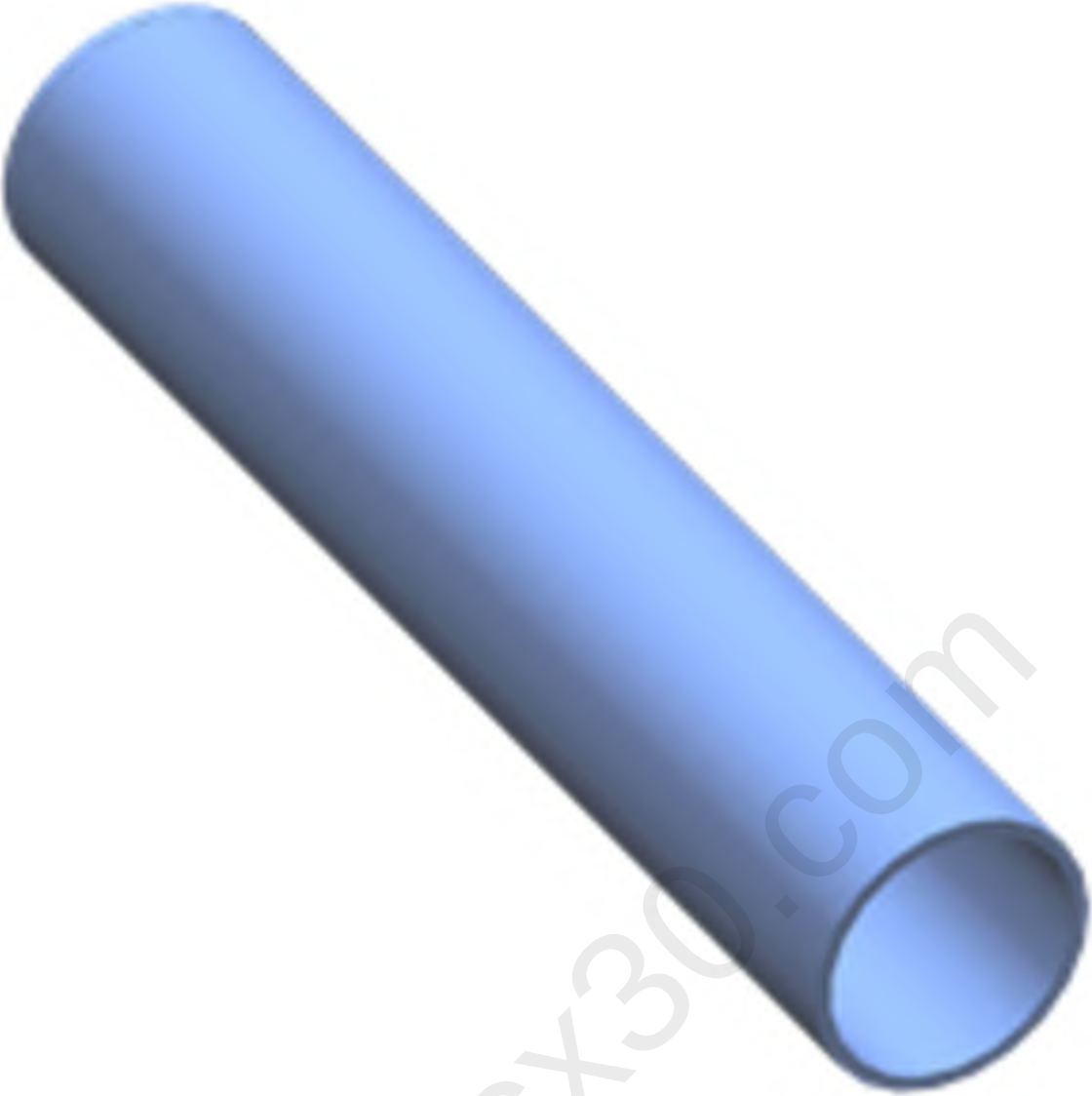
Illustration	Tool Number/Description
	J-36372 Input Sun Gear Needle Bearing Installer

Illustration	Tool Number/Description
 A 3D rendering of a blue cylindrical tool, likely a bearing installer, shown at an angle. The tool is a hollow cylinder with a smooth surface. A large, light gray watermark "mcx30.com" is diagonally across the image.	J-41736 Bearing Installer